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Program Environmental Impact Report for the Lower Putah Creek Restoration Project – Upper Reach Program

Solano County Water Agency

yolo basin foundation

California Department of Fish & Wildlife

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GLOSSARY

Alluvial – Composed of loose or unconsolidated sediments, which have been eroded, reshaped by water in some form, and re-deposited in a non-marine setting. An **alluvial stream** is a stream in which the bed and banks are made up of mobile sediment and/or soil.

Active channel – A feature in an alluvial stream formed by prevailing discharges; its upper limit is defined by a break in the relatively steep bank slope of the channel to a more gently sloping surface beyond the channel edge.

Armoring – The formation of an erosion resistant layer of rocks or gravel on the surface of a stream bed.

Bank – The sloping margin of a natural, stream-formed, alluvial channel that confines discharge during non-flood flows.

Bar – An in-channel depositional feature formed of relatively coarse bed sediments, typically in coarse sand through cobbles sizes, that is generally deposited during the recession of high flow events and is mostly exposed during periods of low flow; the upper surface elevations of bars in perennial streams are typically equivalent to a stage of about 40-percent flow duration.

Channel – A natural, or constructed, passageway or depression of perceptible linear extent containing continuously or periodically flowing water and sediment, or connecting two bodies of water.

Channel Capacity – The maximum amount of flow that a channel can transport within its banks.

Channel cross section – A sectional view of a stream channel, formed by a plane cutting through the stream and its banks, usually at right angles to the main flow direction (see Figure i, below).

Degradation – The process of a channel lowering its elevation through increased erosion, channel bed scour, or down-cutting.

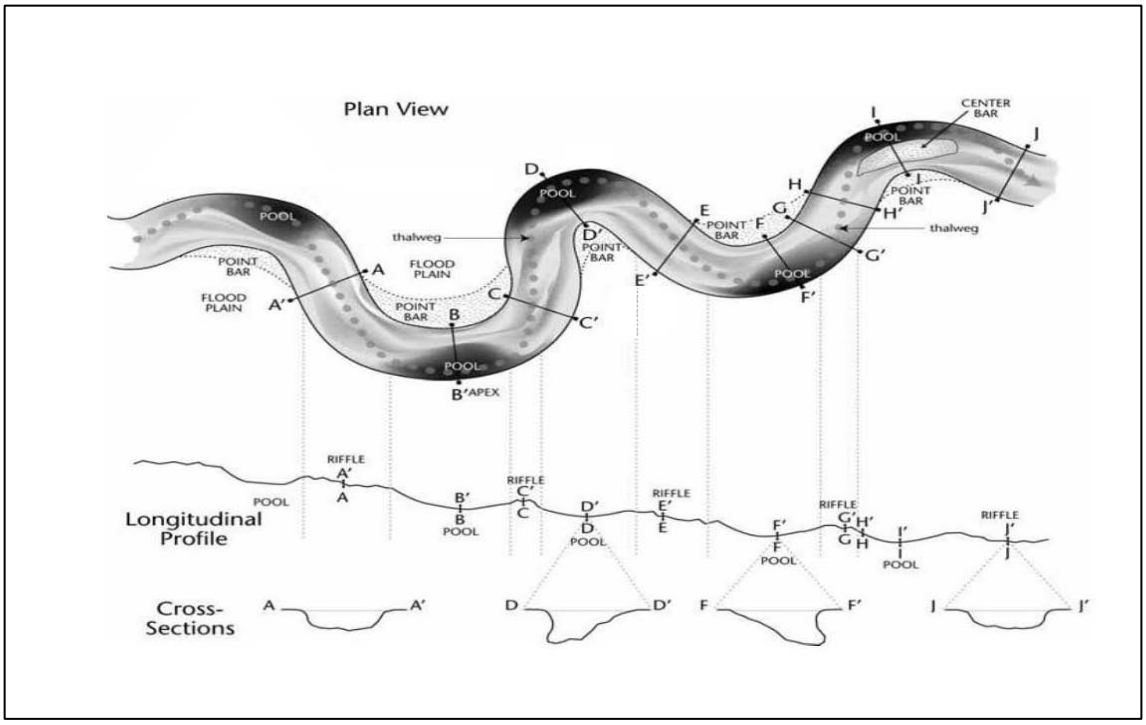


Figure i. Geomorphic Terms – Plan View with Profile and Cross Sections

W. Barry Southerland, 2003

Floodplain – An area of low-lying ground adjacent to a stream or river, formed mainly of alluvial sediments and subject to flooding.

Fluvial – Referring to or pertaining to streams; includes stream processes (fluvial processes), fluvial landforms, such as fluvial islands and bars, and biota living in and near stream channels.

Incised channel – A stream channel in which the bed has dropped and as a result, the stream is disconnected from its floodplain.

Glide – A relatively shallow and low velocity reach that has little or no turbulence.

Longitudinal profile – A profile of a stream or valley, drawn along its length between two given points. These profiles are generally drawn to illustrate the gradient of the stream.

Low flow channel -- A channel formed by base flows or receding flood flows and may occur as a distinct, incised feature or may be distinguished only by subtle changes in composition of bed material or vegetation. The low flow channel is the portion of a stream in which the water is contained during periods of low flow or base flow, when the stream is not in flood.

Meander – One of a series of regular, freely developing, and sinuous curves, bends, loops, turns, or windings in the course of a stream; the process of stream meandering is a means of channel-gradient adjustment through sorting of stored sediment by erosion at the outside of a bend and deposition, as a point bar, at the inside of the bend.

Nick point, nick zone -- A location where there is an abrupt change of gradient in the profile of a stream or river, typically due to a change in the rate of erosion. Nick points migrate upstream due to bed erosion, leaving deep channels and abandoned floodplains, which then become terraces.

Ordinary high water – The line on the shore of a water body established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Planform – Stream channel pattern as viewed from above (see Figure i, above).

Pool –A relatively deep, low velocity reach of quiescent flow between upstream and downstream riffles, or rapids, at which the flows are ordinarily more rapid and turbulent.

Pool-riffle sequence – In alluvial stream channels, refers to a succession of one or more combinations of pools and riffles within the channel in the downstream direction; during flood the normally low water velocities in pools and higher water velocities at riffles are reversed, causing scour and removal of accumulated sediment from pooled reaches and deposition of bed sediment on riffles.

Reach (of a stream) – An uninterrupted section of a stream channel between two points along its longitudinal course.

Riffle – A short, relatively shallow and coarsely bedded length of channel over which the stream ordinarily flows at higher velocities and greater turbulence than it does through upstream and downstream reaches.

Riparian – An ecological term referring to the part of the fluvial landscape inundated or saturated by flood flows; it consists of all surfaces of active fluvial landforms up through the floodplain including channel, bars, banks, and related riverine features such as oxbow lakes, oxbow depressions, and natural levees. Particularly in arid and semiarid (water-deficient) environments, the riparian zone may support plants and other biota not present on adjacent, drier uplands.

Sinuosity – The ratio of stream channel length (measured in the thalweg) to the down-valley distance, or is also the ratio of the valley slope to the channel slope.

Stream – A body of water confined to a narrow topographic depression, through which it flows and transports rock particles, sediment, and dissolved particles. Rivers, creeks, brooks, and runs are all streams.

Terrace – a former floodplain, abandoned due to incision or down cutting.

Thalweg – the deepest point in any waterway cross-section.

EXECUTIVE SUMMARY

OVERVIEW OF THE PROGRAM AND DRAFT EIR

This Program Environmental Impact Report (PEIR) addresses the potential environmental impacts of the Lower Putah Creek Restoration Project, Upper Reach Project, a component of the *Lower Putah Creek Restoration Project, California Department of Fish and Wildlife Ecosystem Restoration Program (ERP Grant No E1183015)*. The Lower Putah Creek Restoration Project Upper Reach Project (hereafter referred to as "the Program") proposes to restore and enhance geomorphic and ecological function on approximately 24.2 miles of Putah Creek between the Putah Diversion Dam (PDD) and the western boundary of the Yolo Bypass Wildlife Area (YBWA) (see Figure 1). This reach of Putah Creek crosses a combination of privately (primarily) and publically owned lands in Solano and Yolo counties. The restoration efforts analyzed in this PEIR are planned by the Solano County Water Agency (SCWA) and the Lower Putah Creek Coordinating Committee (LPCCC) for implementation over the next 15 years. The SCWA is the CEQA lead agency for the Project.

This PEIR is intended to provide the public, responsible agencies, and trustee agencies with information about the potential environmental effects of the proposed Program, which is the CEQA "Project." SCWA has prepared this PEIR in compliance with the California Environmental Quality Act (CEQA) of 1970 (as amended) and the State CEQA Guidelines (14 California Code of Regulations [CCR]) Section 15000 et seq.).

This PEIR is intended to meet CEQA requirements and to integrate CEQA review with related consultations and anticipated programmatic and project-level permit requirements. SCWA, in its role as the lead agency, will use the PEIR to comply with CEQA review requirements for its approval of each of the restoration activities described herein. Program-level documentation may provide sufficient CEQA analysis to meet site-specific, project-level analysis for future projects, or additional documentation may be needed to fulfill CEQA compliance. This determination will be made by the lead agency on a case-by-case basis, typically with preparation of an Initial Study.

PROGRAM PURPOSE AND NEED

The Lower Putah Creek corridor is one of the largest remaining tracts of high quality wildlife habitat in Yolo and Solano counties, and provides habitat for a unique assemblage

of fish and wildlife species native to the Central Valley. However, the creek suffers from substantially reduced flows from flow diversions, altered channels and eroding banks, habitat loss and degradation, invasive weed infestations, and other problems. In many locations in the Program area, the Putah Creek channel is oversized for current flows and has been deepened by mining, which have resulted in degraded habitat. The Program proposes to develop restoration projects on up to 17 separate creek reaches to optimize benefits to fish, wildlife, and other resources.

The overall Program purpose is to restore and rehabilitate the creek channel, banks, and associated habitats to more natural, self-sustaining form and function, consistent with the current (post-Monticello Dam) hydrologic regime. The Program would be implemented to stop further degradation of the creek corridor and to "jump-start" natural geomorphic and ecological processes in site-specific locations. The primary goals for the Program include:

- Improve passage, rearing, and emigration of adult and juvenile salmonids in Putah Creek
- Preserve and enhance, where possible, existing beneficial uses including public access, wildlife viewing, hunting and fishing, balanced with existing, enhanced, and restored ecological functions
- Enhance habitats for Delta native fishes and wildlife within the Putah Creek Upper Reach

PROGRAM ACTIVITIES

The proposed Program activities are designed to work together in a comprehensive manner to achieve the Program goals and objectives. The activities would be implemented (singly or in combination) in a series of individual actions (projects), applied to specific locations within the Program area, as determined by site-specific conditions. For purposes of description of site conditions and of proposed locations for the various activities, the Program area has been divided into 17 stream segments (Project reaches) (see Figure 2-1).

Program activities fall into three general categories: (1) Channel Reconfiguration, (2) Vegetation Management, and (3) Maintenance. These activities are listed by category in Table ES-1. As stated above, site-specific Project implementation may entail application of one or a combination of these activities. All in-stream activities would be implemented adaptively, based upon understanding of the ecosystem and its changes over time. A site-specific Adaptive Management Plan would be developed for each individual project,

based on the desired environmental outcomes and the potential for environmental impacts.

Table ES-1 Program Activities by Category

Channel Reconfiguration	Vegetation Management	Maintenance of Enhancement Sites
• Modify Channel Geometry • Construct Grade/Flow Control Structures • Stabilize Channel Banks • Improve Fish Spawning Gravels • Fill Abandoned Gravel Pits	• Remove Invasive Plants • Plant Native Vegetation	• Irrigate Native Revegetation Sites • Manage Non-Native Vegetation at Restored Sites • Maintain Long-Term Access Points

PUBLIC INVOLVEMENT IN THE CEQA PROCESS

In accordance with State CEQA Guidelines (14 CCR Section 15082[a], Section 15103, Section 15375), SCWA circulated a Notice of Preparation (NOP) for the proposed Program on January 30, 2015 (**Appendix A**). The NOP, in which SCWA was identified as the lead agency for the proposed Program, was circulated to the public; to local, state, and federal agencies; and to other interested parties. The purpose of the NOP was to inform responsible agencies and the public that the proposed Program could have significant effects on the environment, and to solicit their comments so that any concerns raised could be considered during the preparation of the PEIR. In addition, SCWA held a public scoping meeting on February 12, 2015, to provide the public with another opportunity to comment. Comments received in response to the NOP and at the public scoping meeting are included in **Appendix B.**

The Draft Program Environmental Impact Report (Draft PEIR) for the Lower Putah Creek Restoration Project, Upper Reach Program Project was prepared and distributed by the Solano County Water Agency (SCWA) on June 1, 2016. Under CEQA guidelines, after completion of the Draft EIR, lead agencies are required to consult with and obtain comments from public agencies having jurisdiction by law over elements of the project, and to provide the general public and interested parties opportunities to comment on the Draft EIR. The lead agency also is required to respond to substantive comments on environmental issues raised in this review and consultation process. The Solano County Water Agency, as lead agency on this project, held a 45-day review period for the Draft EIR from June 1 to July 22, 2016. Letters received through July 22 have been included in this document. A public hearing on the Draft EIR was held on June 28, 2016. Comments received at that hearing are summarized in this Comments and Responses addendum, but are not directly responded to; commenters at the hearing were directed to submit

comments in writing for formal response. The Comments and Responses addendum to the Draft PEIR has been prepared to respond to comments on the Draft PEIR received from the public and concerned agencies during the formal public review period. The Draft PEIR, along with the comments and responses addendum, constitute the final EIR for the Lower Putah Creek Restoration Project Upper Reach Program.

In addition to integrating any changes required by responses to comments into the DEIR text for this FEIR, due to the time interval between completion of the Draft EIR and the ultimate adoption of the proposed project, minor technical updates have been made in the air quality, energy, greenhouse gas, and noise analyses in this document to bring those sections up to date.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The environmental impacts of the proposed Program and applicable mitigation measures are summarized in Table ES-3 (at the end of this section) and briefly described by topic below.

Hydrology

The Program would not result in any significant, long-term impacts to hydrology. Construction of the various Program elements could potentially cause adverse, short-term impacts due to erosion and siltation. These short-term impacts would be mitigated to a less-than-significant level by the implementation of erosion and sediment control best management practices (BMPs) during and following construction. Within the Project reaches occasional small roadway or agricultural storm drains may need to be modified or replaced due to channel realignment. If modifications or replacement of these drainage systems were not performed according to current standards, they could be damaged, or perform in a substandard manner. Such impacts would be avoided by designing any modifications of storm drainage systems according to current standards appropriate for the setting.

Water Quality

The Program would not result in any significant, long-term impacts to water quality. As discussed above for hydrology, construction of the various Program elements could potentially cause adverse, short-term impacts to water quality due to erosion and sediment release, which would be mitigated to a less-than-significant level by implementing erosion and sediment control BMPs. Construction of the program elements could also cause short-term impacts to water quality through the introduction of fuels

and lubricants from construction equipment into Putah Creek. Implementing restrictions on construction vehicle storage and maintenance would reduce these impacts to a less-than-significant level. The use of herbicides for invasive weed control in the various reaches could cause adverse impacts to water quality if such application is not performed according to the appropriate standards. Application of all herbicides by a licensed applicator, in accordance with label directions and U.S. Environmental Protection Agency (US EPA) recommendations to avoid overspray and accidental water introduction (during non-aquatic uses) would reduce these impacts to a less-than-significant level.

Geology, Soils, and Mineral Resources

The Program would not result in any significant, long-term impacts to geology and soils. As described above for hydrology, construction of the Program elements could potentially result in substantial soil erosion. These short-term impacts would be mitigated to a less-than-significant level by implementing erosion and sediment control BMPs during construction. The Program would not have an impact on the availability of important mineral resources.

Biological Resources

The Program would not result in any significant, long-term impacts to biological resources. Construction of the various Program elements could potentially cause adverse, short-term impacts to a number of special status species and their habitats. All of these short-term impacts would be mitigated to a less-than-significant level by the implementation of mitigation measures prior to, during and following construction.

Air Quality and Greenhouse Gas Emissions

The Program would not have any long-term impacts on air quality or greenhouse gas emissions. Construction of the Program elements could result in short-term impacts to air quality from emissions of criteria pollutants, but these impacts would be mitigated to a less-than-significant level by implementing standard construction best management practices aimed at reducing such emissions.

Noise

The Program would have no long-term impacts to noise levels. However, construction of Program elements would exceed the Solano County daytime non-transportation noise standards at residences closest to some project sites in Solano County, resulting in a potentially significant impact. Implementation of noise reducing construction practices

would reduce this impact to a less-than-significant level at some project sites, but the impacts would be significant and unavoidable in three of the Project reaches (Duncan-Giovannoni, Warren, and MacQuiddy Lester).

Hazards and Hazardous Materials

There are no known contaminated sites within the Program footprint that could cause the release of hazardous materials, if disturbed. The nearby LEHR Superfund site does not pose an immediate risk to people or the environment and Program activities would have no effect on this area. If evidence of hazardous materials are discovered during Project activities, these materials would be tested and analyzed following proper protocols to determine the presence of hazardous substances prior to making arrangements for off-site reuse/recycling or disposal. Implementing restrictions on construction vehicle storage and maintenance would prevent the accidental release of construction-related contaminants (fuels, lubricants, etc.) into the environment. Potential impacts due to the use of herbicides for weed control during Project implementation would be reduced to a less-than-significant level by ensuring that herbicide application is conducted by a licensed applicator, in accordance with label directions and US EPA recommendations to avoid overspray and accidental water introduction (during non-aquatic uses). To prevent the accidental ignition of a wildfire during construction, appropriate fire suppression equipment will be available on all work sites and other BMPs will be implemented to reduce fire risks.

Land Use

Agricultural land uses within the Project reaches could potentially be impacted by construction activities and long-term operations of the Program, including maintenance activities and potential trespass by recreational users. These impacts would be mitigated to a less-than-significant level by (1) coordinating all construction and maintenance activities with adjacent landowners to ensure that access does not impact agricultural operations, and (2) installing access restrictions, such as warning signs and wildlife-friendly fencing, as needed. There would be no impact to non-agricultural land uses.

Aesthetics

There would be no long-term adverse impact to views within the Project reaches due to Program implementation. There may be short-term impacts to views within Project reaches and adjacent areas during construction due to the presence of construction equipment and changes in the appearance of the riparian area and creek channel. These

short term impacts would be mitigated to a less-than-significant level by the use of interpretive signs explaining the restoration process, locating stockpiles away from public view, and, in some cases, installing visual screening fencing to limit the view of construction equipment and stockpiles from existing public access areas.

Recreation

The Program would not have any long-term adverse impacts on recreation. Recreation within the reaches would be temporarily impacted during construction and potentially for a period of time following construction due to disturbance by construction and associated access restrictions. The primary impacts would be loss of access to the creek and associated recreational amenities, including trails, picnic areas, and boating access. These impacts would be mitigated to a less-than-significant level by providing alternate access to high-use recreational sites during construction, minimizing the impact of construction upon recreational site access where feasible, and by working with adjacent landowners to facilitate their provision of public access and recreational infrastructure into the Proposed Project where impacts to sensitive biological resources can be avoided.

Cultural Resources

The Program would not have any long-term adverse impacts on cultural resources. The presence of documented cultural resources within the Project Area indicates that there is a possibility that additional significant sites, features, and artifacts could be discovered or disturbed as a result of Program-related ground-disturbing activities, resulting in a potentially significant impact. These impacts would be reduced to a less-than-significant level by establishing a construction buffer ($\geq$ 100 feet) beyond the known boundaries of documented cultural resources, and by contacting a qualified cultural resource specialist to assess any unrecorded cultural resources encountered during construction. In accordance with the California Health and Safety Code, if human remains are uncovered during ground-disturbing activities, excavation in the area of the burial shall be halted and the County Coroner and a professional archaeologist shall be contacted to determine the nature and extent of the remains.

Transportation and Traffic

Implementation of the Program would not result in any significant long- or short-term impacts to transportation and traffic.

Public Services

Implementation of the Program would not result in any significant long- or short-term impacts to the demand for public services.

Utilities and Service Systems

Construction activities involving excavation could inadvertently damage pipelines crossing underneath some of the Project reaches, which could result in short-term and long-term impacts such as work injuries, property damage, unintentional fire or explosions, and environmental damage. Such potentially significant impacts would be avoided by identification of pipeline locations before excavation activities begin. Also, as described in the hydrology section, within the Project reaches occasional small roadway or agricultural storm drains may need to be modified or replaced due to channel realignment. Such impacts would be avoided by designing any modifications of storm drainage systems according to current standards appropriate for the setting.

CUMULATIVE IMPACTS

A cumulative impact refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period. The cumulative impacts identified in this EIR include issues regarding: hydrology and geomorphology, water quality, geology and soils, air quality, noise, aesthetics, land use, recreation, transportation/traffic, public services, utilities and service systems, and hazardous materials. However, none of these impacts are considered to be cumulatively significant given the nature and extent of other planned/ongoing projects within the Program vicinity.

ALTERNATIVES

Three alternative programs were analyzed in this effort alongside the proposed Program. These alternatives and the variation in impacts, as compared to the proposed Program, are described below. Table ES-2 provides a summary of the potential effects of the two alternatives, as compared to the proposed Program.

Alternative 1 – No Project

The No Project Alternative analyzes the environmental effects of the future conditions along the Project reach absent the Project. This alternative assumes that the Project Area

would remain in its current condition as a degraded-habitat stream corridor. Unlike the proposed Project, the No Project Alternative would not catalyze funding by creating a series of "shovel-ready" projects. Although some restoration projects may occur in the proposed Project's absence, the number of likely future restoration projects and their scale is dependent on episodic funding which is not predictable. This alternative assumes nominal restoration, but ongoing implementation of existing maintenance activities such as irrigation to establish native vegetation, management of non-native vegetation (including manual and mechanical removal and chemical control), and maintenance of long-term access points. This alternative would not fully meet any of the Program objectives. Degraded conditions associated with the deep pools would not be remedied, or may be partially remedied depending on funding available for maintenance and periodic restoration activities. Existing erosion and habitat degradation associated with non-native vegetation and invasive weeds would likely continue.

Alternative 2 – Restoration of Pools Only

This alternative limits restoration activities to only re-contouring the channel to remove approximately 112.5 acres of wide, deep pools in the Program Area. No Program-wide channel re-construction or restoration would occur. This alternative assumes nominal restoration but ongoing implementation of existing maintenance activities such as irrigation to establish native vegetation, management of non-native vegetation (including manual and mechanical removal and chemical control), and maintenance of long-term access points. Alternative 2 could feasibly accomplish significant restoration of areas with the worst aquatic habitat and water quality effects.

Table ES-2 Comparison of Alternatives to the Proposed Program

Environmental Category	Proposed Project	Alternative 1 No Project	Alternative 2 Pool Filling Only	Alternative 3 Reduced Project
Aesthetics	LS/MM	NI	LS/MM	LS/MM-
Air Quality & Greenhouse Gas Emissions	LS/MM	NI	LS/MM-	LS/MM-
Biological Resources	LS/MM	NI	LS/MM-	LS/MM-
Cultural Resources	LS/MM	NI	LS/MM-	LS/MM-
Geology and Soils, Mineral Resources	LS/MM	NI	LS/MM-	LS/MM-
Hazards	LS/MM-	NI	LS/MM-	LS/MM-
Hydrology	LS/MM-	NI	LS/MM-	LS/MM-
Land Use	LS	NI	LS	LS/MM-
Noise	SU/MM	NI	SU-	SU-
Public Services	NI	NI	NI	NI
Recreation	LS	NI	LS-	LS-
Transportation/Traffic	LS	NI	LS/MM-	LS/MM-
Utilities	LS/MM	NI	LS/MM-	LS/MM-
Water Quality	LS/MM	NI	LS/MM-	LS/MM-
Consistency with Project Objectives	Consistent	Inconsistent	Less Consistent	Less Consistent

Notes:
NI = No impact would occur.
LS = All impacts would be less than significant, no mitigation required.
LS/MM = All impacts would be less than significant after mitigation.
SU = One or more impacts would be significant and unavoidable, even after mitigation.
- = Alternative impacts are less severe than the Proposed Project.
+ = Alternative impacts are more severe than the Proposed Project.
Where no + or - is indicated, impacts of the Proposed Project and the Alternative are identical or very similar.

This alternative would only partially fulfill the Program objectives and would not meet the integrative restoration needs of the creek system as a whole. Therefore, Alternative 2 would be less consistent with project objectives than the proposed Project.

Alternative 3 – Reduced Project Alternative

This alternative focuses all of the proposed potential restoration activities in the four reaches from PDD to the Interstate 505 (I-505) bridge (NAWCA/Mariani, Duncan-Giovannoni, Winters Putah Creek Nature Park, and East of I-505), a distance of approximately 4 miles. Activities would be accomplished over a 2-year period, 2 miles per

year. This alternative was selected instead of a downstream Reduced Project Alternative because upstream areas of the creek contain colder water and higher quality fisheries habitat than downstream, resulting in better project results and the most efficient use of funding. This alternative would provide very high value aquatic and riparian habitat for the colder water species and a contiguous corridor for movement, linking to the existing high quality PDD to Berryessa riparian corridor.

This alternative fulfills many of the Program objectives, but to a lesser extent than the Proposed Program due to the reduction in the Program implementation area. However, this alternative fails to meet Objective 6 (Maintain a balance of existing fish and wildlife habitats, hunting, fishing, wildlife viewing, and other public benefits, including water supply and agriculture, between the PDD and YBWA) because it would not perform activities along Putah Creek all the way to the YBWA, and instead would stop at I-505 near the City of Winters. For this reason, Alternative 3 fails to meet the integrative restoration needs of the Creek system as a whole. Therefore, Alternative 3 would be less consistent with project objectives than the proposed Program.

Environmentally Superior Alternative

CEQA Guidelines Section 15126.6(e)(2) requires that the environmentally superior alternative be identified. If the environmentally superior alternative is the No Project/No Development Alternative, the EIR shall also identify an environmentally superior alternative among other alternatives. CEQA also requires public agencies to mitigate or avoid significant effects of a project whenever it is feasible to do so (Public Resources Code Section 21002.1).

The environmentally superior alternative is Alternative 2, Pool Filling Only, which achieves some of the water quality and habitat benefits of the proposed Project but with lessened short-term construction-related impacts. However, this alternative is less consistent with the Project objectives than the proposed Projects, as shown in Table ES-2.

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
Hydrology			
3.1-1	Excessive erosion and siltation within stream reaches due to construction activities.	**3.1-1: Implement Erosion and Sediment Control BMPs.** In the cases in which a SWPPP is not required for Project activities, the Project applicant shall implement BMPs selected by a Qualified SWPPP Developer. The BMPs shall be drawn from the Construction BMP Handbook published by the California Stormwater Quality Association (CASQA) or equivalent prior to the start of any ground-disturbing activities. These BMPs may include, but are not restricted to, the menu of measures listed below, and would be applied both during and after construction, until the work site is stabilized according to the same closure requirements that would be applicable were the work area subject to a SWPPP. In order to ensure that the BMPs implemented are functioning to prevent erosion and sediment impacts, a California-qualified Qualified SWPPP Practitioner (QSP) must inspect functioning of the BMPs on a weekly basis. If the BMPs are insufficient, the QSP shall make recommendations for additional or sufficient BMPs. Erosion Controls – Menu of Potential BMPs • Stream Bank and Channel Stabilization: Where creek banks and channels are disturbed by construction, application of the full suite of available BMPs shall be coordinated by the QSP for application during and following construction to reduce the discharge of sediment and other pollutants from stream banks to minimize the impact of construction activities (CASQA, 2009, Fact Sheet EC-12). • Scheduling: The QSP shall prepare a written plan to sequence construction activities and the implementation of other BMPs to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking. Environmental constraints such as nesting season prohibitions shall also be taken into account in developing a schedule (CASQA, 2009a, Fact Sheet EC-1). • Preservation of Existing Vegetation: Where possible, existing non-invasive and native vegetation shall be preserved to minimize the	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		potential of removing or injuring existing trees, vines, shrubs, and grasses that protect soil from erosion (CASQA, 2009, Fact Sheet EC-2). • Hydroseeding: Where soil has been disturbed by construction and requires temporary protection until permanent stabilization is established, a mixture of hydraulic mulch, seed, fertilizer, and stabilizing emulsion shall be applied to temporarily protect exposed soils from erosion by water and wind (CASQA, 2009, Fact Sheet EC-4). • Geotextiles and Mats: Where soil has been disturbed by construction on slopes where the erosion hazard is high and vegetation will be slow to establish, mattings shall be used to cover the soil surface to reduce erosion from rainfall, hold soil in place, and absorb and hold moisture near the soil surface (CASQA, 2009, Fact Sheet EC-7). • Wood Mulching: Where soil has been disturbed by construction and temporary protection is needed until permanent stabilization is established, an applied mixture of shredded wood mulch, bark, or compost shall be applied to disturbed soils to reduce erosion by protecting bare soil from rainfall. This BMP shall not be used on areas exposed to concentrated flows or on slopes steeper than 3:1 (H:V) (CASQA, 2009, Fact Sheet EC-8). • Velocity Dissipation Devices: Where needed, a physical device composed of rock, grouted riprap, or concrete rubble, shall be placed at the outlet of a pipe or channel to prevent scour of the soil caused by concentrated high velocity flows. This BMP will be applied to stormwater structures as needed to divert run-on flow during construction (CASQA, 2009, Fact Sheet EC-10). Sediment Controls– Menu of Potential BMPs • Silt Fence: Where needed, a woven geotextile that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support will be installed temporarily to detain sediment-laden water and promote sedimentation behind the fence. This shall be used in areas disturbed by construction as a perimeter	

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		control, above channels, and/or below the toe or downslope of exposed and erodible slopes (CASQA, 2009, Fact Sheet SE-1). • Fiber Rolls: Where needed, fiber rolls shall be placed at the toe and on the face of slopes along the contours to intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff (CASQA, 2009, Fact Sheet SE-5). • Gravel Bag Berm: Where needed, a series of gravel-filled bags shall be placed on a level contour to intercept sheet flow runoff, allow sediment to settle out, and release runoff slowly as sheet flow, preventing erosion (CASQA, 2009, Fact Sheet SE-6). • Straw Bale Barrier: Where needed, a series of straw bales shall be placed on a level contour to intercept sheet-flow runoff and allow sediment to settle out (CASQA, 2009h). • Compost Sock and Berm: Where needed, a three-dimensional biodegradable filtering structure shall be used at the site perimeter or at intervals on sloped areas to intercept runoff where sheet flow occurs to retain sediment (CASQA, 2009, Fact Sheet SE-13). • Stabilized Construction Entrance and Exit: A pad of aggregate underlain with filter cloth shall be constructed at a point where traffic would be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto roadways and help prevent deposition of sediments into local storm drains and production of airborne dust (CASQA, 2009i). • Stabilized Construction Roadway: Access roads and parking areas shall be stabilized immediately after any grading and maintained to prevent erosion and control dust after grading (CASQA, 2009, Fact Sheet TC-2). Non-Stormwater Controls • Temporary Stream Crossing: Where needed, a temporary culvert, ford, or bridge shall be placed across a waterway to provide access for	

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		construction purposes for a period of less than 1 year. These crossings are intended to eliminate erosion and downstream sedimentation caused by vehicles (CASQA, 2009, Fact Sheet NS-4).	
3.1-2	Diversion of stream flows around construction areas during Project implementation.	N/A	No impact
3.1-3	Increase in flood hazards in the program vicinity due to changes in channel geometry or roughness.	N/A	No impact
3.1-4	Reduced performance or ineffective operation of roadway and agricultural storm drains if they are not modified/replaced according to current design standards.	**3.1-2: Standards for Modification or Replacement of Storm Drains.** In the event roadway or agricultural storm drains need to be modified or replaced as a result of the channel alignment or other Project activities, such modification or replacement will be done in a manner to bring the drain(s) up to current standards. The Project would replace or upgrade the facility to applicable standards in consultation with property owner. Depending on the funding source or location for a given Project activity, the improvements would be conducted be under city, county, state, or federal standards. For drains in Solano County, the Project would rely on the Solano County Public Works specifications. For portions of the Project occurring exclusively within Yolo County (Mace Road to Road 106A Reach and Road 106A to the YBWA) replacement drains would rely on the Yolo County Public Works specifications. In the event that roadway or agricultural storm drains within flood levees need to be modified or replaced as a result of Project activities, such modification or replacement shall be performed in strict consultation with the Central Valley Flood Protection Board (CVFPB) and according to CVFPB standards and requirements.	Less than significant
Water Quality			
3.2-1	Impacts to water quality due to excessive erosion and sediment release during construction activities.	*See Mitigation Measure 3.1-1, Implement Erosion and Sediment Control BMPs. in the hydrology section*.	Less than significant
3.2-2	Impacts to water quality from operation of construction equipment within stream.	**3.2-1: Procedures to Prevent Contamination from Construction Equipment.**	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
	channels and the potential introduction of fuel and lubricants.	In order to prevent contamination from vehicle or equipment leaks during Project activities, the Project Applicant shall implement the following actions: 1. Vehicles shall be maintained and operated in a leak-free condition. 2. Project vehicles shall not park or stored on impervious surfaces. 3. No fueling or maintenance of vehicles or equipment shall occur in the channel or floodplain. The exception would be if equipment that cannot be readily relocated (e.g., pumps and generators). 4. All off-site fueling sites (e.g., on access roads above the top-of-bank) shall be equipped with secondary containment and avoid a direct connection to underlying soil, surface water, or the storm drainage system. 5. For any stationary equipment (e.g., pumps and generators) that must be fueled on-site, secondary containment, such as a drain pan, drop cloth or booms, shall be provided in such a manner to prevent accidental spill of fuels to underlying soil, surface water, or the storm drainage system. 6. Petroleum products, chemicals, cement, fuels, lubricants, and non-storm drainage water or water contaminated with the aforementioned materials shall not be allowed to enter receiving waters or the storm drainage system. 7. Waste disposal containers shall be covered when they are not in use.	
3.2-3	Impacts of the Project upon stream temperature, dissolved oxygen, and biological oxygen demand.	N/A	Less than significant
3.2-4	Impacts to water quality due to the release of contaminants, such as boron, mercury, fertilizers, and pesticides/herbicides.	*See Mitigation Measure 3.1-1, Implement Erosion and Sediment Control BMPs, in the Hydrology section and Mitigation Measure 3.4-5, Swainson's Hawk Avoidance, in the biological resources section.*	Less than significant
Geology and Soils, and Mineral Resources			
3.3-1	Damage to structures or injury to people from seismic activity such as fault rupture, ground shaking, or liquefaction.	N/A	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
3.3-2	Exacerbated or new channel bank slope failure hazards due to project implementation.	N/A	Less than significant
3.3-3	Substantial soil erosion within restored areas during or after Project construction.	*See Mitigation Measure 3.1-1, Implement Erosion and Sediment Control BMPs. in the Hydrology section.*	Less than significant
3.3-4	Loss of access to mineral resources, such as aggregate and natural gas, within restored areas	N/A	No impact
Biological Resources			
3.4-1	General impacts on special-status species and habitats.	**3.4-1: Worker Environmental Awareness Program (WEAP).** During construction of the Project, before any work occurs on the Project site, including grading, vegetation removal and equipment staging, all construction personnel shall participate in an environmental awareness training regarding special status species and sensitive habitats present on the Project site. Any additional construction personnel that are employed following the initial start of construction shall receive the mandatory training before starting work. As part of the training, an environmental awareness handout will be provided to all personnel that describes and illustrates sensitive resources (i.e., special status species and habitat, nesting birds/raptors) to be avoided during proposed Project construction and lists measures to be followed by personal for the protection of biological resources. Such measures shall include, but are not limited to: • Procedures to follow if a special status species is found within the work area. • Checking under equipment and staging areas for wildlife species each morning prior to work. • Staying within designated work areas. • Maintaining exclusion/silt fencing. • Reduced Project speed limits. • No pets or firearms on-site.	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		• Contain trash/food waste and remove daily to avoid encouraging predators onto the Project site. • Following Project Best Management Practices (BMPs).	
3.4-2	Impacts on Western pond turtle.	**3.4-2: Western Pond Turtle Avoidance.** The western pond turtle shall be protected from Project Area staging and operations areas through monitoring by a qualified biologist. The Project Area shall be inspected daily for the presence of turtles. If necessary, with consultation with CDFW, barriers shall be used when needed to direct the turtles and move them to an area of suitable habitat outside of the construction activity.	Less than significant
3.4-3	Impacts on giant garter snake.	**3.4-3: Giant Garter Snake Avoidance.** In areas that provide suitable habitat for giant garter snake, construction shall only occur during the active period for the snake, between May 1 and October 1. During the active period for giant garter snake direct mortality is lessened because snakes are expected to actively move and avoid danger. Preconstruction surveys for the giant garter snake shall occur within 24 hours prior to ground disturbing activities. A survey of the Project Area should be repeated if a lapse of two weeks or greater has occurred. If a snake is encountered during construction, work shall stop within the vicinity of the snake and the USFWS would be contacted immediately. Only following receipt of USFWS approval shall giant garter snake be collected and transferred to the nearest suitable habitat outside the work area. Work shall not re-commence until a qualified biologist has either removed the snake from the construction area or, after thorough inspection, determined that the snake has vacated the construction area. Any dewatering or vegetation clearing within 200 feet of potential aquatic habitat for giant garter snake shall be limited to the minimum amount necessary.	Less than significant
3.4-4	Impacts on Valley elderberry longhorn beetle.	**3.4-4: Valley Elderberry Longhorn Beetle (VELB) Avoidance).** Valley elderberry plants (with stems greater than 1-inch diameter at ground level) occurring within the Project Area shall be avoided and, if avoidance is not possible, relocated to a designated location. Where Project impacts to elderberry shrubs cannot be avoided, or where shrubs are located	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		within 30.5 meters (100 feet) of Project Area-specific activities, activities shall be conducted according to USFWS Conservation Guidelines for VELB (1999), or other VELB guidance as updated by the USFWS. VELB habitat shall be considered directly affected if Project construction requires the removal of the shrub or if ground-disturbing activities would occur within 6.1 meters (20 feet) of the dripline of the shrub. The species would be considered indirectly affected if Project construction would disturb the ground between 6.1 and 30.5 meters (20 and 100 feet) from the dripline of the shrub (USFWS, 1999). Transplantation or temporary removal of the affected shrubs may be necessary as prescribed by the guidelines, but plants that are extremely difficult to remove may be exempted. Planting of additional seedlings or cuttings may be required under the Project or program USFWS Biological Opinion, depending on the number of elderberry shrubs with emergence holes present in the Project Area. A monitoring plan of any mitigation measures in the Project Area shall be implemented as required under the Biological Opinion, including monitoring the general condition of the mitigation Project Area and the condition of the elderberry plantings for up to ten consecutive years. The plan shall describe monitoring responsibilities, intervals, intensity, and success rates. The monitoring plan shall further include requirements for reporting observations and findings to the applicable agency, for example, for VELB observations, to USFWS.	
3.4-5	Impacts on Swainson's hawk.	**3.4-5: Swainson's Hawk Avoidance.** For any construction activities initiated between March 15 and September 1, surveys for nesting Swainson's hawk shall be conducted within 0.5-mile of areas of disturbance for this species as described in the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in the California's Central Valley* (Swainson's Hawk Technical Advisory Committee, 2000). The recommended minimum survey protocol is completion of surveys for at least the two survey periods immediately prior to a project's initiation.	Less than significant

Table ES-3 Impacts and Mitigation Measures

<table>
<tr><th>Impact Number</th><th>Impact</th><th>Applicable Mitigation Measures</th><th>Impact Significance after Mitigation</th></tr>
<tr><td></td><td></td><td>Survey periods correspond to typical migration, courtship, and nesting behavior and defined as follows:
<table>
<tr><th colspan="2">Survey Period</th><th>Survey Dates</th><th>Survey Time</th><th>Number of Surveys</th></tr>
<tr><td>1</td><td>Recommend optional</td><td>January 1-March 20</td><td>All day</td><td>1</td></tr>
<tr><td>2</td><td></td><td>March 20-April 5</td><td>Sunrise to 1000 or 1600 to sunset</td><td>3</td></tr>
<tr><td>3</td><td></td><td>April 5-April 20</td><td>Sunrise to 1200 or 1630 to sunset</td><td>3</td></tr>
<tr><td>4</td><td>Initiating surveys is not recommended</td><td>April 21-June 10</td><td>All day; Monitoring known nests only</td><td>Ongoing</td></tr>
<tr><td>5</td><td></td><td>June 10-July 30</td><td>Sunrise to 1200 or 1630 to sunset</td><td>3</td></tr>
</table>
If surveys determine that the species is present and nesting within this area, a buffer zone of 0.5-mile will be established and coordination with CDFW will be required prior to any work in this buffer zone during the nesting season. Work within 0.5-mile may be permitted with CDFW approval if a qualified biologist monitors the nest when Project disturbance activities occur within 0.5-mile of the nest. If the monitor determines that construction may result in abandonment of the nest, all construction activities within 0.5-mile will be halted until the nest is abandoned or all young have fledged. The monitor shall continue monitoring the nest until construction within 0.5-mile of the nest is completed, or until all chicks have completely fledged and are no longer dependent on the nest.</td><td></td></tr>
<tr><td>3.4-6</td><td>Impacts on nesting bird species.</td><td>3.4-6: Nesting Bird Avoidance. A pre-construction survey by a qualified biologist for nesting birds shall be required if construction activities are scheduled to occur during the breeding season (February 1 to August 31) for raptors and other migratory birds, including special status bird</td><td>Less than significant</td></tr>
</table>

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		species. The survey shall be conducted 15 days prior to ground disturbing activities and shall cover 500-foot radius surrounding the construction zone. If active nests are found, actions typically include, but are not limited to, monitoring by agency-approved biologists, establishment or refinement of species-specific buffers, reduction or elimination of the use of loud equipment, reducing foot traffic and remaining in the vehicles, and the maintenance of visual screens. Migratory birds shall be protected from Project Area staging and operations through the use of a buffer established based on the birds sensitivity and response to the potential activity. Baseline behavior of the bird should be established to inform the buffer size. The qualified biologist may start with a 100-foot nest buffer or a 250-foot nest buffer for raptors, but may adjust the buffer size based on the reaction of the bird to the activity. If there is a potential for nest abandonment due to intrusion into the buffer zone, as established by the qualified biologist, then CDFW and the USFWS shall be consulted. If a lapse in Project-related work of 15 days or longer occurs, another focused survey, and if required, consultation with CDFW and the USFWS shall be performed before Project work can resume.	
3.4-7	Impacts on special-status bats.	**3.4-7**: **Avoid and Minimize Impacts to Special-Status Bats.** In areas where suitable habitat occurs and there is potential for special-status bat species to be present, specific mitigation measure(s) will be developed in consultation with CDFW	Less than significant
3.4-8	Impacts on rare plants.	**3.4-8: Avoid and Minimize Impacts to Rare Plants.** Before the initiation of any vegetation removal or ground-disturbing activities, in areas that provide suitable habitat for special status plants, the following measures shall be implemented: • A qualified botanist shall conduct appropriately timed surveys for special status plant species, in all suitable habitat that would be potentially disturbed by the Project. • Surveys shall be conducted following CDFW- or other approved protocol.	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		• If no special status plants are found during focused surveys, the botanist shall document the findings in a letter to the lead agency, and other appropriate agencies as needed, and no further mitigation will be required. • If special status plants are found during focused surveys, the following measures shall be implemented: – Information regarding the special status plant population shall be reported to the CNDDB. – If the populations can be avoided during Project implementation, they shall be clearly marked in the field by a qualified botanist and avoided during construction activities. Before ground clearing or ground disturbance, all on-site construction personnel shall be instructed as to the species' presence and the importance of avoiding impacts to this species and its habitat. – If special status plant populations cannot be avoided, consultations with CDFW and/or USFWS would be required. If allowed under the appropriate regulations, the plants shall be mapped, photographed, and then transplanted to a suitable location by a qualified botanist. If required by the relevant agency, a plan to compensate for the loss of special status plant species, detailing appropriate replacement ratios, methods for implementation, success criteria, monitoring and reporting protocols, and contingency measures that would be implemented if the initial mitigation fails; the plan would be developed in consultation with the appropriate agencies prior to the start of local construction activities. – If mitigation is required, the Project proponent shall maintain and monitor the mitigation area for 5 years following the completion of construction and restoration activities. Monitoring reports shall be submitted to the resource agencies at the completion of restoration and for 5 years following restoration implementation. Monitoring reports shall include photo-documentation, planting specifications, a site layout map, descriptions of materials used, and justification	

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		for any deviations from the mitigation plan. Additional mitigation, monitoring may be required or modified by the administering agency, and those requirements would supersede this section.	
3.4-9	Impacts on riparian habitat.	**3.4-9: Monitor Riparian Habitat.** In advance of construction, a Riparian Revegetation and Monitoring Plan shall be prepared for riparian areas which will describe the thresholds of revegetation success, monitoring and reporting requirements, and a description of the site-specific planting plan. The long-term ecological monitoring program described in the Plan will provide the basis for gauging the achievement of minimum performance standards. The Plan will describe a three-year riparian monitoring program that assesses the survival and health of on-site plantings. Appropriate performance standards may include, but are not limited to: an 80 percent survival rate of restoration tree and shrub plantings; absence of invasive plant species in restored areas; and self-sustaining conditions (i.e., plant viability without supplemental water) at the end of three years. The Plan will be submitted to the appropriate regulatory agencies for review and approval.	Less than significant
3.4-10	Impacts on fish.	**3.4-10: Implement Aquatic Habitat Protection.** Aquatic habitat shall be protected during Project Activities by limiting the amount of in-channel work and acquiring proper permits for work done within aquatic habitats. A fence will be installed to the extent necessary to prevent the unintended discharge of excavated material and turbid water. The fencing shall be checked regularly and maintained until construction is complete. If needed, fish salvage shall be performed under the direct supervision of an approved biologist to avoid incidental take from Project activities. Following installation of any water diversion structures, and prior to placement of fill, the approved biologist shall perform surveys for any fish in the Project Area, collect, and transfer native fish, including Pacific lamprey, to the nearest suitable habitat to the work area. During holding and transportation, fish would be held in stream water collected from the Project reach. • Before removal and relocation begins, the approved biologist shall identify the most appropriate release location(s). Release locations	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		should offer ample habitat for Pacific lamprey and other native fish and should be selected to minimize the likelihood of reentering the work area. • Relocation activities shall be performed during the morning when temperatures are coolest. Air and water temperatures would be periodically measured during dewatering activities to ensure native fish that may be present are protected. • If Pacific lamprey are relocated, the following procedure shall be used: – Handling of fish would be minimized. However, when handling is necessary, hands and nets would be wetted prior to handling. – Any handled fish would be immediately placed in an aerated container with a lid in cool, shaded water. Aeration would be provided with a battery powered external bubbler. Fish would not be held more than 30 minutes. – All handled fish would be moved directly to the nearest suitable habitat in the creek, as identified above.	
3.4-11	Impacts on wetland habitats.	N/A	Less than significant
3.4-12	Impacts on wildlife corridors and movement in the Project Area.	**3.4-11: Native or Migratory Fish or Wildlife Species Avoidance.** The Native or Migratory Fish and Wildlife Species, such as North American beaver, North American otter, and other protected species shall be protected from Project staging and operations impacts through monitoring by a qualified biologist. Prior to construction, the Project Area shall be inspected for the presence of these species. If necessary, with consultation with CDFW, appropriate measures shall be taken to avoid and minimize Project impacts to these species. Additional specific measures to protect native or migratory wildlife species, may be required by CDFW under the 1600 series permit for this Project and shall be adhered to by the Project proponent.	Less than significant
3.4-13	Impacts on biological resources from herbicide use.	**3.4-12: Implement Herbicide Protective Actions.** During all Project activities, herbicides shall only be used by a licensed applicator and shall be applied only to target plants. Herbicides shall not be used within 100 feet of blue elderberry (*Sambucus nigra ss. caerulea*) plants.	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		In order to avoid and minimize impacts related to herbicide use, use any herbicides during Project activities in accordance with all directions and protective actions listed on the product label of the herbicide being applied. In addition, take the following actions to ensure protection of fish, plant, and bird life during use of the herbicides listed below: 1. Glyphosate: a. Implement the following US EPA recommendations during Project activities (US EPA, 1993): i. For non-aquatic uses, do not apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters and rinsate. ii. For aquatic uses, only end-use products that are registered for aquatic uses. Do not contaminate water when disposing of equipment washwaters and rinsate. Treatment of aquatic weeds can result in oxygen loss from decomposition for dead plants. This loss can cause fish kills. 2. Triclopyr: a. As recommended by US EPA, avoid spray drift to prevent toxicity to non-target plants during Project activities (US EPA, 1998). b. Do not apply to open water or wetland areas to prevent toxicity to freshwater fish. 3. Imazapyr: a. Implement the following US EPA recommendations during Project activities (US EPA, 2006): i. If groundborne application is performed, take the following precautions to minimize potential risk to non-target terrestrial plants, aquatic vascular plants, and threatened and endangered species (US EPA, 2006, p. 33): • Use a nozzle height below 4 feet above the ground or plant canopy and coarse or coarser droplet size. (ASABE S572) or, if specifically using a spinning atomizer nozzle,	

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		use a volume mean diameter (VMD) of 385 microns or greater. • Do not apply with wind speeds greater than 10 mph. • Do not apply into temperature inversions. b. To minimize potential risk to aquatic vascular plants, do not apply to bodies of water or portions of bodies of water where emergent and/or floating weeds do not exist (US EPA, 2006, p. 32-33). 4. Aminopyralid: a. In addition to following all directions and protective actions listed on the product label, apply aminopyralid using hand-spray and spot treatments only (US EPA, 2005a, p. 19). 5. Chlorsulfuron: a. To minimize potential harm to non-target plants, implement the following US EPA recommendations during Project activities (US EPA, 2005b, p. 6): i. Employ measures to control spray drift. ii. Restrict use to only one application per growing season. 6. Dithiopyr: a. Do not apply dithiopyr in or near water due to its toxicity to fish. b. To minimize potential harm to non-target plants, implement the following US EPA recommendations during Project activities (US EPA, 1991, p. 8): i. Do not apply dithiopyr aerially. 7. Isoxaben: a. To minimize exposure to fish and aquatic invertebrates, implement the following actions (WSDOT, 2006, p. 3): i. Do not apply directly to water, to areas where surface water is present, to wetlands, or to intertidal areas below the mean high water mark. ii. Employ measures to control spray drift. iii. Do not contaminate water when disposing of equipment washwaters and rinsate.	

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
Air Quality and Greenhouse Gas Emissions			
3.5-1	Population and/or employment growth that exceeds growth estimates included in the applicable air quality plan.	N/A	Less than significant
3.5-2	Short-term construction emissions of criteria pollutants that contribute to existing or projected air quality violations.	**3.5-1: Implementation of Construction Best Management Practices.** Project construction activities should implement as feasible and necessary to control dust, the Best Management Practices for construction identified in Section 6.1 of the YSAQMD 2007 CEQA Handbook. Best Management Practices identified to reduce dust emissions include: • Water all active construction sites at least twice daily. Frequency should be based on the type of operation, soil, and wind exposure. • Haul trucks shall maintain at least 2 feet of freeboard. • Cover all trucks hauling dirt, sand, or loose materials. • Apply non-toxic binders (e.g., latex acrylic copolymer) to exposed areas after cut and fill operations and hydroseed area. • Apply chemical soil stabilizers on inactive construction areas (disturbed lands within construction projects that are unused for at least four consecutive days). • Plant tree windbreaks on the windward perimeter of construction projects if adjacent to open land. • Plant vegetative ground cover in disturbed areas as soon as possible. • Cover inactive storage piles. • Sweep streets if visible soil material is carried out from the construction site. • Treat accesses to a distance of 100 feet from the paved road with a 6 to 12 inch layer of wood chips or mulch. • Treat accesses to a distance of 100 feet from the paved road with a 6-inch layer of gravel.	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
3.5-3	Short-term construction emissions that expose persons to substantial levels of toxic air contaminants.	N/A	Less than significant
3.5-4	Short-term objectionable odors exposure to sensitive receptors due to construction activities.	N/A	Less than significant
3.5-5	Long-term emissions from project maintenance activities.	N/A	Less than significant
3.5-6	Program-related emissions conflict with state goals for reducing greenhouse gas emissions.	N/A	Less than significant
Noise			
3.6-1	Construction-related conflicts with local noise standards.	**3.6-1: Noise Reducing Construction Practices.** The following mitigation measures shall be implemented to reduce noise impacts of construction activities within 400 feet of residences: • Limit construction activities in all cases to 7:00 a.m. to 7:00 p.m. • Configure the construction site in a manner that keeps noisier equipment and activities as far as possible from noise sensitive locations, including the placement of staging areas as far as practicable from nearby residences. • Require that all construction equipment powered by gasoline or diesel engines have sound-control devices that are at least as effective as those originally provided by the manufacturer. • Preventing excessive noise by shutting down idle vehicles or equipment. • When practical, use noise barriers between major construction activities and noise sensitive land uses or take advantage of existing barrier features (e.g., terrain to block sound transmission to noise-sensitive land uses). To be effective, the barriers shall break the line of sight between the noise-sensitive use and on-site construction equipment.	Potentially significant and unavoidable

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		• Designate an on-site construction complaint and enforcement manager for the project and notify neighbors and occupants within 400 feet of the Project construction area at least 30 days in advance of extreme noise generating activities about the estimated duration of the activity.	
3.6-2	Temporary construction noise disturbances to local receptors.	*See Mitigation Measure 3.6-1 above.*	Potentially significant and unavoidable
Hazards and Hazardous Materials			
3.7-1	Encounter and potential release of undocumented contaminated soil or groundwater during construction.	**3.7-1: Procedures if Hazardous Materials Discovered.** If evidence of hazardous materials is discovered during Project activities, the Applicant shall notify the appropriate County Environmental Health Services. The Applicant shall test and analyze the materials following proper protocols to determine the presence of hazardous substances prior to making arrangements for off-site reuse/recycling or disposal. Testing shall be performed according to one of the following methods: 1. The method recommended by the County Environmental Health Services in the county in which the materials are located. 2. If the County Environmental Health Services does not specify a method, then the potentially hazardous material shall be tested as follows: a. Conduct representative sampling of the material in accordance with procedures specified in Section One of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" SW-846, 3rd Edition, US EPA (US EPA, 2014; US EPA, 2013). b. Arrange for testing of the material by a laboratory following the analytical procedures outlined in CCR Title 22, Division 4.5. The laboratory performing the testing shall be certified to perform the specific waste analysis by the State of California Department of Environmental Health.	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		c. Deliver samples to the testing laboratory with a "Chain of Custody" type document which indicates the sample type, date and time sample was taken, sample size, source of the waste, quantity of the waste, the type of sample container, place and address of collection, and the name and signature of collector. 3. If testing indicates the presence of contamination, then the contaminated materials shall be excavated and disposed of in a permitted off-site disposal facility prior to completion of construction.	
3.7-2	Contamination from accidental release of contaminants from construction equipment (fuels, lubricants, etc.)	*See Mitigation Measure 3.2-1, Procedures to Prevent Contamination from Construction Equipment, in the Water Quality section.*	Less than significant
3.7-3	Human health hazards from misapplication of herbicides.	*See Mitigation Measure 3.4-12, Implement Herbicide Protective Actions, in the Biology section.*	Less than significant
3.7-4	Accidental ignition of a wild fire by construction equipment.	**3.7-2: Fire Prevention Measures.** 1. All earthmoving and portable equipment with internal combustion engines shall be equipped with spark arrestors. 2. Work crews shall have appropriate fire suppression equipment available at the work site. 3. On days when the fire danger is high and a burn permit is required (as issued by the relevant Air Pollution Control District), flammable materials, including flammable vegetation slash, shall be kept at least 10 feet away from any equipment that could produce a spark, fire, or flame.	Less than significant
Land Use			
3.8-1	Potential conflicts with adjacent non-agricultural land uses.	N/A	No impact
3.8-2	Potential conflicts with adjacent agricultural land uses.	**3.8-1: Coordinate with Adjacent Landowners and Implement Access Restrictions.** The following measures shall be implemented to reduce impacts of restoration on adjacent agricultural lands:	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		• The Project sponsor shall coordinate with adjacent landowners providing access and/or storage areas for project construction activities and materials. Access and construction work area plans acceptable to all parties shall be developed prior to the start of any construction abutting potentially affected lands. • In locations where post-construction access to private agricultural lands by the public may be facilitated by restoration efforts, the Project shall provide warning signage (i.e., Private Property – No Trespassing) and wildlife-friendly fencing along the creek as needed.	
Aesthetics			
3.9-1	Short-term impacts to views during construction.	**3.9-1**: **Construction Fencing and Educational Signage.** In areas where construction activities would be visible to substantial numbers of viewers, SCWA shall place interpretive signage explaining the restoration process and goals. In addition, stockpiles shall be located away from public views and, if that is not feasible, screening fencing shall be placed to limit public views of equipment storage and soil stockpiles from public paths and recreation areas.	Less than significant
3.9-2	Long-term Program impacts on views.	N/A	No impact
Recreation			
3.10-1	Reduction in recreation opportunities during and following project construction.	**3.10-1: Provide Alternate Access to High-Use Recreational Sites.** The following measures shall be implemented as feasible to reduce impacts of construction access: • Where feasible, provide alternate trail and creek access where such access would be eliminated due to Project construction. • Stage restoration work in high-use areas to permit continued access to parts of reaches that are not undergoing active construction activities. • Minimize construction work limits. • To the maximum extent feasible, store equipment and soil stockpiles within the active construction zone.	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		• If necessary, provide alternate access to picnic areas and formal trails/pathways that avoid the active construction zone. • Provide an alternative canoe take out above the Olmo-Hammond-UCD site when boat take-out at that site is interrupted. **3.10-2: Implement Applicable Yolo County Recreation Policies, Where Feasible.** The Project sponsors shall work closely with Solano and Yolo Counties, University of California, Davis, and adjacent landowners to facilitate their provision of public access and recreational infrastructure into the Proposed Project on public lands and in places where the landowner is a willing participant and where impacts to sensitive biological resources can be avoided.	
Cultural Resources			
3.11-1	Construction impacts to significant cultural resources.	**3.11-1**: **Establish a Buffer.** In order to minimize or eliminate the possibility that Project-related ground-disturbances would impact the integrity of the documented site components and/or human remains, a buffer of at least 100 feet shall be defined around the presently-mapped boundaries of each archaeological site. No ground-disturbing Project activities could occur within this buffer or the mapped site boundaries. This would reduce potential impacts to less-than-significant levels. **3.11-2**: **If Unrecorded Cultural Resources are Encountered.** If an inadvertent discovery of cultural materials (e.g., unusual amounts of shell, animal bone, glass, ceramics, structure/building remains, dark soil deposits and charcoal, stone implements and flakes, etc.) is made during Project-related construction activities, ground disturbances in the area of the find shall be halted and a qualified professional archaeologist will be notified regarding the discovery. The archaeologist shall determine whether the resource is potentially significant per the CRHR and develop appropriate mitigation to protect the integrity of the resource and ensure that no additional resources are impacted. Mitigation could include, but not necessarily be limited to preservation in-place, archival research,	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		subsurface testing, or contiguous block unit excavation and data recovery.	
3.11-2	Construction impacts to human remains.	**3.11-3**: **Human Remains.** The county sheriff/coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code Section 7050.5[b]). If the coroner determines that the remains are those of a Native American, he or she must contact the NAHC by phone within 24 hours of making that determination (Health and Safety Code Section 7050[c]). Following the coroner's findings, the property owner, contractor or Project proponent, an archaeologist, and the NAHC-designated MLD shall determine the ultimate treatment and disposition of the remains and take appropriate steps to ensure that additional human interments are not disturbed. The responsibilities for acting upon notification of a discovery of Native American human remains are identified in PRC Section 5097.9. The landowner shall ensure that the immediate vicinity (according to generally accepted cultural or archaeological standards and practices) is not damaged or disturbed by further development activity until consultation with the MLD has taken place. The MLD shall have 48 hours to complete a site inspection and make recommendations after being granted access to the site. A range of possible treatments for the remains, including nondestructive removal and analysis, preservation in place, relinquishment of the remains and associated items to the descendants, or other culturally appropriate treatment may be discussed. Assembly Bill (AB) 2641 suggests that the concerned parties may extend discussions beyond the initial 48 hours to allow for the discovery of additional remains. AB 2641(e) includes a list of site protection measures and states that the landowner shall comply with one or more of the following: • Record the site with the NAHC or the appropriate Information Center;	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		• Utilize an open-space or conservation zoning designation or easement; and/or • Record a document with the county in which the property is located. The landowner or their authorized representative shall rebury the Native American human remains and associated grave goods with appropriate dignity on the property in a location not subject to further subsurface disturbance if the NAHC is unable to identify a MLD or the MLD fails to make a recommendation within 48 hours after being granted access to the site. The landowner or their authorized representative may also re-inter the remains in a location not subject to further disturbance if they reject the recommendation of the MLD, and mediation by the NAHC fails to provide measures acceptable to the landowner. Adherence to these procedures and other provisions of the California Health and Safety Code and AB 2641(e) will reduce potential impacts to human remains to a less-than-significant level.	
Transportation/Traffic			
3.12-1	Construction conflicts with Yolo or Solano County transportation planning policies.	N/A	Less than significant
3.12-2	Substantial increase in roadway hazards during construction.	N/A	Less than significant
3.12-3	Adverse effects on emergency access during construction.	N/A	No impact
3.12-4	Adverse effects on public transit, bicycle, or pedestrian facilities.	N/A	No impact
Public Services			
3.13-1	Increased demand for police services during or after construction.	N/A	Less than significant
3.13-2	Increased demand for fire services during or after construction.	N/A	Less than significant
Utilities and Service Systems			

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
3.14-1	Potential impacts on storm water drainage facilities.	*See Mitigation Measure 3.1-2, Standards for Modification or Replacement of Storm Drains, in the Hydrology section.*	Less than significant
3.14-2	Impacts on landfill capacity due to construction waste.	N/A	Less than significant
3.14-3	Construction impacts to pipelines and electrical lines.	**3.14-1**: **Locate and Avoid Buried Pipelines.** In accordance with state Government Code Section 4216 et seq. and guidance issued by the U.S. Department of Transportation Pipeline & Hazardous Materials Safety Administration (PHMSA), the Project applicant and excavator will contact the regional notification center at least two working days, but not more than 14 calendar days, prior to commencing that excavation. If practical, the excavator shall delineate the area to be excavated with white paint or other suitable markings. In accordance with Government Code Section 4216.4, if consultation with the regional notification center indicates a Project excavation is near a pipeline, then the excavator shall determine the exact location of the pipeline by excavating with hand tools before using any power-operated or power-driven excavating or boring equipment. However, power-operated or power-driven equipment may be used for the removal of any existing pavement if there are no subsurface installations contained in the pavement. If documented notice of the intent to use vacuum excavation devices, or power-operated or power-driven excavating or boring equipment, has been provided to the pipeline operator, and it is mutually agreeable with the operator and the excavator, the excavator may utilize vacuum excavation devices, or power-operated or power-driven excavating or boring equipment within the approximate location of a pipeline. If the exact location of the pipeline cannot be determined by hand excavating, the excavator shall request the pipeline operator to provide additional information, to enable the excavator to determine the exact location of the installation. In the event Project activities discover damage or cause damage to a pipeline installation, including all breaks, leaks, nicks, dents, gouges,	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		grooves, or other damage, to lines, conduits, coatings, or cathodic protection, the Project applicant and excavator shall immediately notify the pipeline operator. If a pipeline is damaged and the operator cannot be contacted, the excavator shall call 911 emergency services.	

1 INTRODUCTION

The Yolo Basin Foundation (YBF), in close collaboration with the Solano County Water Agency (SCWA) and the Lower Putah Creek Coordinating Committee (LPCCC), has prepared this Program Environmental Impact Report (PEIR) as part of the *Lower Putah Creek Restoration Project, California Department of Fish and Wildlife Ecosystem Restoration Program (ERP Grant No E1183015)*, which proposes to restore and enhance geomorphic and ecological function of approximately 24.2 miles of Putah Creek below the Putah Diversion Dam. The ERP grant was awarded to YBF to fund preparation of the PEIR.

This PEIR analyzes a program of restoration actions proposed for the Lower Putah Creek Restoration Project Upper Reach—the portion of Putah Creek between the Putah Diversion Dam (PDD) and the western boundary of the Yolo Bypass Wildlife Area (YBWA). This reach of Putah Creek crosses a combination of privately (primarily) and publically owned lands over two counties. The restoration efforts described in this PEIR are planned by the Solano County Water Agency (SCWA) and the Lower Putah Creek Coordinating Committee (LPCCC) for implementation over the next 5 to 15 years.

This PEIR is intended to provide the public, responsible agencies, and trustee agencies with information about the potential environmental effects of the proposed Upper Reach Program of the Putah Creek Restoration Project. The Upper Reach Program, hereinafter referred to as the "Program" is, for purposes of CEQA, the proposed Project. YBF and SCWA have prepared this PEIR in compliance with the California Environmental Quality Act (CEQA) of 1970 (as amended) and the State CEQA Guidelines (14 California Code of Regulations [CCR]) section 15000 et seq.).

SCWA is the lead agency under CEQA, and will be responsible for certifying the Final EIR and issuing findings for the Putah Creek Restoration Upper Reach Program. SCWA, and its project partner the LPCCC, will be responsible for planning, design, environmental review, securing permits, construction management, monitoring, and maintenance for all of the activities that collectively form the Program described herein.

1.1 GENERAL BACKGROUND

SCWA is responsible for water supply, flood protection, and stream stewardship in Solano County, California. SCWA manages streams, canals, and dams throughout the county to fulfill its responsibilities. SCWA acts not only as Solano County's water wholesaler but also

has a limited flood protection role in the county. SCWA's stream stewardship includes creek restoration and wildlife habitat projects, mitigation monitoring, and pollution prevention efforts. SCWA approves LPCCC restoration activities on Putah Creek and acts as LPCCC's fiscal agent. SCWA is the CEQA lead agency for preparation of the PEIR.

The LPCCC was formed by a settlement agreement (the Putah Accord[1]) between Solano County water users and Yolo County environmental advocates concerning operations of the Solano Project, as related to adequacy of in-stream flows to sustain native fish and wildlife resources of Putah Creek. The LPCCC consists of representatives of the Boards of Supervisors of Solano and Yolo counties; Cities of Davis, Fairfield, Suisun, Vacaville, Vallejo, and Winters; SCWA; Solano Irrigation District; Maine Prairie Water District; University of California, Davis; Putah Creek Council; and landowners along Putah Creek. The LPCCC serves as the watershed group joining several primary stakeholders together to oversee implementation of the Putah Accord, and to undertake maintenance, restoration, enhancement, and protection of Putah Creek's natural resources between the Putah Diversion Dam and the Yolo Bypass.

Implementation of the Program described herein would be a continuation of restoration and enhancement activities that have been conducted by SCWA and the LPCCC on Putah Creek since 2002. Documents prepared in support of restoration and enhancement activities conducted to date include:

- Lower Putah Creek Watershed Management Action Plan, Phase I – Resource Assessments (EDAW, 2005).
- Lower Putah Creek Watershed Management Action Plan – Proposed Projects (EDAW/AECOM, 2008).
- CEQA Initial Study and Mitigated Negative Declaration (IS-MND) for Winters Putah Creek Nature Park/Floodplain Restoration and Recreational Access Project (Wallace-Kuhl, 2008).

Additional funding would be needed to implement restoration work described in this PEIR, and is anticipated to come from a combination of local, state, and/or federal sources.

[1] Second Amended Judgement, Putah Creek Council v. Solano Water Agency and Solano Irrigation District, Sacramento County Superior Court Case Number 515766, October 30, 2002.

All Program activities would be performed on properties of *willing landowners* only. More details regarding the proposed Upper Reach Program are provided in Chapter 2, Project Description.

1.2 INTENDED USES OF THE ENVIRONMENTAL IMPACT REPORT

This chapter discusses CEQA requirements for the Program, public involvement in the CEQA process, and organization of the PEIR.

As described in Section 15121(a) of the State CEQA Guidelines, an EIR is a public information document that assesses potential environmental effects of a proposed project and identifies mitigation measures and alternatives to the Project that could reduce or avoid adverse environmental impacts (14 CCR Section 15121[a]).

The purpose of this PEIR is to analyze the environmental impacts of implementing the Upper Reach Program of proposed activities over a period from approximately 2015 to 2030. The proposed Program consists of the implementation of a combination of stream restoration and habitat enhancement activities along approximately 24 miles of Lower Putah Creek, extending from the downstream face of the PDD to the western boundary of the YBWA, as shown on Figures 1-1 and 1-2.

The lead agency has determined that a PEIR is the appropriate CEQA document to comprehensively address short- and long-term activities planned for the Putah Creek Upper Reach. A PEIR reviews the environmental impacts "of a series of actions that can be characterized as one large project" and that are related geographically, as logical parts in a chain of proposed actions, in connection with general criteria to govern the conduct of a continuing program, and/or "as individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways" (CEQA Guidelines, Section 15168, subd. [a]). A PEIR offers several advantages over multiple separate project-level CEQA documents, including providing for a more exhaustive consideration of cumulative effects and alternatives, avoiding duplicate consideration of cumulative impacts and policy issues, reducing paperwork, and allowing the lead agency to consider program-wide mitigation measures "at an early time when the agency has greater flexibility to deal with basic problems or cumulative impacts" (CEQA Guidelines, Section 15168, subd. [b]).

Figure 1-1

Project Location

Source: Stillwater Sciences

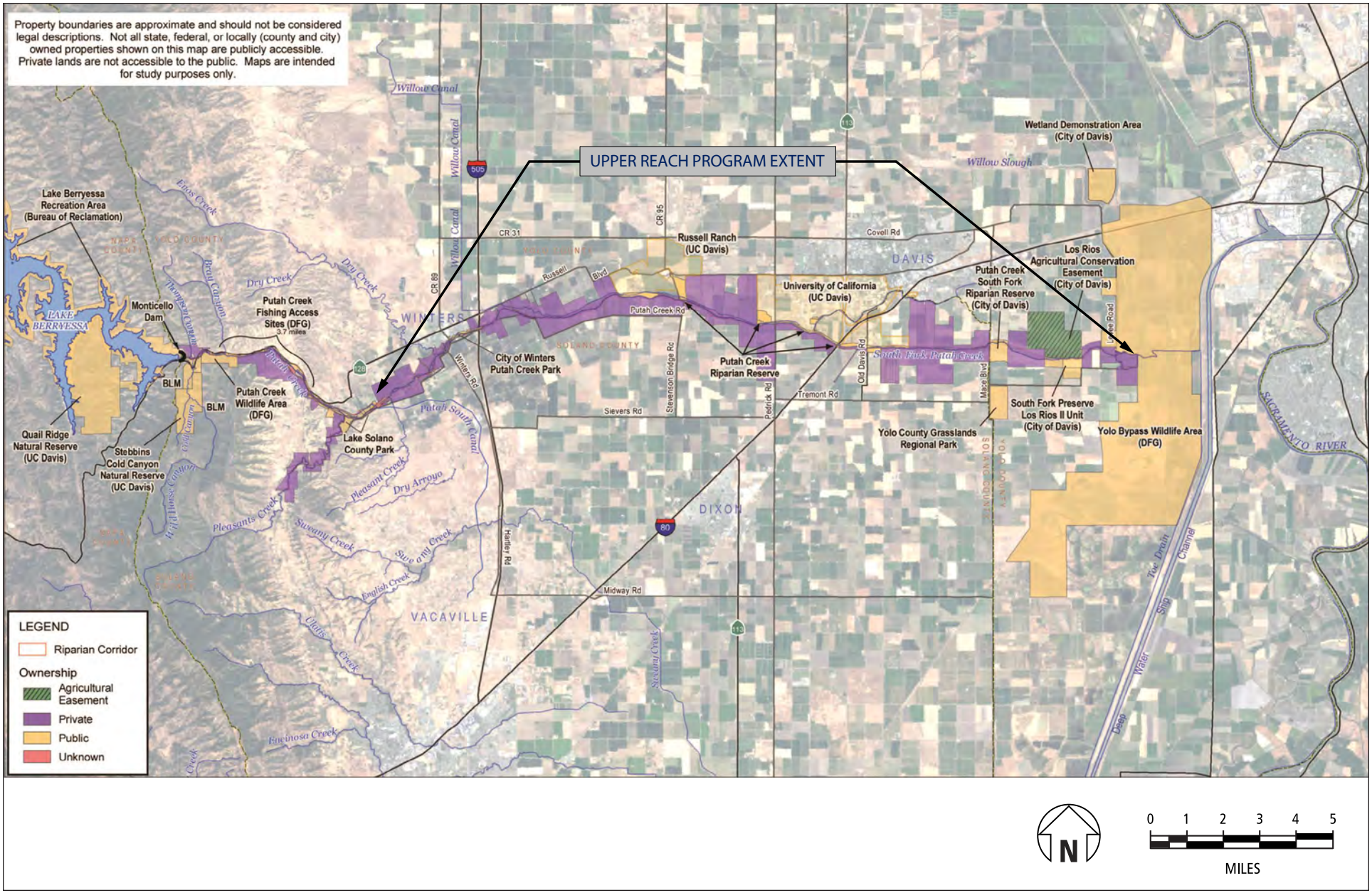


Figure 1-2

Regional Vicinity Map

Sources: USGS 2003, Yolo County 2002, Solano County 2002, UC Davis 2005

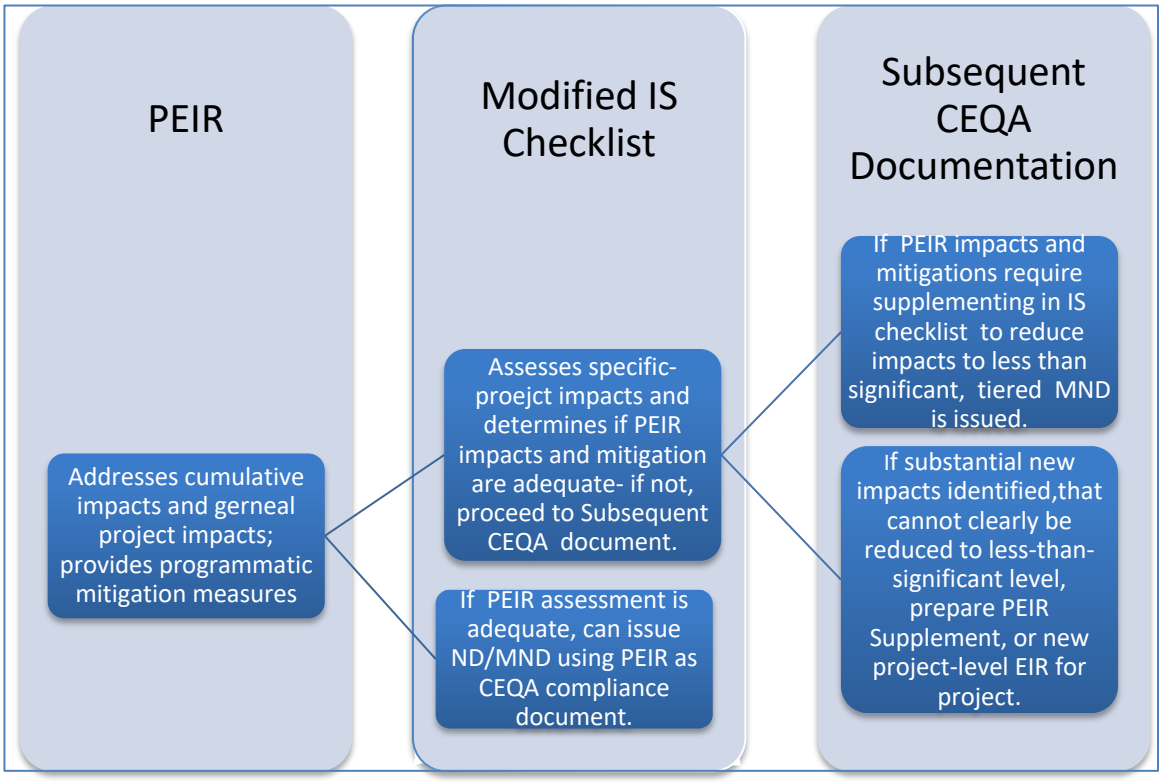
This PEIR discloses relevant information about the proposed Program and alternatives being considered, and invites all interested agencies, organizations, and individuals to play a role in both the decision-making process and implementation of the decision. The document provides federal, state, and local decision makers with detailed information concerning the environmental effects and the significance of these impacts. Further information on the federal, state, and local environmental permits and regulating (responsible) agencies is provided below.

This PEIR is intended to meet CEQA requirements and to integrate CEQA review with related consultations and anticipated programmatic and project-level permit requirements. SCWA, in its role as the CEQA lead agency, will use the PEIR to comply with CEQA review requirements for its approval of each of the restoration activities described herein. Program-level documentation may provide sufficient CEQA analysis to meet site-specific, project-level analysis for future projects, or additional documentation may be needed to fulfill CEQA compliance. This determination will be made by the lead agency on a case-by-case basis, typically with preparation of an Initial Study.

The procedure for conducting the CEQA review for projects addressed at a program level in this EIR is as follows:

1. The specific project design proposed will be evaluated to determine if it may result in any different or greater impacts than described in this EIR. That assessment will be documented in either a standard (CEQA Guidelines Appendix G) Initial Study checklist or a modified version of that checklist that focuses on impacts associated with this type of project.
2. If it is determined, on the basis of substantial evidence, that the analysis performed in this program EIR adequately assesses project-specific impacts, then the lead agency for the specific project may approve that project using this EIR as the CEQA review.
3. If, on the basis of the checklist review, it is determined that new or more severe impacts than described in this EIR may result from a specific project, but that those impacts clearly can be reduced to a less-than-significant level with the application of additional mitigation measures, then a tiered Initial Study/Mitigated Negative Declaration may be used in conjunction with this EIR as the CEQA documentation for that project.

Figure 1-3 CEQA Review for Projects under the Upper Reach Program



4. If, on the basis of the checklist review, a fair argument remains that any project-specific impacts may still be significant after mitigation, then a focused EIR would be prepared. This may be in the form of either a new EIR tiered off of this EIR or a supplement to this EIR.

The Responsible Agencies may use this PEIR for their respective permit approvals. A list of possible state and local permit approvals that the PEIR may be used to support is described in Section 1.4, below.

1.3 RESPONSIBLE AND TRUSTEE AGENCIES

The PEIR is being circulated to responsible agencies, trustee agencies, and interested stakeholders. The following responsible, permitting, and trustee agencies have been identified:

- Office of Historic Preservation
- California Department of Fish and Wildlife
- California Department of Transportation
- California Regional Water Quality Control Board

- California State Lands Commission
- Central Valley Regional Water Quality Control Board
- Central Valley Flood Protection Board
- Yolo County
- Solano County
- University of California, Davis

Federal agencies that also may review this document and utilize portions of it in their permitting include:

- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- National Marine Fisheries Service

1.4 ANTICIPATED PERMITS AND APPROVALS

Implementation of the Lower Putah Creek Restoration Upper Reach Program will require compliance with multiple federal, state, and local laws and regulations. This section identifies the permits or approvals that may be needed for the implementation of Program activities. Discussions of applicable laws, regulations, and policies are provided in the resource sections of Chapter 3. Other agencies may use the information provided in this PEIR for their permitting and approval processes.

1.4.1 Anticipated Permits and Approvals for Program Implementation

Federal Agency Permits

- U.S. Army Corps of Engineers (USACE)
  - Regional General Permit (RGP)
- U.S. Fish and Wildlife Service/National Marine Fisheries Services
  - Federal Endangered Species Act (ESA) Section 7 Consultation for the USACE RGP

State and Local Agency Permits

- Central Valley Regional Water Quality Control Board
  - Program 401 Water Quality Certification (following RGP)

1.4.2 Anticipated Permits and Approvals for Individual Project Implementation

State and Local Agency Permits

- Solano County Water Agency (SCWA)
  - Discretionary Grading Permits, under Solano County authority pursuant to Solano County Code Sec. 31-22(i)
- California Department of Fish and Wildlife
  - 1600 Streambed Alteration Agreement
- California State Parks Office of Historic Preservation
  - Consultation with State Historic Preservation Officer (SHPO), if required for USACE permitting
- California State Water Resources Control Board
  - General Permit for Waste Discharge Requirements
- Central Valley Flood Protection Board
  - Encroachment Permit
- Central Valley Regional Water Quality Control Board
  - 401 Water Quality Certification (for projects not adequately covered by RGP)
  - National Pollutant Discharge Elimination System (NPDES) General Construction Stormwater Permit (requires applicant to develop and implement a Stormwater Pollution Prevention Plan [SWPPP])
- Solano County
  - Public Works Encroachment Permit (for ingress to and egress from individual project areas in cases where the project may impact public rights-of-way)
- Yolo County
  - Public Works Encroachment Permit (for ingress to and egress from individual project areas in cases where the project may impact public rights-of-way)
- Yolo-Solano Air Quality Management District
  - Permit to Operate
  - Portable Equipment Registration Program

1.5 CEQA PROCESS

1.5.1 Scoping Comment Period

Scoping refers to the public outreach process used under CEQA to determine the coverage and content of an Environmental Impact Report (EIR). The scoping comment period offers an opportunity for public review and comment in the early phases of a project. The formal scoping process for an EIR is initiated by publication of the Notice of Preparation (NOP) required by CEQA, which provides formal notice to the public and to interested agencies and organizations that a Draft EIR (DEIR) is in preparation. During the scoping period, agencies and the public are invited to comment on the Project, the approach to environmental analysis, and any issues of concern to be discussed in the DEIR. Scoping also can assist the lead agency with identification of project alternatives and mitigation measures.

In accordance with State CEQA Guidelines (14 CCR Section 15082[a], Section 15103, Section 15375), SCWA circulated a NOP for the proposed Program on January 30, 2015 (see **Appendix A**). The NOP, in which SCWA was identified as the lead agency for the proposed Program, was circulated to the public; to local, state, and federal agencies; and to other interested parties. The purpose of the NOP was to inform responsible agencies and the public that the proposed Program could have significant effects on the environment, and to solicit their comments so that any concerns raised could be considered during the preparation of the PEIR. In addition, SCWA held a public scoping meeting on February 12, 2015, to provide the public with another opportunity to comment. Comments received in response to the NOP and at the public scoping meeting are included in **Appendix B**, and the preparers of this PEIR considered these comments.

1.5.2 Draft PEIR Public Comment Period

The Draft Program Environmental Impact Report (Draft PEIR) was prepared and distributed by the Solano County Water Agency (SCWA) on June 1, 2016. Under CEQA guidelines, after completion of the Draft EIR, lead agencies are required to consult with and obtain comments from public agencies having jurisdiction by law over elements of the project, and to provide the general public and interested parties opportunities to comment on the Draft EIR. The lead agency also is required to respond to substantive comments on environmental issues raised in this review and consultation process. The Solano County Water Agency, as lead agency on this project, held a 45-day review period for the Draft EIR from June 1 to July 22, 2016. Letters received through July 22 have been included in this document. A public hearing on the Draft EIR was held on June 28, 2016.

1.5.3 Preparation of Final PEIR

A Comments and Responses addendum to the Draft PEIR was prepared in 2017 to respond to comments on the Draft PEIR received from the public and concerned agencies during the formal public review period. The Draft PEIR has been revised as necessary to incorporate any changes required as a result of the comments. The revised Draft PEIR, along with the Comments and Responses addendum, constitute the Final EIR for the Lower Putah Creek Restoration Project Upper Reach Program.

1.5.4 Update of Final EIR

SCWA postponed adoption of Final PEIR from 2017 to Fall of 2022. Due to this passage of time, SCWA determined that the Final PEIR should be reviewed to identify if any updates were required to make the document current. This update included a review of all technical analyses included in the Final PEIR, as well as restoration projects that have been implemented in the intervening years, and any other substantive changes that could affect project impacts. Restoration projects that have been implemented subsequent to circulation of the Draft PEIR include:

1. River Parkway Grant Phase 3 to end of City limit – Creek channel and floodplain were re-configured to a more narrow and shallow shape for better fish habitat. Weedy invasive species were removed and native plants were reestablished. Public access features were added to create a 'nature park'.

2. NAWCA Phase 4 – Similar work as at Phase 3, above.

3. River Parkway Phase 1 - removal of perc dam 2010 (pre-2016 but not listed in the PEIR as completed). In addition to the removal of a derelict percolation dam, the Creek channel and floodplain were re-configured to a more narrow and shallow shape for better fish habitat.

4. River Parkway Grant Phase 2 – from below the railroad bridge (1500 upstream) to upstream from previous the sewer ponds location. Similar work as Phase 1, above.

5. NAWCA 2 PDD to Dry Creek (through CWA) – Similar work as at River Parkway Phases 3 and 4.

6. Trash removal projects, fuel tank at Nishikawa, homeless encampments at Putah Creek Park.

7. Planting on McNamara near the triangle parcel. Eucalyptus removal 2018-2019

8. Establish cottonwoods at Winters 2018, established field nursery of cottonwoods

9. Scarification of multiple sites 2013- on, except 2020 Reaches 1, 2, 3, 4, and 5 (NAWCA/Mariani, Duncan-Giovannoni, Winters Putah Creek Nature Park, East of 505, and Warren).

10. Mertz dam removal 2021 in Reach 1, NACWA- Mariani.

11. Eucalyptus (30 trees) removal downstream of Stevenson Bridge, 2019.

12. Opposite McNamara main parcel (now Turkovich) blackberry control and tree of heaven removal NRCS grant subcontractor 2017.

13. Fermin Hernandez re-vegetation, 2020 – Reach 1, NACWA- Mariani.

14. Eucalyptus removal at Hasbrook, 2021– Reach 1, NACWA- Mariani .

15. Harris - removal of deadfall and storm debris, 2020-2021.

16. Dry Creek Confluence transplanted cottonwoods on south bank, mixed riparian on north bank to help with post-fire recovery, 2018-2022.

This updated review resulted in edits to the biological resources, noise, and air quality/GHG/energy sections of the document to bring those analyses current to 2022 conditions. No new or substantially more sever impacts were identified (in fact, air quality and GHG impacts were reduced), so recirculation the DEIR for public review is not required.

1.5.5 FPEIR Review and Certification

After review of the FPEIR, SCWA staff will recommend to SCWA Board of Directors whether to approve or deny the proposed Program. This governing body then will review the FPEIR, consider SCWA staff recommendations and public testimony, and decide whether to certify the FPEIR and approve, modify, or deny the proposed Program.

Because certain significant impacts are identified in the PEIR that cannot be mitigated, a statement of overriding considerations must be included in the record of the proposed Program approval and mentioned in the Notice of Determination, to be filed with the State Office of Planning and Research and at the office of the County Clerk (14 CCR Section 15093[c], Section 15094). Filing of the Notice of Determination starts a 30-day period for filing of any litigation challenging the PEIR.

If the Program is approved, SCWA will also adopt requisite CEQA findings and a Mitigation Monitoring and Reporting Program. After certification of the PEIR, at the close of the 30-day challenge period, CEQA responsible agencies may use this document in subsequent individual project approvals.

1.6 ORGANIZATION OF THIS PEIR

This PEIR contains the information required by CEQA Guidelines (Sections 15120-15131). It is organized into the following chapters:

- **Executive Summary:** Summarizes the PEIR contents, includes a summary table of anticipated impacts and proposed mitigation measures, and briefly describes alternatives eliminated from further consideration, including the environmentally superior alternative.
- **Chapter 1. Introduction:** Provides an overview of the PEIR and the proposed Program, including background, an introduction to the CEQA process, and anticipated permits/approvals.
- **Chapter 2. Description of Project:** Describes the Project site, objectives, activities, and implementation and sequencing.
- **Chapter 3. Environmental Setting, Impacts, and Mitigation Measures:** Describes the affected environment, analyzes the environmental impacts, including site specific and cumulative effects, and identifies mitigation measures to reduce or avoid significant impacts.
- **Chapter 4. Alternatives:** Describes a range of reasonable alternatives and compares their impacts to those of the proposed Program.
- **Chapter 5. Other Statutory Considerations:** Discusses cumulative impacts, growth-inducing effects, irreversible and irretrievable commitments of resources, energy analysis, and significant and unavoidable impacts to comply with various requirements of CEQA.
- **Chapter 6. Consultation and Coordination:** Identifies agencies and individuals that contributed to the preparation of this document and are involved in ensuring compliance with other environmental laws.
- **Chapter 7. References**: Lists references cited in the PEIR, organized by chapter.
- **Appendices**: Provides scoping documents and technical studies and information supporting the PEIR analyses.

2 PROJECT DESCRIPTION

2.1 PROJECT LOCATION

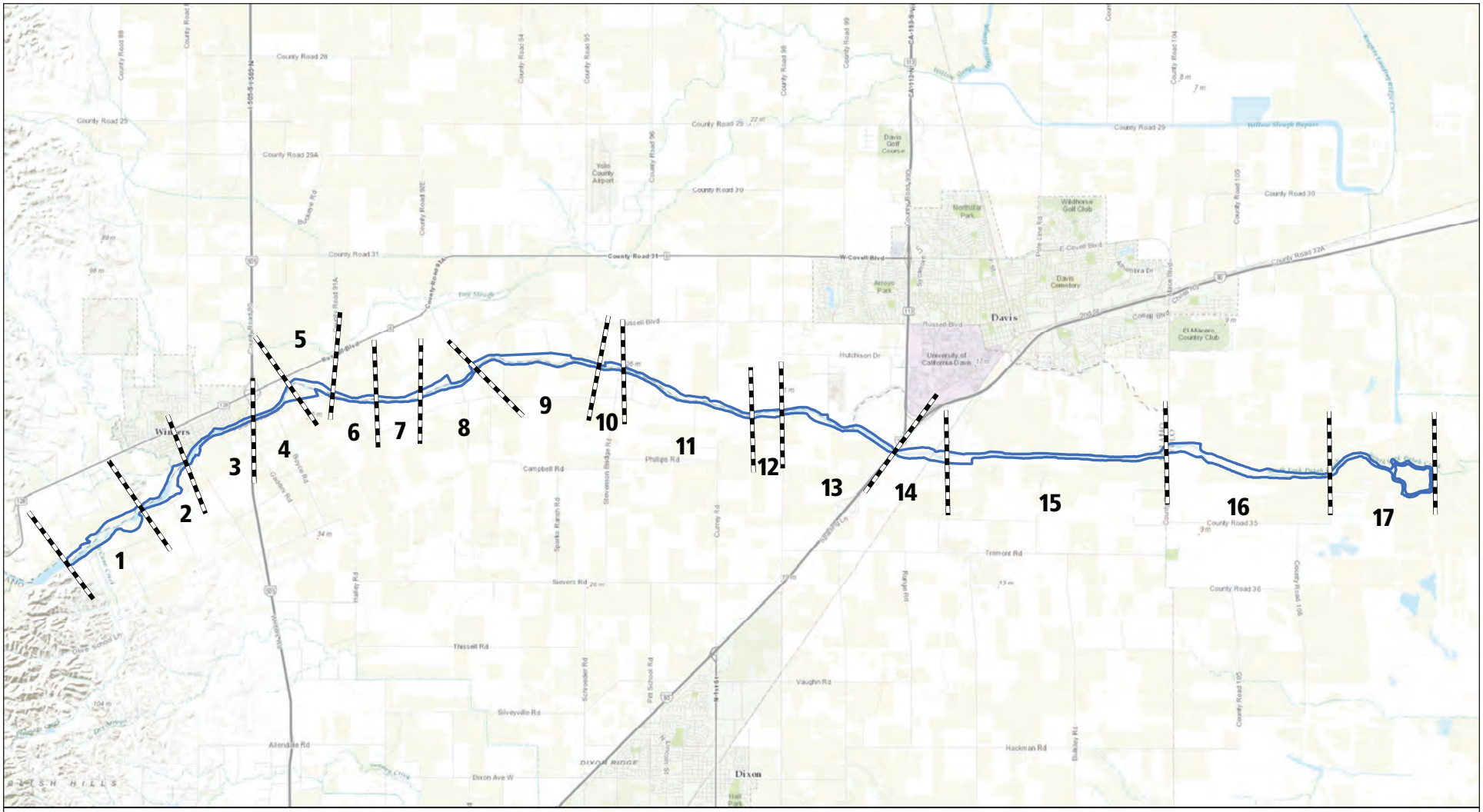
Putah Creek Restoration Upper Reach Program activities would occur within and along an approximately 24.2-mile length of Putah Creek, extending from the downstream face of the Putah Diversion Dam (PDD) to the western boundary of the Yolo Bypass Wildlife Area (YBWA), as shown in Figures 1-1 and 1-2 in Chapter 1, *Introduction.* The Program footprint (Program Area) includes the creek, its riparian area, banks, terraces, adjacent wetlands, and adjacent seasonally flooded riparian forest, and encompasses approximately 1,354 acres. Through most of the Program Area, the creek forms the border between Solano and Yolo counties, with the exceptions of two reaches that lie entirely within Solano County (I-80 to Old Davis Road Reach and Old Davis Road to Mace Reach) and two reaches that lie entirely within Yolo County (Mace Road to Road 106A Reach and Road 106A to YBWA Reach), on the eastern edge of the Program Area.

The Program Area is bordered to the south in many places by rural Putah Creek Road, various intermittent farm roads to the south and north, and by the Cities of Winters and Davis to the north. The precise boundaries of the Program Area are shown in **Figure 2-1**.

2.2 PROJECT BACKGROUND

Although Lower Putah Creek (including its riparian corridor) is one of the largest remaining tracts of high-quality wildlife habitat in Yolo and Solano counties and provides habitat for a unique assemblage of fish and wildlife species native to the Central Valley, it is characterized by altered channels and eroding banks, habitat loss and degradation, flood and flood control related impacts, invasive weed infestations, and other problems. In the Program Area, the Putah Creek channel is, in many locations, no longer in natural form and function. Gravel extraction, channelization, vegetation removal, and other channel modifications have caused significant degradation of natural channel form, process, and ecology (Stillwater Sciences 2014).

Lower Putah Creek offers a unique opportunity to develop restoration projects to optimize benefits to fish, wildlife, and other resources.



Project Study Area Boundary

Stream Reaches (East to West)

1. NAWCA/Mariani
2. Duncan-Giovannoni
3. Winters Putah Creek Nature Park
4. East of 505
5. Warren
6. Upper McNamara
7. Lower McNamara
8. MacQuiddy (Lester)
9. Russell Ranch
10. Stevenson Bridge
11. Glide Ranch
12. Nishikawa
13. Olmo-Hammond-UCD
14. I-80 to Old Davis Road
15. Old Davis Road to Mace
16. Mace to Road 106A
17. Road 106A to Yolo Bypass Wildlife Area

N

0 1 2 3

MILES

Figure 2-1

Program Area Map with Reach Locations

Source: BSK Associates

Ecological damage has been compounded by the trapping of sediments behind the Monticello and Putah Diversion dams, by agricultural diversions, and the South Fork Channel. As a result, the Putah Creek channel has become deeply incised, and is generally lacking in pool-riffle-run sequences, natural meander patterns, and functional floodplains. Gravel extraction operations have created reaches of over-wide channel, characterized by long, featureless pools and devoid of floodplains. Extensive Gravel Mining Occurred on Putah Creek West of Winters (circa Putah Creek Road at Olive School Road) as shown in a 1952 photo (**Figure 2-2**). These reaches cannot 'self-adjust' to more natural morphology, because flow velocities are insufficient to mobilize sediment, and natural gravel recharge is substantially arrested. In this condition, the creek is virtually devoid of riffles and spawning habitat, and lacks the materials and functions needed to build such features naturally.

Source: SCWA Archives.

Figure 2-2 1952 Photo Showing Extensive Gravel Mining on Putah Creek West of Winters (Putah Creek Road at Olive School Road)

2.3 PROGRAM OBJECTIVES

CEQA requires that an EIR include a statement of the underlying objectives to be achieved by a proposed project (CEQA Guidelines Section 15124 subd. [b]). These objectives are intended to help the lead agency develop a range of reasonable alternatives, and to aid decision makers in preparing findings including, if necessary, a statement of overriding considerations.

The overall Program purpose is to restore and rehabilitate the creek channel, banks, and associated habitats to more natural, self-sustaining form and function, consistent with the current (post-Monticello Dam) hydrologic regime. The Program would be implemented to stop further degradation of the creek corridor and to "jump-start" natural geomorphic and ecological processes in site-specific locations.

In the Lower Putah Creek Restoration Project planning process, goals and objectives were established by a group of stakeholders. The goals and implementing objectives for the Upper Reach Program are:[1]

GOAL 1: IMPROVE PASSAGE, REARING, AND EMIGRATION OF ADULT AND JUVENILE SALMONIDS IN PUTAH CREEK	
At YBWA/Upper Reach Boundary	
Objective 1.3	Provide for effective fish passage for essential life history stages – i.e., structural passage and recruitment and emigration flows – between the Yolo Bypass and Putah Creek above the Yolo Bypass Wildlife Area
Between YBWA and Putah Diversion Dam	
Objective 1.4	Provide for effective fish passage for essential life history stages – i.e., structural passage and recruitment and emigration flows – on Putah Creek from the YBWA boundary to upstream spawning grounds below the Putah Diversion Dam
Objective 1.5	Restore, enhance, and maintain spawning and rearing physical habitats and processes on Putah Creek below the Putah Diversion Dam
Objective 1.6	Provide necessary flow regimes and water quality conditions for recruitment, rearing, and emigration of self-sustaining runs of salmonids on Putah Creek
Objective 1.7	Incorporate natural planform and cross sectional geomorphology that supports structural habitat complexity and natural hydrologic, geomorphic, and ecological processes

GOAL 4: PRESERVE AND ENHANCE, WHERE POSSIBLE, EXISTING BENEFICIAL USES INCLUDING PUBLIC ACCESS, WILDLIFE VIEWING, HUNTING AND FISHING, BALANCED WITH EXISTING, ENHANCED, AND RESTORED ECOLOGICAL FUNCTIONS	
Objective 4.1	Maintain a balance of existing fish and wildlife habitats, hunting, fishing, wildlife viewing, and other public benefits including water supply and agriculture between the PDD and YBWA

[1] Six goals were established for the Lower Putah Creek Restoration Project. Goals 2 and 3 were specific only to the Project on the Yolo Bypass Wildlife Area, Goal 5 is specific only to the Upper Reach Program

GOAL 5: ENHANCE HABITATS FOR DELTA NATIVE FISHES AND WILDLIFE WITHIN THE PUTAH CREEK PROJECT UPPER REACH	
Objective 5.1	Provide for effective fish passage for essential life history stages – i.e., structural passage and recruitment and emigration flows – on Putah Creek above YBWA to upstream spawning grounds below the Putah Diversion Dam (same as Objective 1.4)
Objective 5.2	Restore, enhance, and maintain spawning and rearing physical habitats and processes on Putah Creek below the Putah Diversion Dam (same as Objective 1.5)
Objective 5.3	Provide necessary flow regimes and water quality conditions to support anadromous and other native Delta fishes on Putah Creek
Objective 5.4	Incorporate natural planform and cross sectional geomorphology that supports structural habitat complexity and natural hydrologic, geomorphic, and ecological processes (same as Objectives 1.7)
Objective 5.5	Maintain and enhance native riparian vegetation communities along Putah Creek below the Putah Diversion Dam
Objective 5.6	Maintain a balance of existing fish and wildlife habitats, hunting, fishing, wildlife viewing, and other public benefits, including water supply and agriculture, between the PDD and YBWA (same as Objective 4.1)

2.4 PROGRAM ACTIVITIES

The proposed Program activities are designed to work together in a comprehensive manner to achieve the Program objectives identified above, and have been grouped to simplify the analyses of their effects for the purposes of CEQA and associated environmental permits. The activities would be implemented (singly or in combination) in a series of individual actions (projects), applied to specific locations within the Program Area, as determined by site-specific conditions.

For the purposes of Program planning and implementation, the Upper Reach has been further divided into 17 Project reaches (Figure 2-1). **Table 2-3** shows the Project activities that may be implemented at each project reach within the overall Project Area. Each individual project implemented under the Program would be designed to address site specific conditions, and would be subject to environmental review (see Chapter 1, Section 1.2), and permitting (See Chapter 1 Section 1.4.2). Preliminary maps and summaries of conditions and anticipated activities and outcomes for the individual Project reaches are provided in **Appendix C**. All in-stream activities would be implemented adaptively, based upon understanding of the ecosystem and its changes over time, and based upon information gained from ongoing monitoring and management of previously implemented projects. A site-specific Adaptive Management Plan would be developed for each individual project, based on the specific desired environmental outcomes and the potential for environmental impacts (See Section 2.5 Monitoring and Adaptive Management, below).

Activities proposed under the Upper Reach Program fall into three general categories: (1) channel reconfiguration, (2) vegetation management, and (3) maintenance. A more detailed description of the activities that may be undertaken within each of these categories follows. As stated above, site-specific Project implementation may entail application of only one or a combination of these activities.

2.4.1 Channel Reconfiguration

A “stable” stream is in dynamic equilibrium when, over time, sedimentation processes are balanced so that the channel, while adjusting locally to variable conditions, maintains the same general morphological character. A stream's morphology is a result of its response to two principal driving variables—runoff and sediment yield—acting in concert with channel boundary conditions to determine the channel planform, cross section, and grade. Boundary conditions include the valley slope, geology, resistance, substrate type and size, and vegetation. They may also include natural or man-made controls such as dams, bridges, and water levels of receiving water bodies. Changes in sediment load, flow regime, and boundary conditions can disrupt this balance, resulting in rapid morphologic changes. When long-term erosion exceeds sedimentation, channel incision occurs. Channel modification, such as enlargement or straightening for flood control or water diversions, is probably the most common human-induced cause of channel incision, and often results in the most severe cases. Other human-induced causes of channel incision include reduced sediment load due to upstream dams. In a typical incising channel, the streambed degrades until the critical bank height is exceeded and the bank fails, increasing channel width and sediment load. In severe cases, nick points and nick zones migrate upstream and destabilize large parts of the system, including tributaries. Over time, the stream would move toward a new equilibrium. However, in systems (such as Putah Creek) where incision is initiated by watershed changes that affect hydrology and sediment yield, a new equilibrium may take decades or even centuries to achieve (Fischenich, 2000).

As is typical of incised channels, Putah Creek in the Program Area is deep, broad, and lacks a defined or stable low flow channel. The banks are steep and subject to ongoing failure. Pool and riffle habitat is lacking and riparian vegetation is often rare or absent. The original floodplain habitat has become hydrologically disconnected from the stream. Channel incision has been a major cause of floodplain and wetland deterioration and loss. For these reasons channel reconfiguration on Putah Creek is a high priority.

Proposed Program activities would reconfigure degraded areas of the creek channel to more natural cross-sectional form (confined, sinuous low flow channel with adjacent floodplain surfaces) to stabilize eroding banks, facilitate channel shading with bank-side riparian vegetation, lower water temperatures, and improve habitat values for native fish species. A narrower (more efficient) low flow channel would also serve to increase flow velocities, restore competency of the channel to mobilize gravels (for spawning), and restore geomorphic processes that support natural channel and ecosystem dynamics. Implementation of these activities would expand the geographical extent of high-quality habitat for native fish species, including local fall-run Chinook salmon and steelhead, and increase riparian habitat by converting shallow, open water areas to floodplains. Channel reconfiguration activities may consist of modifications to channel geometry, construction of grade/flow control structures, stabilizing channel banks, improving spawning gravels, and/or filling abandoned gravel pits. These activities are described in detail below.

Implementation of channel reconfiguration activities may entail temporary disturbance of channel banks and clearing of vegetation adjacent to the channel, temporary dewatering of the creek channel in all or portions of the project reach, and the use of heavy equipment for earthmoving and related restoration work (see also Section 2.6 for more detail on construction related activities). Channel reconfiguration activities would be accomplished via balanced cut and fill operations within the Program Area. No fill would be imported. Generally, vegetation clearing would be limited to a 50-foot maximum width zone adjacent to the flow channel. Native riparian vegetation, particularly mature riparian trees, would be preserved within individual restoration projects wherever feasible. Areas of the (existing or created) floodplain that have been subject to compaction from vehicle and/or equipment traffic would be ripped or otherwise prepared to restore the substrate to conditions suitable to support establishment of native species and functions.

Channel Geometry

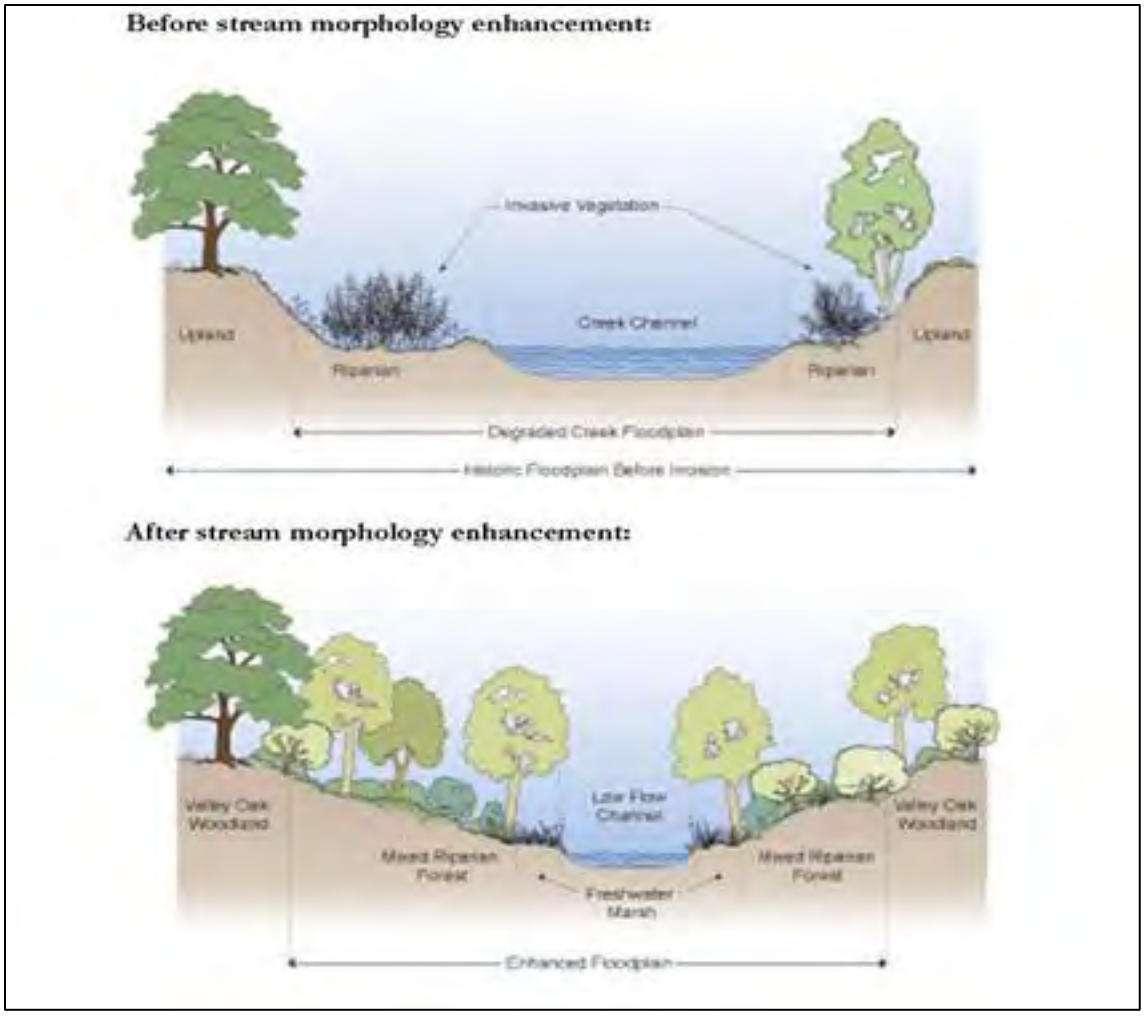
As described above, the role of physical structure is important to restoration strategies that seek to improve the ecological function of stream systems. Channel reconfiguration and realignment actions are applied to restore geometry, meander, sinuosity, substrate composition, structural complexity, re-aeration, stream bank stability, re-establishment of riffle substrates, re-establishment of riparian vegetation, and stabilization of stream banks.

Program actions to restore functional channel morphology on Putah Creek may include modification of channel cross-section, planform, and longitudinal profile. Each potential component of channel geometry modification activities is described below.

Create Low Flow Channel and Floodplain

Naturally meandering alluvial streams produce floodplains with spatially diverse hydrology and plant types, and often contain a variety of wetlands. These floodplain wetlands serve many functions and provide important habitats for a diversity of fish and wildlife species. Floodplains are especially important to fishes inhabiting streams and rivers. Due to their high productivity and quickly warming waters in spring, floodplains are important spawning and rearing areas for many fish species. Floodplain wetlands act as nutrient and sediment sinks—improving water quality in the stream. They also provide storage capacity that can decrease magnitude of downstream floods, benefiting stream fishes and riparian landowners. Animals other than fish also rely on floodplain habitat. Many amphibians and reptiles require floodplain habitats for some or all of their life stages, and floodplain habitat loss has been linked to declines in some species. Neotropical birds rely upon riparian habitats associated with floodplains for feeding and roosting. Much of the migratory waterfowl in the United States could not survive without access to healthy floodplain habitat, and many animals that are not generally thought of as wetland species thrive in floodplains because of their natural productivity.

To create a low flow channel bordered by functional floodplain surfaces, alluvial material from within the project reach stream corridor would be excavated and placed within the (currently over-wide) channel (**Figure 2-3**). Modified channel dimensions, including channel invert width, channel bank slopes, and floodplain width, would be determined based upon reach specific conditions. In reaches that were heavily mined for gravel, substantial quantities of fill may be required to create the desired channel morphology. In such cases, appropriate material would be obtained from adjacent project reaches within the Program Area.



Source: EDAW, 2005.

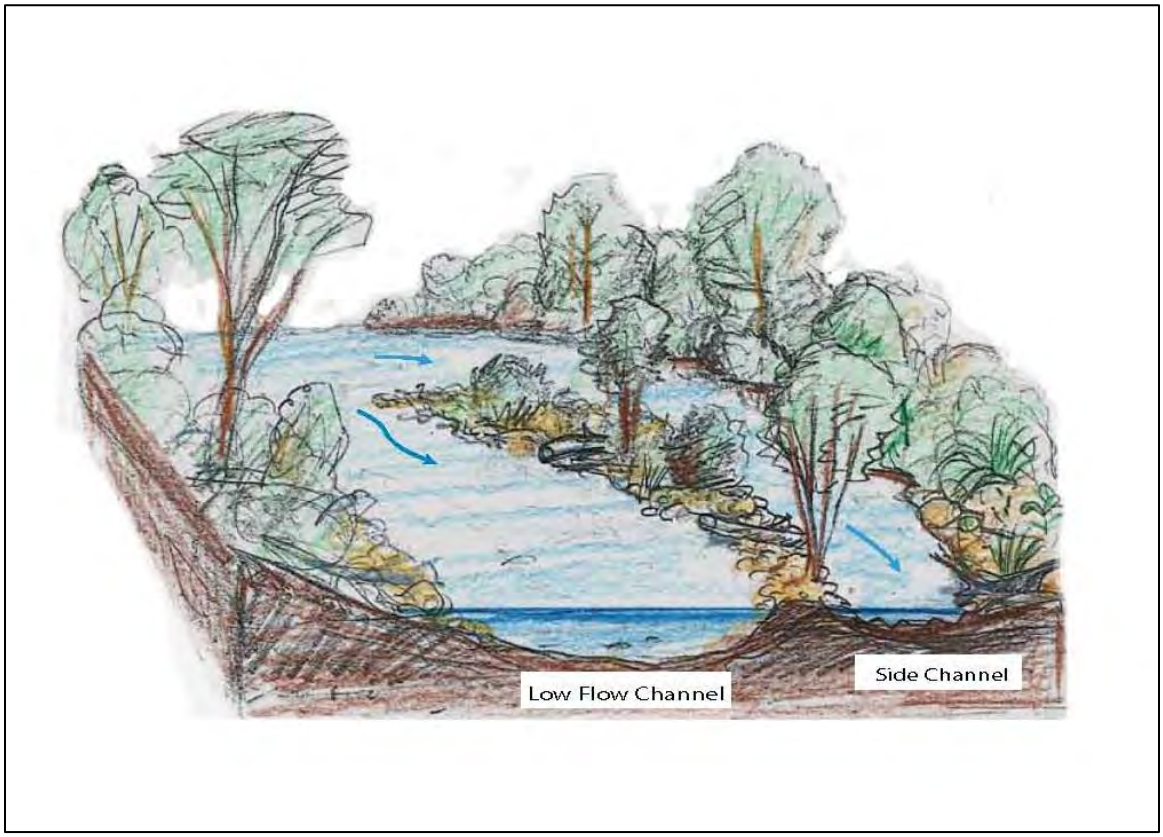
Figure 2-3 Typical Channel Reconfiguration

Create Side Channels

Secondary side channels carry flows from the main creek channel through adjacent floodplain areas before rejoining the main channel downstream. Side channels can reduce high stage flow rates and velocities in the main channel during storm events. These areas can also provide important habitat for salmonids due to lower velocities, cover (large wood, pools, edge complexity), and higher food production.

In areas where the stream corridor is wide enough, secondary side channels may be excavated adjacent to the main low flow channel. These channels would have smaller cross-sectional areas than those of the main low flow channel (**Figure 2-4**). The side channels would be constructed by excavating and grading to define a new channel. Side channel geometry would be determined based upon site specific design flows and channel configuration. The side channel edges would be graded to create transitional

habitat and cover as flow rates rise and fall during the winter months. Wood structures (see Section 2.4 below, *Install Large Woody Debris*) may be installed to provide habitat, channel complexity, and to maintain hydraulic and geomorphic function within the channels. The new side channels would provide velocity refugia, areas for foraging, and protection from predators. The side channels would provide similar function during larger storm events and would also alleviate erosive forces in the main channel that are causing bank erosion in some locations on Putah Creek.

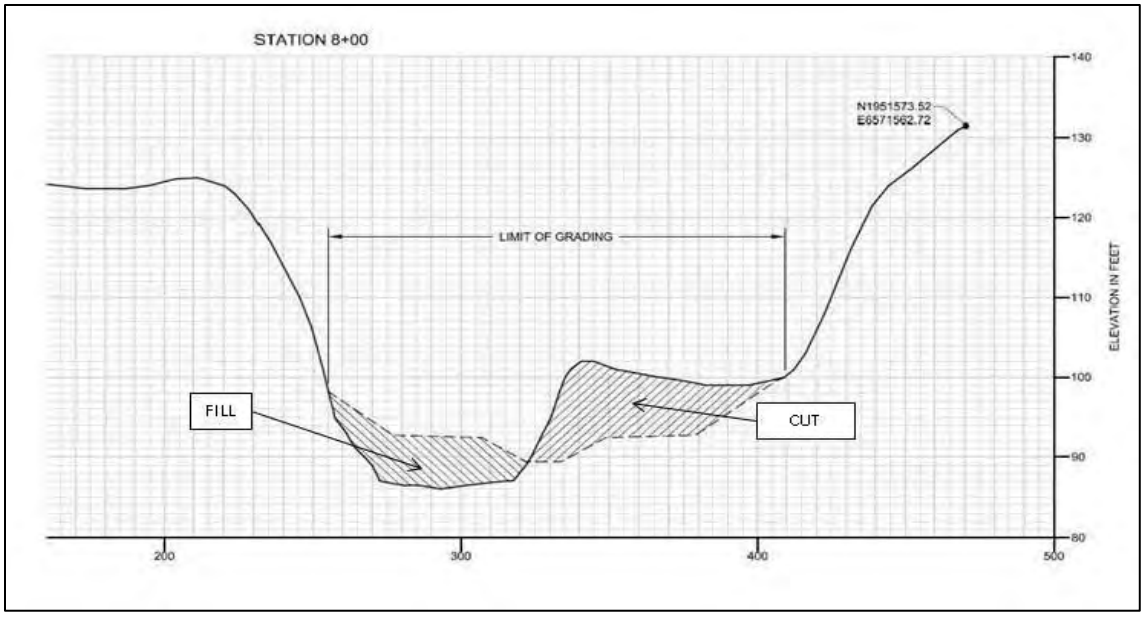


Source: ESA, 2014.

Figure 2-4 Main Channel and Side Channel – Typical

Reposition Thalweg

In areas where the channel thalweg (the deepest point in the channel cross section) has been negatively "captured" by an in-channel pool, or its location is contributing to bank instability, the thalweg would be repositioned within the active channel. Thalweg repositioning would involve excavating a new thalweg and/or filling all or portions of the old thalweg with the excavated material (**Figure 2-5**). In reaches where the thalweg is repositioned, work may also include repositioning of sand or gravel bars to function properly with the realigned channel thalweg.



Source: LPCCC, 2015.

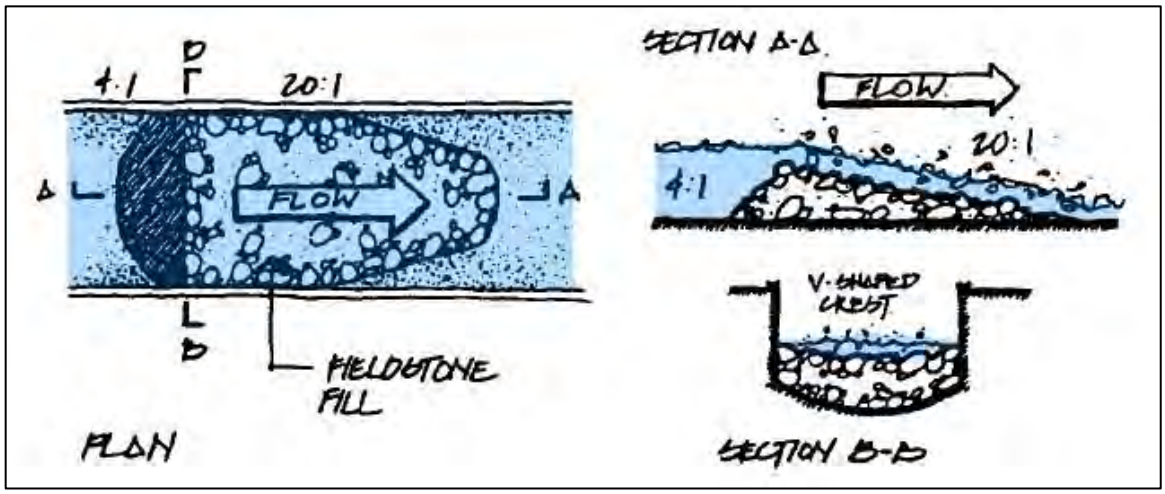
Figure 2-5 Grading to Reposition Thalweg – Typical

Construct Riffles

Riffle and pool habitats are lacking in Putah Creek and are critical to successful enhancement efforts. Riffles, high points in the channel bed with higher flow velocities, provide spawning habitat if suitable gravel size and flow conditions are present. Pools, low points in the channel bed with slower velocities, provide valuable and necessary locations for juvenile salmonid rearing, cover, and foraging and are resting locations for migrating adults. As noted previously, the formation of riffle-pool sequences in Putah Creek has been disturbed by construction of structures that artificially control the slope of the water surface, by excavation of the channel for gravel mining and other activities, by long, straight, and confined reaches, and by entrapment of stream sediments behind the Monticello and Putah Diversion dams.

Riffles would be constructed by placing appropriately sized (relatively coarse) substrate material into the active channel to raise the channel invert adjacent to or within existing in-channel pools, or by realigning the low flow channel so that it crosses suitable in-channel gravels, and filling the former channel (**Figure 2-6**). Appropriately sized gravels would be collected from within the reach or imported from local sources. Gravels would be placed into the stream bed using a loader. Where gravels must be imported, the majority would come from the nearby Putah South Canal spoil site. A maximum of 10,000 cubic yards of gravel would be placed in the Program Area per year. In some locations, wood structures would be installed in conjunction with gravel placement activities to induce channel sinuosity, bar formation, and to support natural processes

that would continue to form and/or maintain riffles and pools. Installation of wood structures at the channel margins would also provide (immediate) critical cover and foraging habitat for fish (see *Construct Log Revetments*, below).



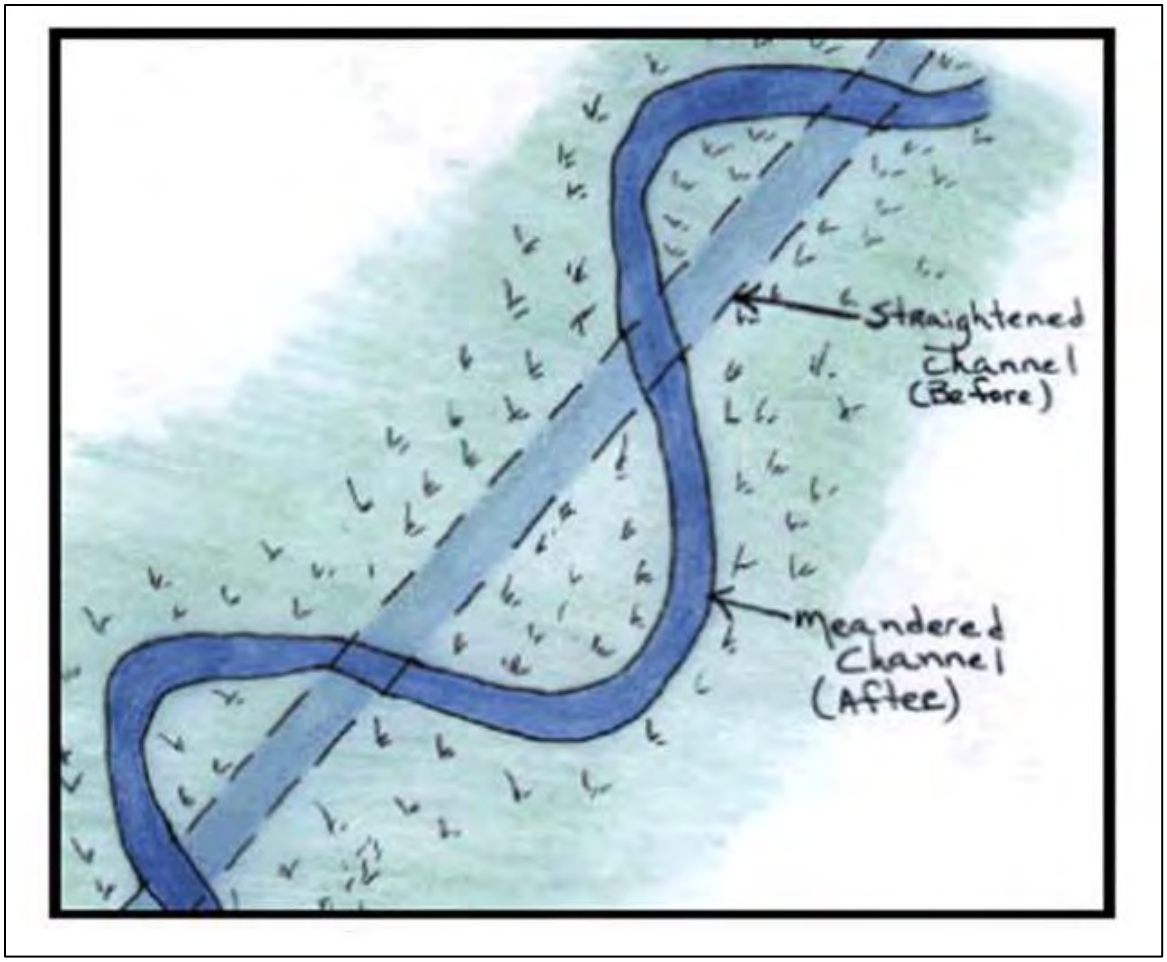
Source: Hough, 1993.

Figure 2-6 Constructed Riffle – Typical Plan and Section Views

Increase Channel Sinuosity

Stream meander restoration is the restoration of natural alignment, channel capacity, and meander relationships to establish a functional, stable stream consistent with the modern hydrologic regime. This type of channel reconfiguration would transform a straightened stream reach to a more curvilinear planform, based upon channel size and meander relationships in conjunction with expected flow and sediment regimes and the geomorphology of the area. Meandering channels offer physical stability and support natural ecological functions of the stream corridor. Meandering channels typically have higher levels of physical habitat diversity than straightened channels.

In areas of the stream corridor where low flow channel and floodplain morphology exists, but with an unnaturally straight alignment, a new meandering low flow channel alignment would be excavated and the excavated material would be used to fill the old, straightened channel alignment (**Figure 2-7**).



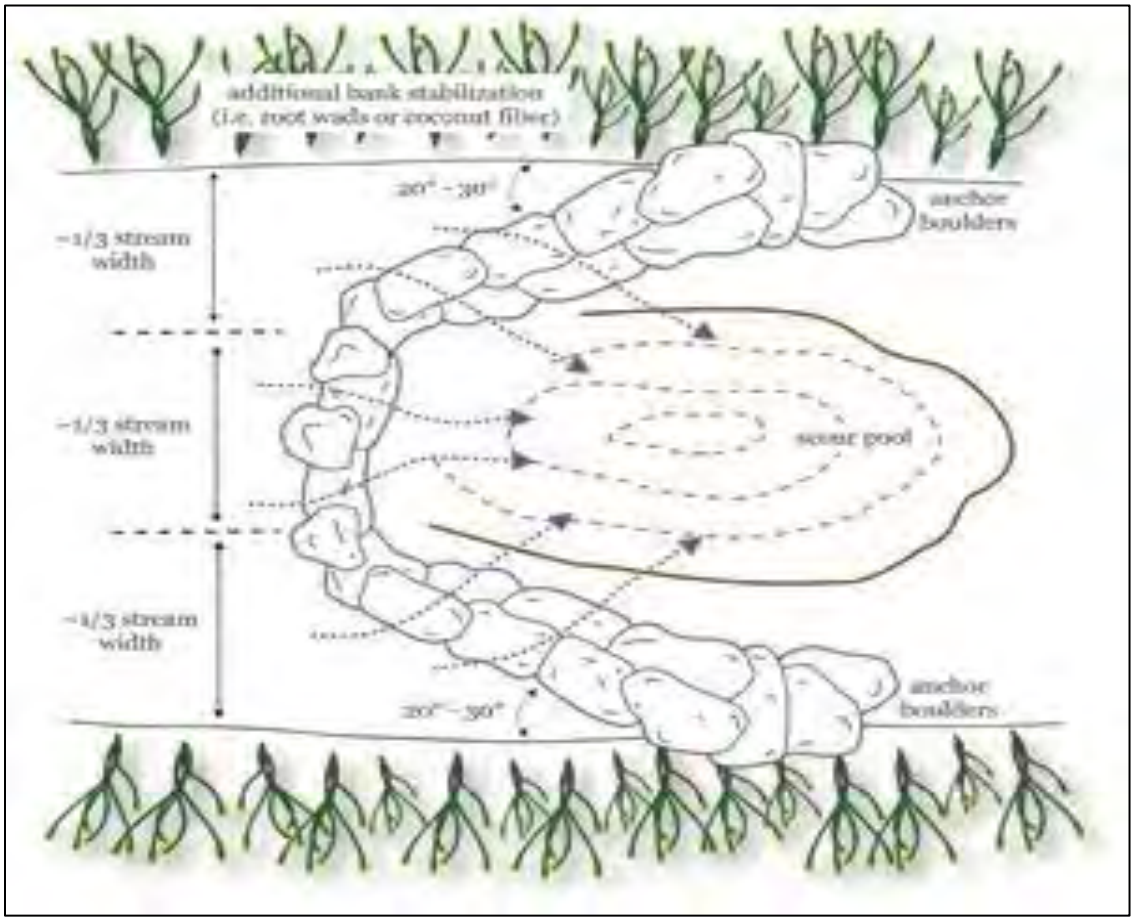
Source: USACE, 2007.

Figure 2-7 Stream Meander Restoration – Schematic

Construct Grade/Flow Control Structures

Grade control structures, such as rock cross-vanes and weirs, can decrease near-bank shear stress, velocity and stream power, but increase the energy in the center of the channel. Rock cross-vanes and similar grade control structures would be installed to establish grade control, reduce bank erosion, create a stable width/depth ratio, and maintain channel capacity, while maintaining sediment transport capacity and sediment competence (**Figure 2-8**). The cross-vane also can improve stream habitat by: 1) increasing bank cover due to a differential raise of the water surface in the bank region, 2) creating holding and refuge cover during both high and low flow periods in the deep pool, 3) developing feeding lanes in the flow separation zones (the interface between fast and slow water) due to the strong down-welling and up-welling forces in the center of the channel, and 4) creating spawning habitat in the tail-out or glide portion of the pool.

Rock sizes and placement locations of grade control structures in Putah Creek would be determined based on site-specific conditions and calculations of bank-full shear stress. Large boulders used in constructing these features would be gathered on-site (where possible) and/or imported from local sources.



Source: Hill et al., 2007.

Figure 2-8 Rock Cross-Vane – Typical Plan View

Stabilize Channel Banks

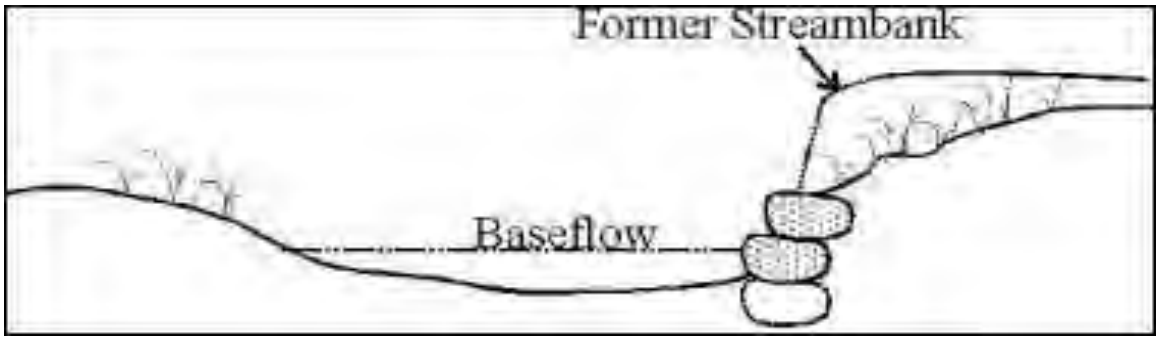
Maintaining stable banks is the foundation of stewardship and water quality protection efforts along the creek. Bank erosion contributes fine sediments to the creek that degrade the water quality and habitat conditions for salmonids and other aquatic species. Increased sediment reduces visibility needed for foraging, can cover or bury incubating salmonid eggs, and the associated increased level of nutrients can reduce oxygen levels in the water.

Priority would be given to bank stabilization methods that can provide multiple benefits (e.g., cover, velocity refuge, shade, and foraging opportunities). Channel bank stabilization methods that may be employed include installation of rock revetment, log revetment, root wads, and/or large woody debris. These structural approaches may also incorporate the use of native plant materials (e.g., willow fascines, live stakes and cuttings, brush matting) and/or geotextiles/erosion control fabric. Rock material used in these installations would be sourced on-site to the extent possible. Large logs and or root wads would primarily be sourced on-site or from neighboring agricultural operations (dead orchard trees and eucalyptus removed in riparian forest management, for example). Live native cuttings and brush would similarly be collected on-site or from adjacent lands.

Construct Rock Revetments

Along streams, the most erosion prone area is the toe of the stream bank. Failure at the toe of the stream bank can result in failure of the entire bank and lead to large influxes of sediment to the stream. Rock (or boulder) revetments serve to protect the most vulnerable portion of the stream bank. Rock revetments are often combined with other bank stabilization measures to protect the stream bank area above the revetment.

Rock revetments would be created by first excavating a trench below the invert of the stream along the toe of the stream bank. In this trench, a series of generally large, flat or rectangular boulders would be placed as a foundation for the revetment stones. Once the foundation stones were been installed, the revetment stones would be placed on top the foundation stones (**Figures 2-9** and **2-10**). Rocks or boulders would be placed up to the ordinary high water elevation. If protection is needed higher on the bank, a second set of rock may be placed on top of the first. Rock size would be determined based on reach specific stream velocity conditions. Used alone, rock revetments have only a modest potential to enhance stream habitat. Rock revetment may be combined with planting of live cuttings in interstices between the rocks to increase habitat value.



Source: Pier+Kieli, 2007.

Figure 2-9 Rock Revetment Concept Drawing

Source: The Stormwater Manager's Resource Center.

Figure 2-10 Rock Revetment Under Construction

Construct Log Revetments

Log revetments are constructed by cabling logs along eroding stream banks to deflect, absorb, and diffuse the erosive force of stream flows. To facilitate sediment settling, brush is densely packed around the large logs (**Figure 2-11**).

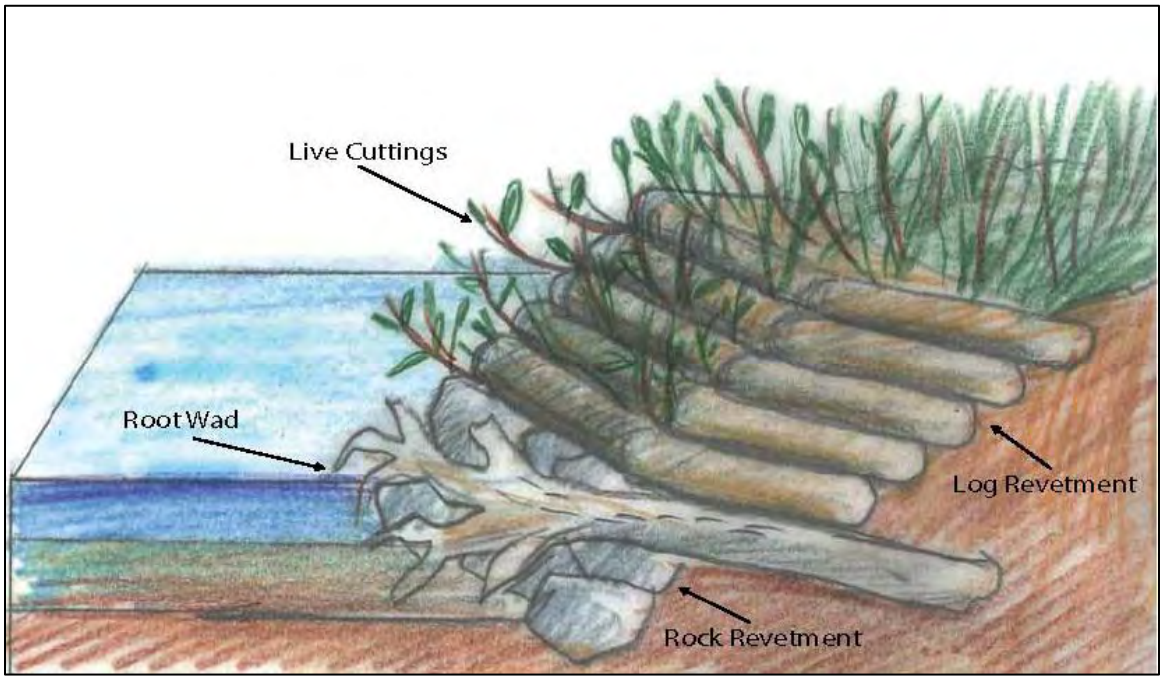
Source: ESA, 2014.

Figure 2-11 Log Revetment Immediately Post Construction

Logs would be placed at the streambed, bank toe, and bank, up to the ordinary high water elevation, aligned along the channel banks, and stacked on top of each other. Logs would be anchored to the bed and bank of the channel and attached to each other using cable, rebar, or other similar materials. Logs used to construct revetments would typically vary between 12 and 36 inches in diameter.

Live plant cuttings, brush, and in some cases, soil (where log revetments are installed in conjunction with creation of floodplain surfaces, for example) would be packed between the logs and into the eroding banks, and incorporated with log revetments to further stabilize the structures and to provide forage and refugia for fish and other aquatic and terrestrial wildlife. Log revetments can work in tandem with other stream bank

stabilization techniques, such as rock revetments, root wads, and live willow cuttings (**Figure 2-12**).



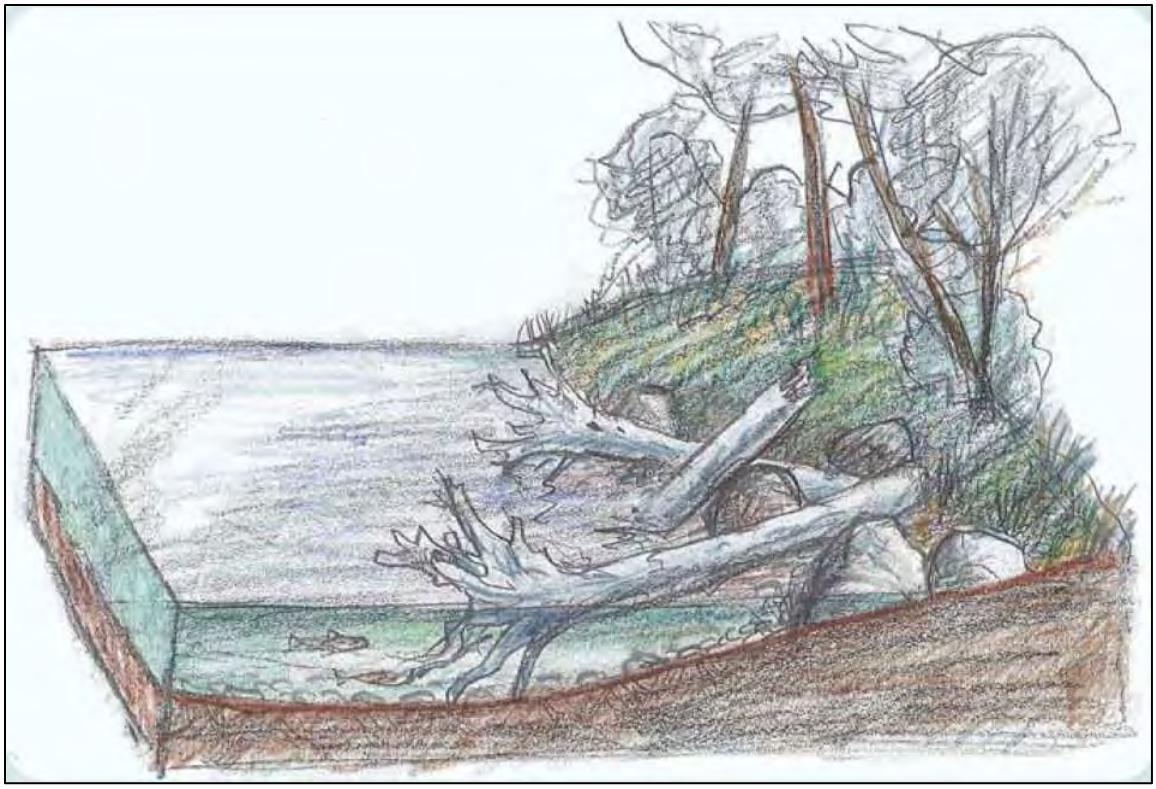
Source: ESA, 2014.

Figure 2-12 Log Revetment, Rock Revetment, and Root Wad Combination, Using Live Cuttings

Install Root Wads

Root wads are log installations that can be embedded in the stream bank to deflect flow against the bank, create instream habitat for fish and other aquatic species, and add roughness to the channel and floodplain. Root wads provide cover, velocity refuge, shade, and foraging locations for fish (perennially in the main channel and seasonally on the floodplain, under high flow conditions). Root wad structures can provide necessary cover and food sources for salmonids immediately following construction.

Root wads would be constructed by embedding the trunk of a “footer log” into the bank, below the thalweg, topped diagonally by a second log, with root crown and roots projecting into the channel to form an “X”. The logs would be anchored to the bed and bank of the channel and attached to each other using cable, rebar, or other fasteners (**Figure 2-13**).



Source: ESA, 2014.

Figure 2-13 Root Wad

Install Large Woody Debris

Large wood is a vital component of creek systems because it provides lasting structural and habitat components and creates hydraulic conditions that support more sustainable off-channel habitats. Large wood structures can be used to create local scour holes for riffle and pool enhancement, flow deflection, and cover and edge complexity. These structures support significant habitat complexity by creating trapping sediment, and providing cover for fish over a range of flows and depths. The placement and orientation of multiple wood structures can be used to create areas of flow constriction, to direct or turn flow, and to induce scour to maintain openings at connections to side channels.

Large wood structures installed under the Program would typically consist of one to three logs with intact root wads. Construction would include excavation and trenching to embed logs, driving logs into the bank and bed, and interlocking individual logs. The logs would be stabilized using large boulders for ballast, pinning with other logs that would be driven vertically into the bank, or using existing trees to interlock the logs (**Figure 2-14**). Large logs and anchoring boulders would primarily be sourced on-site or from neighboring agricultural operations.

Source: ESA, 2014.

Figure 2-14 Large Woody Debris Anchored by Boulders

Improve Fish Spawning Gravels

Gravel mining and changes in flow regimes created by dam construction have left many salmon-bearing Pacific coast gravel-bed rivers and streams in geomorphically and biologically dysfunctional states. Trapping of coarse gravels has led to deficits in the reaches below the dams. These coarse gravels are a necessary characteristic of spawning beds, so a gravel deficit leads to a reduction in spawning habitats. Poor intragravel conditions, primarily associated with low permeability (caused by an excess of fine material) and/or armoring of substrate materials, have degraded spawning areas. Gravel is a mobile material, so is important for maintaining geomorphic processes that lead to dynamic and diverse stream channels. Since construction of the Monticello Dam, habitat in Lower Putah Creek for spawning and other salmon life stages has become severely degraded, and salmon populations have drastically declined.

The general aim of this category of activities is improvement of spawning habitat, but also the restoration of the geomorphic and biological functioning of the stream such that spawning habitat is naturally maintained over the long term. Program activities would

include gravel augmentation, salvage of gravel for reuse, and loosening of gravels embedded in the creek bed by scarification. Each potential spawning gravel improvement activity is described in more detail below.

Gravel Augmentation and Salvage

Gravel augmentation or gravel replenishment means artificially adding gravel suitable in size distribution for salmon spawning and fry emergence to existing riffles in the streambed where these riffles lacks sufficient or suitable gravel.

Gravel would be augmented in riffles to restore and/or improve conditions in gravel bar deposits for salmon spawning. Gravels would be salvaged from within the Program site from activities that involve excavating gravels, or gravels would be imported to the site. Where gravels must be imported, the majority would come from the nearby Putah South Canal spoil site. Gravels would be placed into the streambed using a loader.

Loosen Embedded Gravels by Scarification

In locations where armoring has rendered streambed gravels unsuitable for use by spawning salmon, gravel scarification may be undertaken to loosen embedded gravels. Scarification would be accomplished using excavators to loosen gravels that are impacted by cementation.

Fill Abandoned Gravel Pits

Historically, side channels on Putah Creek were mined for gravel and disconnected from the stream and its floodplain. Wetland and riparian habitat around these side channels was also destroyed. Fish and aquatic organisms lost access to the slower water flows and adjacent floodplain wetlands the mined areas formerly provided. By filling abandoned gravel pits and reconnecting these areas to the functional creek corridor, these areas would be returned to a more natural state and provide habitat for the threatened Chinook salmon.

The Program would fill and reconnect former gravel pits to the creek as off-channel habitat. Abandoned gravel pits would be filled to floodplain elevation. Isolated (off-channel) pool areas would be retained or may be created. In some locations, fill would be placed to slightly lower elevations to create wetland habitat within the footprint of abandoned gravel pits. Fill material would consist of clean soil and rock. If not available within the site, these materials would be imported from adjacent reaches. Restored gravel pits would be planted with appropriate native plant species (see *Plant Native Vegetation* discussion, below).

2.4.2 Vegetation Management

The vegetation patterns of Putah Creek have changed significantly due to the operation of the Monticello and Putah Diversions dams, agricultural diversions, and other disturbances. Active vegetation management would be undertaken, and would include both invasive vegetation removal and establishment of new native plantings. For the benefit of salmonid habitat, plantings would be designed to: manage stream bank and channel stability; shade the main channel and newly created off-channel habitats; provide surface sediment filtering; provide food sources; restore structural diversity; suppress invasive species; and provide sources of small organic debris and wood for the channel. These activities are further described below.

Remove Invasive Plants

Invasive vegetation control activities would occur year round. Many non–native plants have become naturalized within native habitats in the region, and function as benign, or in some cases even beneficial functions. For the purposes of Program vegetation management activities targeted "invasive plants" are defined as plants having a moderate or high rating by the California Invasive Plant Council (Cal-IPC). Individual restoration project designs will incorporate invasive species controls targeted to site specific conditions. To the extent feasible, native vegetation would be retained on restoration sites. Measures for protection of native vegetation to remain would be implemented prior to commencement of invasive vegetation control activities (See Section 2.6.1).

Weed control activities would typically be accomplished in combination with clearing and grubbing, and followed by revegetation with native wetland and riparian plant species. Invasive vegetation control would be accomplished via manual/mechanical removal, chemical control, or a combination of these methods (**Table 2-1**). Temporary access trails may be created to facilitate weed control activities. Creation of such temporary access features would be undertaken during the construction season.

A. **Manual and/or Mechanical Removal** – Mechanical equipment, such as bulldozers, scrapers, weed whackers, and hand tools, including broom wrenches, would be used to remove invasive weeds and other nuisance vegetation.

B. **Chemical Control** – Herbicides that are approved by the California Department of Pesticide Regulation would be used in accordance with their labels to control invasive weeds and other nuisance vegetation, such as *Arundo donax*, *Lepidium latifolium, Rubus armeniacus*, *Tamarix* spp., and *Ailanthus altissima*.

Plant Native Vegetation

The LPCCC plants native vegetation in all seasons to enhance fish and wildlife habitat and to deter regrowth of invasive weeds. The LPCCC operates a nursery that propagates native plants from locally collected seeds and cuttings or purchased seeds from local sources.

The restored landscape will be planted with native wetland and riparian species, located within the restoration sites according to their physiological requirements, to create natural zonation and structural diversity within the restored habitat.

- Riparian vegetation will be planted on floodplains and channel banks adjacent to the low flow channel. Once established, riparian canopy will shade the creek channle, lowering water temperatures and enhancing aquatic habitat conditions.
- Existing canopy trees that currently serve as roosting, nesting, and forage sites for raptors and a variety of avian species will be preserved on site.
- Plantings will include species such as California blackberry (*Rubus ursinus*) and blue elderberry (*Sambucus nigra* ssp. *caerulea*), which have cover and forage value for birds and other wildlife.

Plant materials will be salvaged from the site or collected and grown from sources within the Putah Creek watershed, in order to preserve local genotypic integrity.

Native plants of up to 4 inches diameter at breast height (DBH) may be transplanted at revegetation sites. Some revegetation sites may also serve as on-site growing grounds for native transplants. Growing grounds sites would be planted at higher densities to compensate for future removal. Such growing ground sites are typically located 100 feet or more from the low flow channel to minimize potential for flood flow obstruction. The LPCCC would install native plant poles, cuttings, seeds, container plants, and plugs following weed management and site preparation activities, such as clearing and grubbing (see Section 2.6.1 below).

Table 2-1 Invasive Vegetation Control Methods

	Mechanical			Herbicides						
Species	**Excavator**	**Loader/ Dozer**	**Weed Wrench**	**Glyphosate**	**Triclopyr**	**Imazapyr**	**Aminopyralid**	**Clorsulfuron**	**Diothopyr**	**Isoxaben**
Almond (*Prunus dulcis*)	✓		✓		✓	✓				
Arundo (*Arundo donax*)	✓			✓						
Black Locust (*Robinia pseudoacacia*)	✓		✓		✓	✓				
Catalpa (*Catalpa bignoniodes*)	✓		✓		✓	✓				
Edible Fig (*Ficus carica*)	✓		✓		✓					
English Ivy (*Hedera helix*)	✓				✓	✓				
Eucalyptus (*Eucalyptus sp.*)	✓		✓	✓						
Fennel (*Foeniculum vulgare*)		✓		✓						
Himalayan Blackberry (*Rubus discolor*)	✓	✓		✓						
Pampas Grass (*Cortaderia sp.*)	✓			✓						
Milk Thistle (*Silybum marinum)*		✓		✓			✓			
Pepper tree (*Shinus molle*)	✓				✓	✓				
Perennial Pepperweed (*Lepidium latifolium*)				✓				✓		
Tamarisk (*Tamarix sp.*)	✓				✓					
Tree-of-Heaven (*Ailanthus altissima*)	✓			✓	✓	✓				
Tree Tobacco (*Nicotiana glauca*)			✓	✓	✓					
Vinca (*Vinca major*)		✓		✓						

Table 2-1 Invasive Vegetation Control Methods

	Mechanical			Herbicides						
Species	**Excavator**	**Loader/ Dozer**	**Weed Wrench**	**Glyphosate**	**Triclopyr**	**Imazapyr**	**Aminopyralid**	**Clorsulfuron**	**Diothopyr**	**Isoxaben**
Virginia Creeper (*Parthinocissus quincifolia*)		✓		✓						
Winter Annual Weeds (pre-emergent)		✓		✓					✓	✓
Yellow Starthistle (*Centaurea solstitialis*)		✓		✓			✓			

2.4.3 Maintenance of Habitat Enhancement Sites

Maintenance and monitoring would be conducted, and corrective measures implemented where these criteria were not achieved. Maintenance activities at sites where creek and habitat enhancement activities have been implemented would include irrigation, invasive plant species control, replanting of failed native plantings, adjustments/repairs to damaged or failed structures, and maintenance of some long-term access points. These activities are described below.

Irrigate Native Revegetation Sites

Irrigation is expected to be used for up to three years at revegetated sites to establish native plantings. Different irrigation methods may be used depending on the site (e.g., low pressure low impact spray heads, drip irrigation, bubblers), but all irrigation components would be above ground and temporary. Longer-term irrigation (beyond the first three years) may be needed to maintain plants or irrigate new plantings if the original plantings fail to meet success criteria.

Manage Non-Native Vegetation at Restored Sites

Invasive species would be removed using hand, mechanical, and/or chemical methods as necessary (Table 2-1).

Maintain Long-Term Access Points

With landowner agreement, the LPCCC Streamkeeper may establish access easements at key locations along the creek for the purposes of long-term restoration/enhancement site management. In such cases, the access points created during restoration project construction would not be fully revegetated, and would be managed to allow Streamkeeper access and use of small equipment/vehicles, such as ATVs or front loaders. These access points would be developed with local landowners for the purposes of the Program and are not intended to provide public access where such access is not expressly granted by the landowner.

2.5 MONITORING AND ADAPTIVE MANAGEMENT

Immediately following construction of each project implemented under the Program, monitoring would commence. Monitoring would be performed for a period of at least five years and may be extended if contingency measures are required beyond the third year, and/or if the final success criteria are not met at the end of five years. In this event, monitoring would continue until such time as all disturbed areas and restoration plantings

are established and the long-term viability of the target replacement habitat is assured, as determined in consultation with the permitting agencies.

2.5.1 Monitoring Methods

Monitoring shall be performed by a qualified biologist, horticulturist, or ecologist with appropriate credentials and demonstrated experience in native habitat restoration. The project monitor shall provide oversight of maintenance operations to ensure high quality project maintenance, which conforms to standards established in the restoration plan for each individual project, and to immediately address any unanticipated problems. The monitor shall be in direct contact with SCWA/LPCCC, via regular telephone reports of maintenance activities and periodic site visits.

Recording of As-Built Conditions

Accurate plans shall be prepared depicting the finished grades, locations of any grade control or hydraulic structures, erosion control measures, and species, quantities and locations of all planted materials. Methods of construction and planting, as well as any significant problems or unexpected conditions encountered, shall also be recorded. As-built plans shall include surveyed cross-sections of the restored creek channel. Cross-section locations shall be permanently marked in the field. Permanent photo stations shall be established and depicted on the as-built plans. Baseline information shall be incorporated into a written report describing the as-built status of the restoration project, and submitted with the as-built drawings to the permitting agencies within 6 weeks of completion of construction activities.

Monitoring Schedule

Monitoring visits shall be conducted monthly for the first year and at least quarterly thereafter, as determined necessary by the relative success of the project plantings in the first year.

Monitoring Protocol

During the monitoring visits, detailed records shall be made of the conditions existing at the restoration site. In order to maintain continuity and ensure comparable assessments, standardized data sheets shall be used to record monitoring data. A copy of the as-built planting plan shall be attached to the data sheets for each monitoring visit, so that monitoring data and observations may be tied to exact locations on the restoration site. Sample channel cross-sections, quadrats, and permanent photo stations shall be permanently marked in the field using rebar stakes.

Channel cross-sections shall be surveyed in the field to record the condition of the channel and banks, and any changes occurring as a result of natural geomorphic adjustment or other causes (e.g. possible vandalism, or human activity in the channel, wildlife trails/laydown areas, etc.).

Quadrat sampling methods shall be used to record data for selected areas of the restoration site. Required monitoring data would include:

- Percent survival and average height of all trees planted (with the exception of willows and cottonwoods, which shall be evaluated based upon aerial cover);
- Overall cover, percent cover by species (dominant as well as incidental species present shall be recorded), and natural recruitment of native and invasive species;
- Mortality and other problems such as insect damage, erosion, or other soil problems shall be noted and documented with photographs; and
- General health and vigor of restoration plantings.

Photographs showing overall views of the restoration site shall be taken at established photopoints during each visit.

The following is a description of specific monitoring data to be collected for the restoration site.

Vegetation:

Riparian vegetation

Riparian vegetation planted on the restoration site shall consist of liner and one- to two-gallon materials. As-built planting plans shall identify the locations and species of each planting. During monitoring visits, the percent cover, species diversity and natural recruitment (both by native and invasive species) within these areas shall be assessed.

Existing riparian trees retained within the project site

The general conditions and health of these trees and seedlings shall be documented during monitoring visits. Any natural recruitment of native tree and shrub species in these areas shall be noted.

2.5.2 Success Criteria

The restoration prescribed for individual restoration projects under the Program would be considered successful if, at the end of the 5-year monitoring period, restoration objectives are achieved, the channel morphology is stable, planted areas are self-sustaining, and plant survivorship and vigor are adequate to assure a viable, high-quality wildlife habitat.

The section below provides proposed minimum success criteria for the different vegetation types within the individual project sites. Success criteria presented below may be modified based upon site specific conditions and subject to review and approval of regulatory stakeholders and permitting agencies.

Plantings in each restoration site would be considered successful if, at the end of the 5-year monitoring period, the following criteria have been met. Non-native cover includes plant species that are non-native, but not considered invasive. To measure this success criteria, Invasive plants are defined as having a moderate or high rating by the California Invasive Plant Council (Cal-IPC). Maintenance and/or replanting would be performed as necessary to achieve these standards. If significant numbers of replacement plantings are required after the third year, the applicant would consult with the permitting agencies to determine whether the monitoring period should be extended.

Vegetation Success Criteria:

Plantings in the restoration site shall be considered successful if, at the end of the 5-year monitoring period, the following criteria have been met:

Riparian trees and shrubs

- 80 percent cover of the planted area, as indicated on as-built plans submitted to the regulatory agencies.

All revegetated areas within the restoration site

- Percent cover by invasive plants not to exceed 5 %

Maintenance and/or replanting necessary to achieve these standards shall be performed as required. If significant numbers of replacement plantings are required after the third year, the applicant shall consult with the CDFW and other regulatory agencies, as appropriate, to determine whether the monitoring period should be extended.

Hydrologic Success Criteria:

Hydrologic function in the restoration site would be considered successful if, at the end of the 5-year monitoring period, the modified Putah channel has the following features/characteristics:

- A relatively stable low flow channel or channels; and
- Low, in-channel flood terraces, which are periodically overtopped and support healthy wetland and riparian vegetation (as defined by vegetative success criteria described above); and
- Stable channel banks which support healthy riparian trees and shrubs (as defined by vegetative success criteria described above).

2.5.3 Compliance Monitoring and Adaptive Management Requirements of the Regulatory Agencies

Compliance monitoring focuses on proposed methods for monitoring of the individual restoration projects to satisfy the requirements of the U.S. Army Corps of Engineers (USACE), U.S. Fish & Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), and the California Regional Water Quality Control Board (CRWQCB). Compliance monitoring would be formulated for each individual project based upon the following:

- Requirements of the USACE CWA Section 404 Regional General Permit
- USFWS Biological Opinion (for each individual project, as applicable)
- Requirements of the California Department of Fish and Wildlife Lake and Streambed Alteration Agreement (for each individual project)
- Requirements of the programmatic RWQCB Section 401 Water Quality Certification

2.5.4 Adaptive Management

SCWA/LPCCC would prepare an Adaptive Management Plan for each individual project (or group of projects, if implemented concurrently) implemented under the Program. Each Adaptive Management Plan would identify site-specific project goals and objectives, identify risks and uncertainties, establish long term success criteria based on identified reference sites, and identify thresholds that would trigger adaptive management actions.

Within this framework, SCWA/LPCCC would complete regular assessments to evaluate performance of each project. The assessments would compare monitoring results with performance criteria to determine whether any adjustments to the project are needed. SCWA/LPCCC would consult with regulatory stakeholders and/or identified experts to

conduct and/or evaluate the assessments to inform adaptive management decisions. This section defines the proposed assessment process, the frequency and timing of assessments, and assessment documentation.

Assessment Process

The assessment process would consist of comparing the results of monitoring and ongoing inspections by SCWA/LPCCC to performance criteria and management thresholds that indicate how well each project is progressing toward the restoration objectives, and evaluation of whether any adaptive management action(s) are warranted.

Each management threshold would be assessed regularly by analyzing the monitoring data. SCWA/LPCCC, in consultation with stakeholders and/or regulatory agencies as appropriate, would identify methods for comparing the restoration performance criteria with monitoring data. The results of these assessments would be documented and stored in a monitoring database.

Frequency of Assessments

It should also be noted that the monitoring schedule described below is adaptable based upon adaptive management assessments and review.

SCWA and LPCCC would meet with stakeholders every year to discuss monitoring and research findings, compare these finding with management thresholds, and discuss implications for adaptive management. Assessments may be more frequent, depending on the relevant physical or ecological scale of each restoration target, and issues identified in project assessments.

2.5.5 Decision-making and Adaptive Management Actions

This section describes the decision-making process for implementing any management actions required to keep the project on track. The decision-making process would go into effect if the assessment process determined that a management trigger has been reached, indicating that the system is not performing well. If SCWA/LPCCC determined that small management actions are needed, these actions would implemented immediately. If a larger change to the project approach or a substantial action is deemed necessary, SCWA/LPCCC would vet this change or action through stakeholders, outside scientists, or the regulatory agencies, as needed, depending on permit conditions and the scale and type of issue.

If a management threshold is reached, this prompts review for possible management action. When the cause for triggering of a management threshold and the appropriate corrective management actions are clear, then SCWA/LPCCC would implement the appropriate management actions. When the cause for triggering a management threshold or the appropriate response is not readily apparent, then studies and/or additional monitoring would be conducted to better understand what caused the system to respond differently than predicted. Once adaptive management actions are implemented, subsequent monitoring may be used to evaluate the effectiveness of these actions.

2.5.6 Annual Reports

Annual monitoring reports would be submitted by LPCCC/SCWA to the Corps, CDFW and other appropriate agencies and stakeholders. The first annual report for each project would be delivered by December 31 of the year following the first growing season after planting, and by December 31 of each year thereafter.

The reports would include analyses of all quantitative monitoring data, prints of monitoring photographs, and maps identifying monitoring transects and/or quadrats, monitoring photo points, and restoration plantings by vegetation type and height class, and provide discussion of the implications of monitoring data for site evolution, and comparison to the success criteria. The reports would discuss problems and successes encountered, any replacement planting or other remedial measures taken, and would recommend steps to ensure continued success (or remediation of problems encountered) of the restoration project.

2.6 CONSTRUCTION RELATED ACTIVITIES

Implementing the Program would entail varying degrees of temporary site manipulation and/or disturbance. This section describes Program implementation construction activities.

2.6.1 Site Preparation

Site preparation activities would include clearing and grubbing, vegetation management, and installation of protective fencing around sensitive resources on or adjacent to Project work areas.

Clearing and Grubbing

Clearing and grubbing would include removal of debris, vegetation, and/or minor demolition (of relict structures, for example). Vegetation would be cleared to the ground

surface, and large tree roots would be removed. Where feasible, native vegetation removed from the site would be salvaged for re-use in restoration activities. Non-native species would be chipped and/or removed to an appropriate disposal/recycle facility. All refuse and debris would be removed from the site and legally disposed of. Clearing and grubbing would typically be accomplished using heavy equipment such as bulldozers, brush mowers, scrapers, stump grinders, or tree skidders.

Vegetation Management

Vegetation management activities may include the removal of invasive vegetation, native plant protection, and removal or trimming of vegetation in areas of the Project sites where grading or placement of biotechnical, rock, or other materials would occur, and/or to facilitate access.

Invasive plants would be removed using manual, mechanical or chemical treatments or a combination of these, as appropriate to the specific target species (see Section 2.4.2 above and Table 2-1).

Existing native vegetation or other sensitive resources to remain within or adjacent to the Project site may be identified and protected with fencing prior to commencement of invasive species treatments and/or site disturbing activities (including construction of temporary access ramps/roads). Elderberry shrubs (*Sambucus sp.*), which provide habitat for the federally listed valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), typically would be protected in place following the standard elderberry protection guidelines; however, on some sites a mitigation plan may need to be prepared to identify measures to transplant or replace elderberry shrubs. Such determination would be made on a project-specific basis. (See Section 3.4, *Biological Resources*, of this PEIR for further discussion.)

2.6.2 Project Access

Materials and equipment would be delivered to the Project area via surface roads. Trucks and vehicles would access the Project Areas via Putah Creek Road and local private roads on the north or south side of Putah Creek. Existing roads in the Program Area would be used as the primary access for construction of the bank protection measures. Access to the stream bank would be via existing roads wherever possible. Internal access within the Program implementation areas would be restricted to disturbed areas once initial site preparation activities had commenced.

During construction, existing roads through the subject site(s) would be cleared of vegetation (to a width of approximately 12 feet) and may be nominally improved (graded and possibly surfaced with gravel and rock or potentially matting/cribbing) to accommodate heavy equipment and trucks.

Should access across adjacent property be needed for Program implementation, landowners would be notified prior to commencement of construction activities, and the necessary authorizations (e.g., access easement agreement, road maintenance agreement) would be obtained to ensure minimal disruptions to their land and daily activities. These agreements would contain measures to minimize dust on private roads by maintaining low vehicle speeds (less than 10 mph) and by watering roads. The agreements would also provide for proper notification in advance of construction access, maintain access for agricultural traffic, grading or laying gravel to improve roads disturbed by construction traffic, schedule access around irrigations, avoid travel over wet ground, and other measures negotiated with the landowners.

Construction materials, including any needed aggregate for improvement of access roads, would be hauled from a commercial or previously permitted quarry or borrow site located within 30 miles of the Program Area.

Construction Access to Channel

Construction equipment access to the stream channel and floodplain for implementation of Program activities would be via existing access ramps and roadways. In some cases these are overgrown and would need to be cleared and grubbed. Following completion of construction and post construction establishment activities, cleared access features would be re-graded to match natural contours and fully revegetated with appropriate native plant species, except where they are intended to be maintained for future use.

Construction on the restoration sites would generally progress in an upstream to downstream direction. This sequencing of construction activities would allow for the careful control of sediment and water on the site, and would also allow local ambulatory wildlife to move progressively downstream with site disturbance, toward suitable habitat areas unaffected by construction disturbance.

2.6.3 Construction Staging Areas

For projects where staging areas would be needed for storage/staging of vehicles, fuels, materials, and other associated construction equipment, these would be designated in previously disturbed areas and/or in areas along the tops of the upper creek terraces with

easy access to the stream banks and (constructed temporary or existing) access points. Staging areas would be cleared of any vegetation and/or debris. Adjacent native vegetation would be protected. Following completion of project activities necessitating the use of staging areas, these areas would be cleared of any equipment and/or debris and revegetated with appropriate native plant species.

2.6.4 Temporary Flow Diversion

Flow diversion is typically implemented where channel reconfiguration activities are to be implemented over a long stream reach, in a reach where a deep pool is located, or where alternate methods of separation of the work area from the flowing stream are not feasible. In some cases, regulatory agencies may require stream diversion to allow work in a stream channel. For projects that require temporary diversion/dewatering of the active channel, prior to commencement of earth moving activities within the creek channel, temporary diversion pipe(s) and sheet-pile coffer dam would be installed. Diversion pipe(s) would be placed such that they are aligned with the thalweg of the design channel. Fill would be placed around the pipe(s) to floodplain elevation. Following completion of in-channel activities, flows would be released into the restored channel, and diversion pipe(s) and coffer dam would be removed.

2.6.5 Construction Schedule

Based on current and anticipated resource levels (staff and funding), physical constraints to work in or near the creek (e.g., high flows, species work window restrictions, mandatory flow releases), and the intent of the Program to limit construction-related impacts, it is anticipated that a limited number of projects would be implemented each year. Depending on site conditions and the results of pre-construction surveys, construction would occur during the months between April and October. The various wildlife and stream flow release constraints on work scheduling are shown below (**Table 2-2**). On average, 12 construction workers would be on-site, and a maximum of 20 workers would be working on any given work day. Construction is expected to occur primarily during daytime hours 8:00 a.m.to 5:00 p.m., Monday through Friday; however, if needed, construction could occur between 7:00 a.m. and 7:00 p.m. No nighttime construction or weekend work is anticipated.

2.7 ANNUAL SCOPE OF ACTIVITIES

The Program has been designed to minimize environmental impacts of overlapping projects by including the following annual construction limits:

- Implementation of the proposed Program activities would be limited to a *combined* total maximum of 640 acres per calendar year, with a typical range from 20 to 60 acres/year; and a maximum annual total Project length of five stream miles, with a typical distance of 2 miles per year. Work in any one activity category would not exceed 60 acres per year in order to minimize potential impacts. Activities would be conducted in a discontinuous pattern to further avoid or minimize any potential construction-related effects.
- Gravel augmentation and salvage would be limited to 500 cubic yards each, per year.
- No more than 61 new riffles would be created each year within the Project Area, each requiring approximately 170 cubic yards of gravel, for a total maximum of 10,187 cubic yards of gravel placed per year.
- In the Solano County portion of the Project Area, the maximum number of one-way 3- and 4-axle truck trips would be 42 per day. In the Yolo County portion of the Project Area, daily 3- and 4-axle truck trips would not exceed 19 one-way trips.
- Construction materials, including any needed soil, sand, and aggregate, would be hauled from a commercial or previously permitted quarry or borrow site located within 30 miles of the Project Area.

Table 2-2 Program Work Scheduling Limitations

	January	February	March	April	May	June	July	August	September	October	November	December
Biological Restrictions[a]												
Swainson's Hawk			Mar. 15	No intensive new disturbances within ½-mile of active nests (away from urban development)[b]				Aug. 15*	Sept. 1			
Breeding Birds		Feb. 1		Require Survey[c]				Aug. 31				
Valley Elderberry Beetle	Transplant only in November through first 2 weeks in February										Transplant only in November through first 2 weeks in February	
Hydrologic Restrictions[a]												
In-water work	Work restriction through April 15				Unrestricted work when Los Rios Check Dam is in Place[d]							No later than Dec. 15

Note: *If a Management Authorization or BO is obtained.
[a] Additional restrictions may be required by trustee agencies.
[b] See Mitigation Measure 3.4-5.
[c] If construction, grading, or other project-related improvements are scheduled during the nesting season of protected raptors and migratory birds (typically February 1 to August 31), a focused survey for active bird nests shall be conducted by a qualified biologist within 15 days prior to the beginning of project-related activities (see Mitigation Measure 3.4-6).
[d] Work shall be timed with the driest time within the channel. The time period for completing the work within the flowing or standing water of the watercourses shall be confined to the period of April 15 to the date when boards are pulled at the Los Rios Check Dam (not later than December 15). Work within the dry portion of the stream zone shall be timed with awareness of precipitation forecasts and likely increases in stream flow and river flood stages. Construction activities within the stream zone shall cease until all reasonable erosion control measures, have been implemented prior to all storm events. Construction equipment and material shall be removed from the floodplain if inundation is likely. Revegetation, restoration and erosion control work is not confined to this time period.
Sources: BSK Associates, 2015; typical CDFW conditions for work on Putah Creek.

Table 2-3 Activities within Project Reaches

	NAWCA\Mariani	Duncan-Giovannoni	Winters Putah Creek Nature Park	East of 505	Warren	Upper McNamara	Lower McNamara	Lester	Russell Ranch	Stevenson Bridge	Glide Ranch	Nishikawa	Olmo-Hammond-UCD	I-80 to Old Davis Road	Old Davis Road to Mace	Mace to Road 106A	Road 106A to Yolo Bypass
Channel Reconfiguration																	
Create low-flow channel and floodplain	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create side channels	✓	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Reposition thalweg	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Construct riffles	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Increase channel sinuosity	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Construct rock cross-vane grade/flow control structures	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stabilize channel banks	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Construct rock revetments	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Construct log revetments	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Install root wads	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Install large woody debris	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Improve fish spawning gravels	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	
Gravel augmentation	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	
Loosen embedded gravels by scarification	✓				✓			✓		✓		✓					
Fill abandoned gravel pits		✓	✓	✓		✓	✓		✓		✓		✓			✓	

Table 2-3 Activities within Project Reaches

	NAWCA\Mariani	Duncan-Giovannoni	Winters Putah Creek Nature Park	East of 505	Warren	Upper McNamara	Lower McNamara	Lester	Russell Ranch	Stevenson Bridge	Glide Ranch	Nishikawa	Olmo-Hammond-UCD	I-80 to Old Davis Road	Old Davis Road to Mace	Mace to Road 106A	Road 106A to Yolo Bypass
Vegetation Management																	
Remove invasive plants	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Manual and/or mechanical removal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Chemical control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Plant native vegetation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pole planting	✓				✓		✓	✓	✓	✓		✓	✓			✓	✓
Cuttings	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Seedlings	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Seeding (drill/direct)	✓			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓
Container plants	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Plugs	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Transplant	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Maintenance of Habitat Enhancement Sites																	
Irrigate native revegetation sites	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Manage non-native vegetation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Manual and/or mechanical removal				✓					✓	✓		✓	✓				
Chemical control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 2-3 Activities within Project Reaches

	NAWCA\Mariani	Duncan-Giovannoni	Winters Putah Creek Nature Park	East of 505	Warren	Upper McNamara	Lower McNamara	Lester	Russell Ranch	Stevenson Bridge	Glide Ranch	Nishikawa	Olmo-Hammond-UCD	I-80 to Old Davis Road	Old Davis Road to Mace	Mace to Road 106A	Road 106A to Yolo Bypass
Maintain long-term access points	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Construction Related Activities																	
Temporary flow diversion		✓				✓	✓		✓	✓	✓		✓		✓	✓	
Temporary staging areas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Site Preparation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clearing and grubbing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Vegetation management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Installation of protective fencing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Source: ESA Associates, Inc., 2015.

2.8 PROJECTED PROGRAM OUTCOMES

Project goals and projected Program outcomes (with implementation of all anticipated individual reach projects) are presented in **Table 2-4**.

Table 2-5 shows existing (pre-Program) habitats and projected (post-Program) habitats that would result with full Program implementation (implementation of restoration activities in all project reaches over 5 to 15 years). Projected post-Program habitat coverage was calculated based upon **conceptual** project parameters as follows:

- Design channel:
  - sinuous low flow channel of 1.2 times the length of each project reach
  - 'typical' channel width of 30 feet.
- Open water conversion to floodplain habitats:
  - Design channel (above) subtracted from existing (pre project) open water area
  - Portions of the resulting floodplain area remaining designated for sand and gravel bars and the remaining area to mixed riparian forest cottonwood forest, oak woodland and herbland cover based on general character of each project reach and the types of weeds to be replaced.

As stated above, these estimates of habitat change are based upon Program-level baseline data and general design concepts for channel reconfiguration projects. All project reaches may not be subject to channel reconfiguration activities. Individual project designs would be based on site specific resource assessments conducted in consultation with CDFW and other agencies, as appropriate, and may result in habitat changes that vary from the information presented in **Table 2-5**.

Table 2-4 Project Goals and Projected Outcomes

Goal	Objectives	Projected Outcome by Program Activity: Channel Reconfiguration	Vegetation Management	Maintenance of Habitat Enhancement Sites
1 Improve passage, rearing and Emigration of adult and juvenile salmonids in Putah Creek	1.3 1.4 Provide ***for effective fish passage for essential life history stages—i.e., structural passage and recruitment and emigration flows***[a]—between the Yolo Bypass and Putah Creek above the Yolo Bypass Wildlife Area (Objective 1.3) and on Putah Creek from the YBWA boundary to upstream spawning grounds below the Putah Diversion Dam (Objective 1.4)	Modifying channel geometry by creating a confined low flow channel would enhance flow depths for fish passage. Constructing in-channel pools would provide resting locations for migrating adults. Constructing grade/flow control structures would remove velocity barriers to and provide sufficient flow depths for fish passage. Bank stabilization and large woody debris features would provide velocity refuges, resting and foraging locations. Specific to the Mace to Road 106A reach project: replacing the current seasonal earthen fill crossing with modular box culverts and providing a fish ladder or equivalent natural feature would improve fish passage between the YBWA and Putah Creek upstream of Road 106A.	N/A	N/A
	1.5 Restore, enhance, and maintain spawning and rearing physical habitats and processes on Putah Creek below the Putah Diversion Dam	Modifying channel geometry by creating low flow channels and floodplains and constructing riffles would restore and enhance spawning and rearing habitat. Constructing grade/flow control structures would create spawning habitat in glide portions of pools. Improving fish spawning gravels would enhance spawning habitat. Restoring 171 acres of open water pools to 89 acres of reconfigured channel and 82 acres of floodplain habitat would provide important spawning and rearing areas for many fish species. Bank stabilization measures that incorporate live plant material (log revetments, root wads, large woody debris) would provide cover, velocity refuge, shade, and foraging locations for fish (perennially in the main channel and seasonally on the floodplain, under high flow conditions).	Planting native vegetation would provide food sources, restore structural diversity, provide sources of in-stream small organic debris and wood, and increase shaded riverine area cover, therefore restoring and enhancing spawning and rearing physical habitats. Removing invasive plants would support establishment of native vegetation and thus support restoring and enhancing spawning and rearing habitat.	Irrigating and maintaining restored native riparian vegetation and managing non-native vegetation would promote establishment of native over non-native vegetation, which is turn would support spawning and rearing habitat.

Table 2-4 Project Goals and Projected Outcomes

Goal	Objectives	Projected Outcome by Program Activity: Channel Reconfiguration	Vegetation Management	Maintenance of Habitat Enhancement Sites
	1.6 Provide necessary ***flow regimes[1] and water quality conditions for recruitment, rearing, and emigration of self-sustaining runs of salmonids*** on Putah Creek	Restoration of 82 acres of functional floodplains would support salmonid runs and other fish species— floodplains are important spawning and rearing areas for many fish species. Floodplain wetlands also act as nutrient and sediment sinks—improving water quality in the stream. Bank stabilization actions provide refugia and forage locations and would reduce contributions of fine sediment to the creek waters from unstable, eroding banks. Bank erosion contributes fine sediments to the creek that degrade the water quality and habitat conditions for salmonids and other aquatic species. Increased sediment reduces visibility needed for foraging, can cover or bury incubating salmonid eggs, and the associated increased level of nutrients can reduce oxygen levels in the water. Bank stabilization measures that incorporate live plant material (revetments, root wads, large woody debris) would provide shade (lower water temperatures), and foraging locations for fish (perennially in the main channel and seasonally on the floodplain, under high flow conditions).	Planting native vegetation would enhance water quality by stabilizing channel banks and filtering surface water runoff thereby by reducing erosion and fine sedimentation loads and improve water temperature by providing shade along low flow channel and off-channel habitats.	Maintaining native revegetation and managing non-native vegetation would help native tree and other vegetation establish over time. Established native riparian vegetation would provide more channel shading and surface sediment filtering, improving water quality conditions.
	1.7 Incorporate ***natural planform and cross sectional geomorphology*** that supports ***structural habitat complexity and natural hydrologic, geomorphic, and ecological processes***	Modifying channel geometry by creating low flow channels and floodplains (providing habitat complexity), side channels (providing velocity refugia, foraging area, and protection from predators), repositioning the thalweg (providing stabilization of channel form), increasing channel sinuosity (increasing structural complexity), and filling abandoned gravel pits (creating floodplain and wetland habitat) would support natural hydrologic, geomorphic, and ecological processes.	Planting native vegetation would help to provide stability to reconfigured channel planform and cross section, thus supporting outcomes described under Channel Reconfiguration.	Irrigating native revegetation and managing non-native vegetation would provide stability to reconfigured channel planform and cross section, thus supporting outcomes described under Channel Reconfiguration.

Table 2-4 Project Goals and Projected Outcomes

Goal	Objectives		Projected Outcome by Program Activity: Channel Reconfiguration	Vegetation Management	Maintenance of Habitat Enhancement Sites
4 Preserve and enhance, where possible, existing beneficial uses including public access, wildlife viewing, hunting and fishing, balance with existing, enhanced, and restored ecological functions.	4.1	Maintain a ***balance of existing fish and wildlife habitats, hunting, fishing, wildlife viewing, and other public benefits*** including water supply and agriculture between the PDD and YBWA[b]		N/A	Maintaining long-term access points would support a continued balance of wildlife, hunting, fishing, wildlife viewing, and other public benefits. Specific to the Olmo-Hammond-UCD reach project: maintaining access would greatly enhance the natural setting and learning opportunities for Camp Putah (a week-long summer camp for Davis youth).
5 Enhance habitats for Delta native fishes and wildlife within the Putah Creek Project Upper Reach	5.1		*Same as Objective 1.3*		
	5.2		*Same as Objective 1.5*		
	5.3	Provide necessary ***flow regimes[a] and water quality conditions to support anadromous and other native Delta fishes*** on Putah Creek	*Same as Objective 1.6*		
	5.4		*Same as Objective 1.7*		
	5.5	***Maintain and enhance native riparian vegetation communities*** along Putah Creek below the Putah Diversion Dam	Bank stabilization measures that incorporate live plant material would promote native riparian community enhancement along channel banks.	Converting 82 acres of open water to floodplain habitat, which would be planted with riparian vegetation, would enhance native riparian communities along Putah Creek. Removing 94 acres of invasive plants and planting them with native riparian vegetation would enhance riparian vegetation communities.	Irrigating restored areas of native revegetation and managing non-native vegetation would enhance native riparian vegetation communities
	5.6		*Same as Objective 4.1*		

[a] Flow regimes to support effective fish passage and to provide conditions necessary for recruitment, rearing, and emigration of salmonids, other anadromous fish, and other native Delta fish are provided by the Putah Creek Accord.

[b] The program would maintain current public uses along Putah Creek including hunting, fishing, wildlife viewing, public access, and water uses for agriculture. The program also contains annual limits of Project activities and would typically occur at a range of 20 to 60 acres/year. Activities would be conducted in a discontinuous pattern to minimize any potential construction-related effects that may affect public uses.

Table 2-5 Estimated Current and Post-Restoration Vegetation Cover in Acres

Current Vegetation Cover in Acres[1]

		Aquatic		Native Plant Communities						Invasive Plant Communities										
Reach Name	Total Habitat Acres	Open Water	Gravel and Sand Bars	Mixed Riparian Forest	Cottonwood Riparian Forest	Herbland Cover	Great Valley Riparian Scrub	Valley Fresh Water Marsh	Valley Oak	Giant Reed	Blackberry Scrub	Eucalyptus	Tamarisk	Pepperweed	Domestic Almond	Yellow Star Thistle	Milk Thistle	Tree-of-Heaven	Black Locust	Disturbed Riparian Habitat
NAWCA	178	8	0	46	9	4	0	1	0	3.0	67.0	0.0	0.0	28.8	0.0	0.0	0.0	0.0	0.0	10
Duncan-Giovannoni	99	15	0	29	1	1	3	0	0	3.2	13.9	33.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0
Winters Putah Creek Park	42	5	0	21	0	5	5	0	0	0.5	1.5	3.5	0.1	0.0	0.2	0.0	0.0	0.4	0.0	0
East of 505	36	6	0	14	3	0	6	0	0	0.4	2.0	3.0	0.1	0.0	0.0	0.1	0.6	0.3	0.0	0
Warren	15	3	0	3	2	0	2	0	0	0.3	0.3	5.0	0.1	0.0	0.0	0.2	0.2	0.1	0.0	0
Upper McNamara	41	10	0	17	1	0	9	0	0	1.2	0.5	3.0	0.2	0.0	0.0	0.1	0.0	0.1	0.0	0
Lower McNamara	15	5	0	5	2	0	2	0	0	0.0	0.0	1.5	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0
MacQuiddy (Lester)	65	9	0	32	3	0	15	0	0	0.6	2.4	1.0	0.8	0.0	0.0	0.0	0.0	0.1	0.0	0
Russell Ranch	65	8	0	42	2	0	5	0	0	0.0	5.3	0.6	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0
Stevenson Bridge	18	2	0	15	1	0	1	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Glide Ranch	125	12	0	49	16	1	18	0	5	0.0	16.0	6.6	0.6	0.0	0.0	0.0	0.0	0.2	0.0	0
Nishikawa	30	3	1	10	2	1	8	0	0	0.0	5.1	0.2	0.2	0.2	0.0	0.1	0.0	0.6	0.2	0
Olmo-Hammond-UCD	90	16	0	46	9	0	12	0	4	0.0	1.0	1.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0
I-80 to Old Davis Road	75	5	0	22	2	20	12	0	0	0.0	10.3	0.8	0.1	0.0	0.0	2.2	0.0	0.0	0.2	0
Old Davis Road to Mace	165	29	0	38	13	5	50	1	0	0.9	25.0	1.3	2.3	0.3	0.0	0.0	0.0	0.0	0.0	0
Mace to Road 106A	239	25	0	108	26	15	30	0	2	2.4	18.2	0.0	5.3	6.5	0.0	1.4	0.1	0.0	0.0	0
Road 106A to Yolo Bypass	41	12	0	5	6	0	2	0	0	0.2	6.2	0.0	0.5	7.5	0.0	0.2	0.0	0.0	0.0	0
Totals	**1339**	**171**	**2**	**502**	**96**	**53**	**179**	**2**	**11**	**13**	**175**	**61**	**11**	**45**	**0**	**4**	**1**	**2**	**0**	**10**

Restored Vegetation Cover in Acres[2]

		Aquatic		Native Plant Communities						Invasive Plant Communities										
Reach Name	Total Habitat Acres	Open Water	Gravel and Sand Bars	Mixed Riparian Forest	Cottonwood Riparian Forest	Herbland Cover	Great Valley Riparian Scrub	Valley Fresh Water Marsh	Valley Oak	Giant Reed	Blackberry Scrub	Eucalyptus	Tamarisk	Pepperweed	Domestic Almond	Yellow Star Thistle	Milk Thistle	Tree-of-Heaven	Black Locust	Disturbed Riparian Habitat
NAWCA	178	6	1	70	34	46	0	1	20	0	0	0	0	0	0	0	0	0	0	0
Duncan-Giovannoni	99	6	3	75	1	4	3	3	3	0	0	0	0	0	0	0	0	0	0	0
Winters Putah Creek Park	42	4	1	24	2	5	5	0	1	0	0	0	0	0	0	0	0	0	0	0
East of 505	36	4	2	20	3	1	7	0	0	0	0	0	0	0	0	0	0	0	0	0
Warren	15	1	1	8	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper McNamara	41	4	2	24	2	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0
Lower McNamara	15	2	1	9	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
MacQuiddy (Lester)	65	6	1	35	5	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0
Russell Ranch	65	6	1	44	2	2	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Stevenson Bridge	18	2	0	14	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Glide Ranch	125	8	1	59	16	1	34	0	5	0	0	0	0	0	0	0	0	0	0	0
Nishikawa	30	2	1	21	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Olmo-Hammond-UCD	90	7	1	55	9	2	12	0	4	0	0	0	0	0	0	0	0	0	0	0
I-80 to Old Davis Road	75	3	1	26	2	20	23	0	0	0	0	0	0	0	0	0	0	0	0	0
Old Davis Road to Mace	165	13	2	57	13	5	75	1	0	0	0	0	0	0	0	0	0	0	0	0
Mace to Road 106A	239	11	3	121	26	23	54	0	2	0	0	0	0	0	0	0	0	0	0	0
Road 106A to Yolo Bypass	41	5	1	18	6	9	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	**1339**	**90**	**23**	**679**	**127**	**120**	**260**	**5**	**35**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Net Cover Change by Habitat Type	**0**	**-81**	**21**	**178**	**31**	**67**	**81**	**3**	**24**	**-13**	**-175**	**-61**	**-11**	**-45**	**0**	**-4**	**-1**	**-2**	**0**	**-10**

[1] EDAW. 2005. Lower Putah Creek Watershed Management Action Plan, Phase 1 -Resources Assessment, Map Volume.

[2] Marovich, R. 2016. Personal Communication. Lower Putah Creek Coordinating Committee.

3. ENVIRONMENTAL SETTING, IMPACTS, AND MITIGATION MEASURES

This chapter provides a programmatic analysis of the potential environmental impacts of implementing the proposed Lower Putah Creek Restoration Project, Upper Reach Program (Project). As described in Chapter 1, *Introduction*, of this Program Environmental Impact Report (PEIR), the approach to analyzing the Project's environmental impacts is programmatic because the program presents a program of proposed activities over a period from approximately 2015 to 2030. The proposed Project consists of the implementation of a combination of stream restoration and habitat enhancement activities along approximately 24 miles of Lower Putah Creek.

The programmatic analysis of Project impacts addresses potential impacts related to all aspects of the restoration program, as described in Chapter 2, *Project Description,* of this EIR. Much of the project description is presented at a programmatic level of detail, meaning that the project description lacks the detail that will be available when each of the specific restoration projects are proposed. Thus, to conduct this California Environmental Quality Act (CEQA) analysis, assumptions were made about the results of implementing the proposed project. These assumptions are discussed in Chapter 2, *Project Description*.

The structure of the analysis is similar for each environmental issue. The analysis starts with a discussion of the existing environmental setting, and is followed by a programmatic discussion of potentially significant adverse effects resulting from implementation of the proposed Project. A table summarizing potential impacts and applicable mitigation measures for each reach follows the text discussion.

Each issue analysis includes the following sub-sections:

- **Environmental Setting:** This section describes the existing conditions of the environmental issue being analyzed, and includes a general setting and reach-specific settings for each of the 15 project reaches.
- **Regulatory Setting:** This section describes the applicable federal, state, regional, and local regulations related to the environmental issue being analyzed.

- **Thresholds of Significance:** Thresholds for analysis are independently determined by considering the regional context and the setting. This section presents the guidelines used to determine significance for each issue area.
- **Impacts and Mitigation Measures:** This section presents the evaluation methodology and the analysis of each specific environmental issue area. It then identifies any potentially significant environmental impacts or explains why an impact would not occur. Mitigation measures are identified for any potentially significant impacts that were identified. This section first identified general impacts and mitigation measures for the entire program then identifies impacts and mitigation measures applicable to each of the specific reaches.

3.1 HYDROLOGY

This section discusses local and regional hydrologic conditions, current channel conditions, expected channel evolution, potential changes in drainage patterns, flooding, and erosion in the Project Area. The section describes the interrelationship of these factors and the potential for the Project to impact them.

Analyses in this section are based on review of Federal Emergency Management Agency (FEMA) Flood Maps, a Geomorphology Assessment (Stillwater Sciences, 2014), and the Putah Creek Watershed Management Action Plan (WMAP) (EDAW, 2005), among other sources.

Water quality issues are discussed in Section 3.2, *Water Quality*. Section 3.14, *Utilities and Service Systems*, addresses water supply and associated systems.

The following CEQA Guidelines Appendix G hydrology topics are not addressed in this PEIR because the Project has no potential to affect them:

- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam
- Inundation by seiche, tsunami, or mudflow

3.1.1 Setting

Environmental Setting

Climate and Precipitation

The Putah Creek watershed has a Mediterranean climate of hot dry summers and mild rainy winters. Approximately 75 percent of the annual rainfall is received between

November and March, the typical rainy season. Near the headwaters of Putah Creek in the Coast Range, 40 to 60 inches of rain falls annually, while the City of Davis, on the lower portion of Putah Creek, averages about 17 inches per year (EDAW, 2005, p. 1-8).

Regional Drainage

The Putah Creek watershed lies along the eastern flank of the California Coast Range and the western side of the Central Valley, within USGS hydrologic unit code (HUC) 18020109. In all, the 90-mile-long creek drops over 3,540 feet and drains a watershed area of approximately 660 square miles. The Putah Creek watershed is bordered by the watersheds of Cache Creek to the north and Napa River to the southwest.

Below Monticello Dam, the creek flows through a 6.7-mile-long "inter-dam" reach between the dam and Putah Creek Diversion Dam (PDD), where the creek emerges from the Coast Ranges. Tributaries to Putah Creek below Monticello Dam include Thompson Creek, Cold Creek, Bray Canyon Creek, and Pleasants Creek above the PDD, and McCune/Pleasant Creek and Dry Creek downstream of the PDD. Below the PDD and entering the Project Area (the upper reach of lower Putah Creek), Putah Creek flows eastward for approximately 26 miles, past the cities of Winters and Davis, and through the Yolo Bypass where it reaches the toe drain (see Figure 1-2 in Chapter 1, *Introduction*). The toe drain eventually joins the Sacramento-San Joaquin River Delta after following a straight, 20-mile long course along the Yolo Bypass.

Through the Project Area, Putah Creek flows along the bottom of a deeply incised corridor. Water surface elevations are typically 28 to 32 feet below the terrace elevations (City of Winters 2008, p. 12). The portion of the creek within the Project Area includes several long, deep, and wide pools created by historic mining activities. These pools reduce flow velocities and accelerate warming of the creek. The pools range in size from approximately 1.5 to 27 acres and are located in the following Project reaches: Duncan-Giovannoni, Upper McNamara, Lower McNamara, Russell Ranch, Stevenson Bridge, Glide Ranch, Olmo-Hammond-UCD, Old Davis Road to Mace, Mace to Road 106A, and Road 106A to Yolo Bypass Wildlife Area (YBWA).

An earthen dam at Road 106A, about 3 miles upstream of the Los Rios Check Dam forms a seasonal barrier to Putah Creek flows. Under a California Department of Fish and Wildlife (CDFW) permit, a plug of earth is pushed annually across the stream channel at this point. Downstream of the Project Area, the Los Rios Check Dam—a 30-foot-wide concrete dam, fitted with wooden flash-boards—is operated in conjunction with installation of the flash-boards at the dam at Road 106A to control the hydrology of the

lower creek. From approximately from April 1 to December 1, to these dams are operated to form a pool of water for diversion to irrigation canals, and are also operated to impound water for irrigation and flood-up of wetlands managed by CDFW (Stillwater Sciences, 2014, p. 5). The check-dam boards and the soil plug are removed to provide fish passage in the winter rainy season.

Lower Putah Creek Flows

Historically, the inherently unpredictable nature of runoff in the upper watershed and flooding in the Yolo Basin resulted in substantial year-to-year variability in streamflow and overbank inundation patterns along Lower Putah Creek. Completion of the Solano Project in 1957 has led to a dramatic reduction in peak streamflow downstream; the post-dam 100-year peak flow is about one-fifth of the pre-dam peak flow. The creek historically discharged to the Yolo Basin with occasional through-flow farther into the north Delta during the highest flows (Whipple, *et al*., 2012; as cited in Stillwater Sciences, 2014, p. 12). The lower creek is believed to have been intermittent during most water years, as the upper watershed tributaries would usually run dry in summer months. Most low flows in the creek were wholly maintained by shallow groundwater inflow (Yates, 2003; EDAW, 2005; as cited in Stillwater Sciences, 2014, p. 12).

Since completion of the Solano Project, peak flows in the lower creek have been limited to high run-off from tributary inputs below the dam, such as McCune/Pleasant Creek or occasionally Dry Creek, or the considerably less frequent events when the Lake Berryessa rises to its upper level and spills via its glory hole. With the deeply incised channel and regulated flood flows after the Solano project, all peak flows have been contained within the confines of the upper terrace elevations (City of Winters, 2008, p. 12).

Currently, daily mean flows through the inter-dam reach are much reduced in the rainy season ranging from 10-15 cubic feet per second (cfs) compared with historic conditions. Conversely, baseflows in July through October are greater than historic flows, ranging from a high of 43 cfs in July to a low of 20 cfs in September and October (SCWA, 2015).

The majority of the Putah Creek flows are diverted into the Putah South Canal at the PDD for irrigation, municipal, and industrial uses. Annual average diversion into the canal between water years 1995 and 2013 (excluding water year 1998) was approximately 190,000 acre-feet (USGS, 2014; as cited in Stillwater Sciences, 2014, p. 13; USGS 2007). Monthly mean flows in Putah Creek over this same time period were greatest between May and September (300 to 600 cfs) and lowest between November and February (40 to 60 cfs) (USGS, 2014; as cited in Stillwater Sciences, 2014, p. 13; SCWA 2015, p. 1). Between

water years 2004 and 2013, the majority of streamflow reaching Lake Solano at PDD was routed into the Putah South Canal even during the large winter flow events in 2004, 2005, and 2006 (Stillwater Sciences, 2014, p. 13).

In May 2000, the Putah Creek Accord formally regulated seasonal flow releases by Solano County Water Agency (SCWA) and Solano Irrigation District (SID) from Putah Diversion Dam to ensure minimum instream flows to chiefly benefit aquatic and riparian resources in the lower creek. Four flow-requirement categories, rearing flows, spawning flows, supplemental flows, and drought-year flows were established in the Accord. The minimum daily "rearing flows" to be maintained in the lower creek are summarized in **Table 3.1-1**. The Accord calls for the highest flows during the late spring and early summer months (April-July). Finally, "drought year flows" with reduced minimum flow releases from Putah Diversion Dam are triggered when total storage in Lake Berryessa is less than 750,000 acre-feet. Maintenance of continuous flows downstream of I-80 is not required under drought conditions; however, to date, this condition has not been triggered as storage in Lake Berryessa has maintained at least 900,000 acre-feet (USBR, 2014; as cited in Stillwater Sciences, 2014, p. 16).

Table 3.1-1 Minimum Daily Required "Rearing Flows" to be Recorded at Two SCWA-Operated Gaging Stations on Lower Putah Creek

SCWA Gaging Station	Water Year Type	Minimum Daily Required "Rearing Flows" (cfs)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
PDD	Normal	20	25	25	25	16	26	46	43	43	43	34	20
	Drought	20	25	25	25	16	26	46	43	43	43	34	20
I-80	Normal	5	10	10	15	15	25	30	20	15	15	10	5
	Drought	2	2	2	2	2	2	2	2	2	2	2	2

Source: Stillwater Sciences, 2014; Table 3, p. 16.

The Accord also stipulates that "spawning flows" must be released below the PDD as a 3-day pulse with associated minimum flows and gradual ramp-down rates between February 15 and March 31 of every year: 150 cfs for the first 24 hours, 100 cfs for the second 24 hours, and 80 cfs for the third 24 hours. The "supplemental flows" require that flows of at least 50 cfs be maintained at the point where Putah Creek discharges into the toe drain for five consecutive days each year between November 15 and December 15. This pulse is coordinated with removal of the flash-boards at Los Rios Check Dam. Removal of the earthen dam at Road 106A generally coincides with this activity.

Since the Accord was enacted, flows released from the Putah Diversion Dam into Lower Putah Creek have averaged approximately 40 cfs. Flows events with greater peaks and duration occur due to increased uncontrolled run-off, particularly from Dry and McCune creeks. Since the construction of Monticello Dam, peak flows have been attenuated from an estimated daily average of approximately 18,000 cfs to 8,000 cfs, with the pre-dam instantaneous peak of over 50,000 cfs dropping to the post-dam peak of approximately 18,000 cfs (City of Winters, 2008, p. 12; USGS, 2015). Between Monticello Dam and Putah Diversion Dam, instantaneous peak flows have measured 15,000-18,000 cfs during flood events (in 1970, 1983, and 1997) (County of Yolo, 2005, p. 4-39 and Figure 4-39). Peak flows of about 12,500 cfs occurred on this reach in January 2006 (SCWA streamflow data).

Once the capacity of Lake Berryessa's reservoir pool is exceeded and the glory hole begins to spill, flood events both upstream and downstream of the PDD are similar to the natural instantaneous peak discharges prior to the dam construction. A release of over 14,000 cfs was recorded in March of 1983. Solano County Water agency records indicate that inflow to Lake Berryessa during the December 2002 flood may have been in excess of 90,000 cfs (City of Winters 2008, p. 12). While the lake buffered the full effect of this flood in the Project Area, flows through the proposed Project Area still likely reached several thousand cfs due to input from tributaries below the dam (City of Winters, 2008, p. 12).

In summer months, daily flows are shown to decrease downstream along the length of the creek, which are likely due to infiltration losses to the subsurface, evapotranspiration from aquatic and riparian vegetation, surface water pumping from the creek, and nearby groundwater pumping. An unusual set of flow conditions occurs roughly three out of 10 years, when backwater conditions are induced on the lowest reaches of the Creek by high flows in the toe drain or even flooding of the Yolo Bypass (Stillwater Sciences, 2014). Under these conditions, Putah Creek's flow velocity nears zero, flow in the creek is significantly less than in the Yolo Bypass, and thus the flow essentially builds up at the mouth of the bypass.

Under ordinary conditions, all tributary flows into the Project Area are seasonal, because there are no perennial waterways flowing into Putah Creek within the Project Area.

Lower Putah Creek Sediment Transport

Downstream of the PDD, changes to Putah Creek channel form have largely been caused by dams blocking larger coarse sediment transport, direct manipulation of the channel for flood protection and gravel mining operations, and diversion of streamflows into of the South Fork canal (EDAW, 2005, pp. 4-19 and 4-20). Following completion of the Solano

Project in 1957, water released from the PDD became relatively sediment-free, or "sediment-starved" because sediments settled out in the reservoir behind the Dry Creek dam rather than continue downstream. Fine sediments, such as silt and sands, are still transported over the dam, but coarse sediment, such as gravel and cobbles, are not. When sediment-free water flows over existing sediment it has an increased capacity to entrain, or pick up and carry, particles from the bed and banks, which can contribute to continuing channel scour and erosion along lower Putah Creek.

The only consistent source of coarse sediments to the Lower Putah Creek channel is from Dry Creek, which now delivers only a fraction of the course sediments supplied prior to the Solano Project. While sediments (and woody debris) are occasionally flushed through the sluice gates at PDD, nearly all are fine-grained materials (Yates, 2003; EDAW, 2005; as cited in Stillwater Sciences, 2014, p. 26). Thus, the lower creek is effectively starved of coarse-grained sediments. The high proportion of fine sediments has degraded water quality and aquatic habitat conditions (EDAW, 2005; as cited in Stillwater Sciences, 2014, p. 26). These issues are addressed in the Water Quality and Biological Resources sections of this document, respectively.

Along the length of Lower Putah Creek, bed material generally transitions from predominantly sand and gravel near Winters to predominantly sand, silt, and clay near the YBWA (NHI *et al*., 2002; Yates, 2003; as cited in Stillwater Sciences, 2014, p. 26). Mean particle sizes (D50) between PDD and Pedrick Road bridge (just east of Davis and the North Fork split) show a general trend of coarser bed material near Winters to finer bed material towards the Mace Boulevard bridge. Limited field observations in 2012 support these trends, which continue through the YBWA Reach to the toe drain. Bank substrates throughout are fine-grained, being composed mostly of silty/sandy loams, with some clay and gravels.

Flood Hazards

The Federal Emergency Management Agency (FEMA) produces Flood Insurance Rate Maps (FIRMs) that identify flood-prone areas. The FIRMs for the Project Area show the majority of the Project Area is in the 100-year flood zone (Zone A), with some areas designated as Zones X, AO (river or stream flood hazard areas with a 1 percent or greater chance of shallow flooding), or AE (areas subject to inundation by a 100-year flood event, for which base flood elevations have been established) (FEMA, 2014a.). In the Project Area, flood hazards take four general forms:

1. Some 100-year flood zones occur exclusively within the confined channel because it is incised.

2. Some 100-year flood zones involve the channel overtopping into the shallow upland flood areas, primarily in the City of Davis and downstream to the bypass.
3. Some 100-year flood zones involve flooding from upland areas that drain into the creek via existing tributary channels, and this occurs primarily in areas around the City of Winters.
4. Some 100-year flood zones are associated with sheet flow across the landscape, flowing generally towards the Yolo Bypass, parallel to the creek. This occurs in the last two reaches of the Project Area, downstream of the City of Davis.

Detailed descriptions of flood-prone areas along the Project alignment are presented below, in "Project Area Conditions by Reach."

Project Area Conditions by Reach

Reach-by-reach information on hydrologic conditions is described below. Flood hazards are described below and shown generally on **Figures 3.1-1A** through **3.1-1D**, FEMA flood hazard maps.

NAWCA/Mariani

Outside sources of seasonal flow in this reach include McCune/Pleasant Creek. McCune Creek drains areas south and west of the Project Area and enters the creek and Project Area in the first third of the reach. The stream channel is deeply incised, and the 100-year floodplain in this reach is largely contained within it.

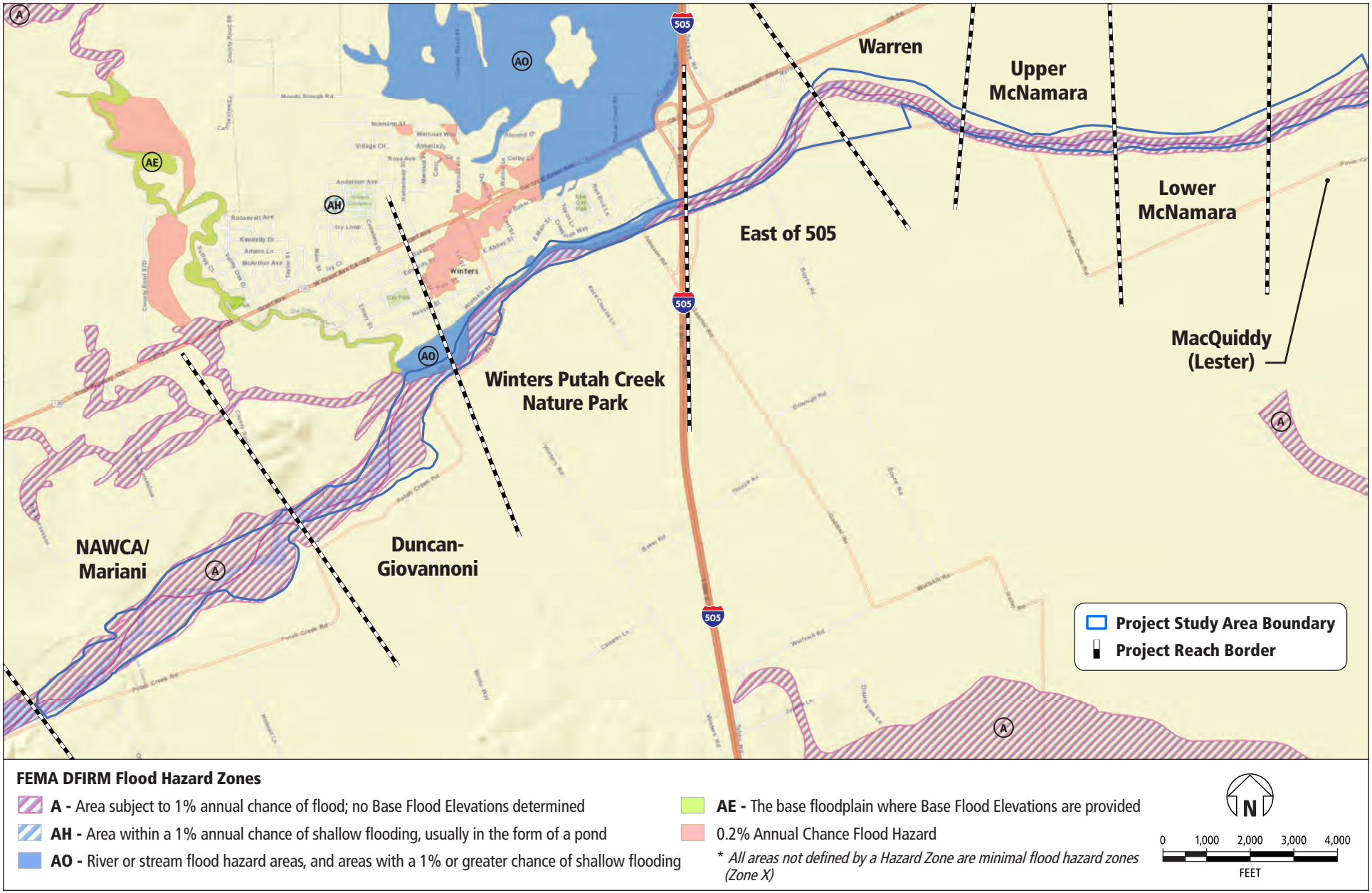


Figure 3.1-1A

FEMA Mapped Flood Zones

Source: FEMA

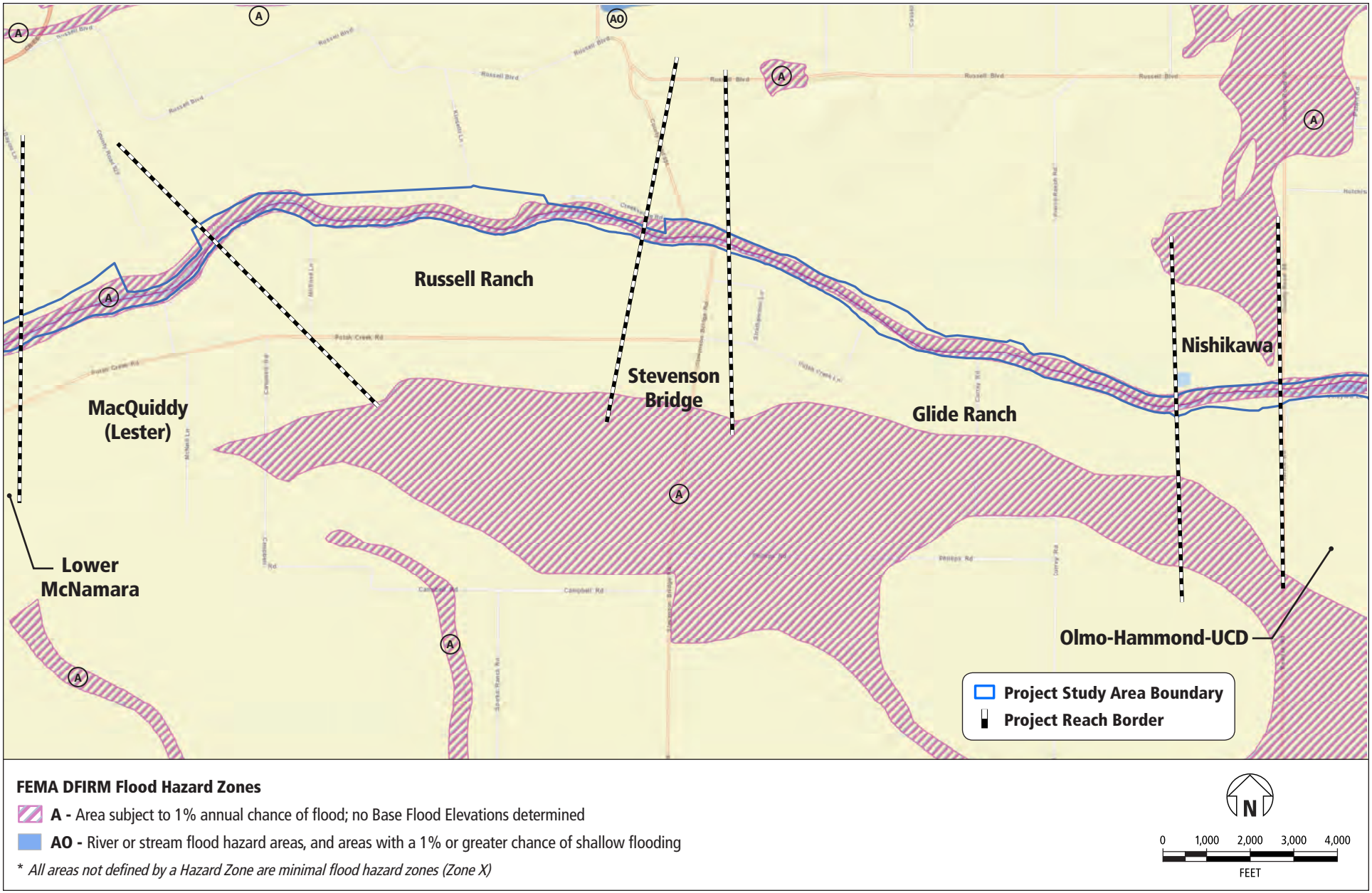
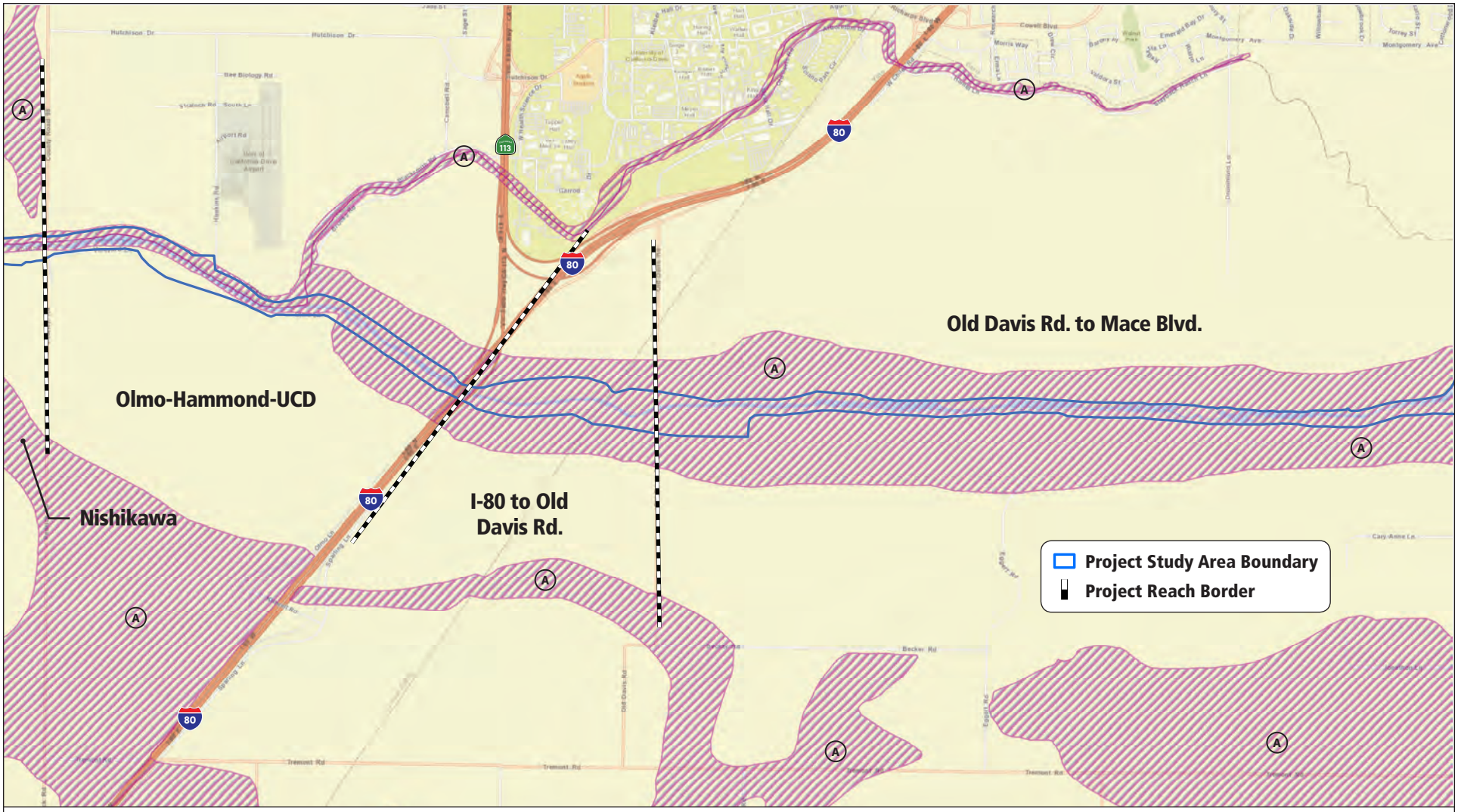


Figure 3.1-1B

FEMA Mapped Flood Zones

Source: FEMA



FEMA DFIRM Flood Hazard Zones

A - Area subject to 1% annual chance of flood; no Base Flood Elevations determined

* *All areas not defined by a Hazard Zone are minimal flood hazard zones (Zone X)*

N

0 1,000 2,000 3,000 4,000

FEET

Figure 3.1-1C

FEMA Mapped Flood Zones

Source: FEMA

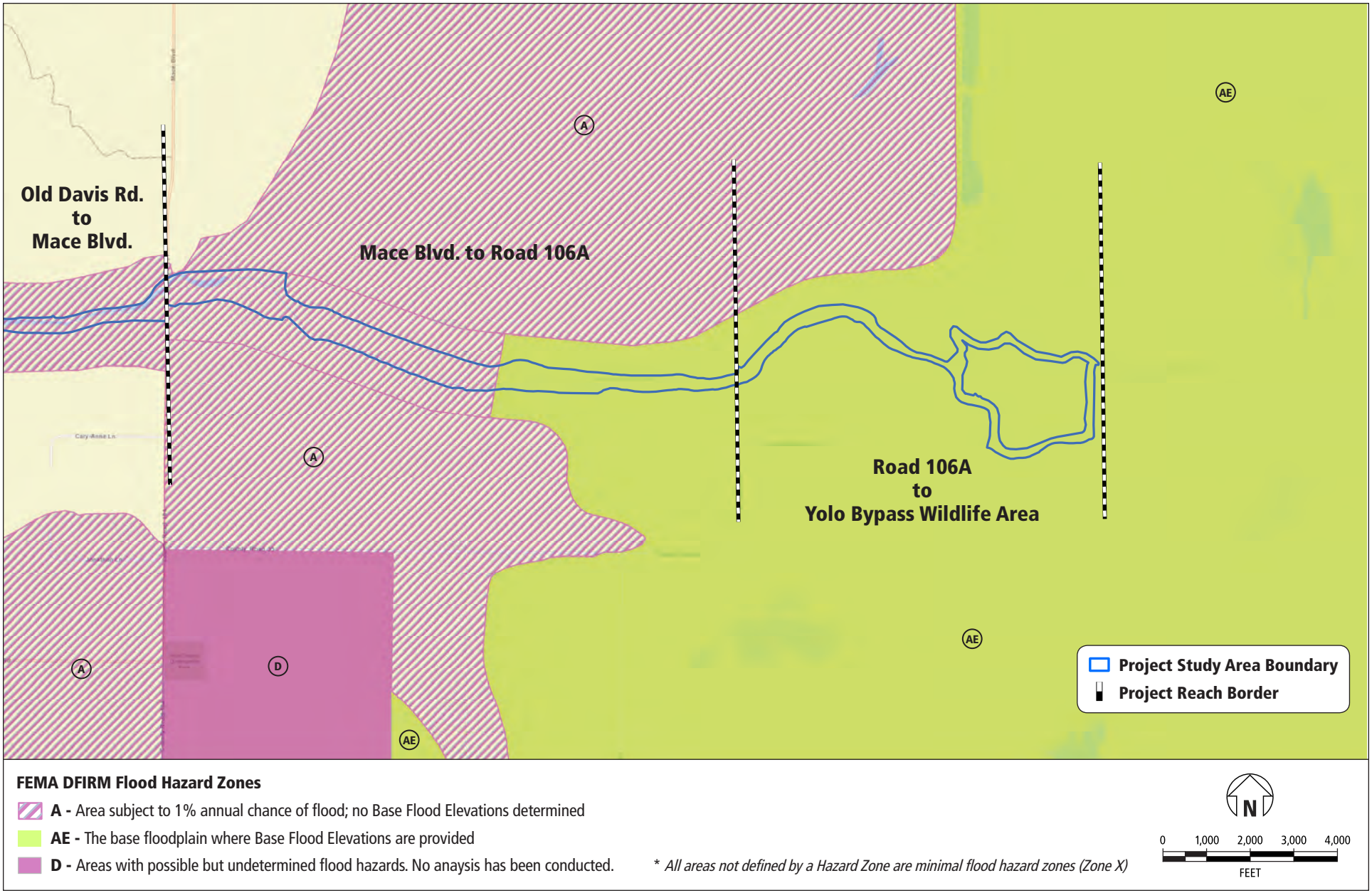


Figure 3.1-1D

FEMA Mapped Flood Zones

Source: FEMA

In the northeastern, downstream portion of this reach, the FEMA mapped floodplain extends beyond the top of the bank in three locations. These locations include land used as orchards and a large private residence with agricultural outbuildings that extends downstream into the vicinity of the Duncan-Giovannoni reach.

Duncan-Giovannoni

This is a transitional reach from the wider floodplains to what was one of the sections of the creek with the greatest pools and most incised floodplains. Dry Creek, a major tributary that flows from northwest and west of the Project Area, enters Putah Creek near the southwest corner of the City of Winters. Dry Creek's seasonal flows are flashy, with brief periods of high flows followed by long periods of no flow. A prior restoration on Dry Creek has stabilized downcutting in the reach, and Dry Creek is now one of the leading contributors of sediment to naturally rebuild the floodplain. However, approximately 5 acres of in-channel pools remain in the reach, increasing water temperatures.

The mapped floodplain is largely within the creek banks in this reach because the channel is highly entrenched and evolved to handle much higher pre-dam flows. This is not a leveed reach. Flood risk is minimal on the southern boundary of the reach. In the southwestern, upstream portion of this reach, the mapped floodplain extends beyond the top of the bank and beyond the Project Area. Areas mapped as subject to 100-year flooding include orchards and a large private residence with agricultural outbuildings (same as described above for NAWCA/Mariani reach).

Mapped 100-year flood plains occur in the northern part of this reach, due to the influence of McCune/Pleasant Creek and Dry Creek, which back up at their confluences with Putah Creek under 100-year flood conditions. Within the Project Area, 100-year flood flows remain within the incised Putah Creek channel, but just upstream on the tributaries, flooding occurs due to backed-up water.

Winters Putah Creek Nature Park

Through previous restoration activities, previously mined pools have been filled and the floodplain in this reach has been recontoured to design grades. Under non-flood conditions, there are no significant contributors to creek flow within this reach. The channel in this reach is incised and evolved to handle the higher pre-dam flows.

In most of the reach, 100-year flood flows remain within the channel. However, as in the Duncan-Giovannoni reach, the FEMA map for this reach depicts a backwater effect at the confluence of Dry Creek and Putah Creek, south of the City of Winters, which leads to

shallow flooding outside of the channel in the upstream end of the reach. During 100-year flood events, there is also shallow flooding along an intermittent channel at the northeast end of the reach, west of Interstate 505 (I-505). In both the cases of Dry Creek and the unnamed shallow upland runoff drainage, Putah Creek's flood remains in the channel, and flooding backs up along the tributary channels.

East of 505

There are no significant contributors to seasonal flow or runoff within this reach. The channel in this reach is deeply incised and not leveed.

The mapped 100-year floodplain in this reach extends somewhat outside of the top of the bank, outside of the Project boundaries, on the north bank of the creek, directly east of I-505 and south of an agricultural packing facility. In this reach, 100-year flood flows remain within the incised, confined channel.

Warren, Upper McNamara, Lower McNamara

There are no significant contributors to seasonal flow or runoff within these reaches. Because the creek channel is deeply incised, the mapped floodplain is largely contained within the creek channel. The 100-year mapped floodplain does not appreciably extend beyond the top of the channel in these reaches, which are all un-leveed. The Upper McNamara Reach contains approximately 5 acres of in-channel pools and Lower McNamara contains approximately 7 acres, increasing water temperatures in these reaches.

MacQuiddy (Lester)

There are no significant contributors to seasonal flow or runoff in this reach. Because the creek channel is deeply incised, the 100-year flood flows remain within the channel. This is not a leveed reach.

The mapped 100-year floodplain in this reach extends somewhat outside of the Project Area on a portion of the north bank of the creek. The Project Area boundaries have been narrowed in this area due to the presence of private property, including an orchard and a rural residence abutting the creek.

Russell Ranch

There are no significant contributors to seasonal flow or runoff in this reach. The creek channel is deeply incised, and so the 100-year floodplain is largely within the channel. This

is not a leveed reach. This reach contains approximately 7 acres of in-channel pools, which have resulted in increased water temperatures.

The mapped 100-year floodplain extends somewhat outside of the Project Area on a portion of the north bank of the creek in the far eastern, downstream end of the reach. The Project Area boundaries have been narrowed in this area due to the presence of a rural subdivision that extends eastward.

Stevenson Bridge

There are no significant contributors to seasonal flow or runoff in this un-leveed reach. The creek channel is deeply incised, keeping the 100-year flood flows remain within the channel. This reach contains approximately 1.5 acres of in-channel pools, which have resulted in increased water temperatures.

As in the Russell Ranch reach, the mapped 100-year floodplain extends somewhat outside of the Project Area on a portion of the north bank of the creek in the western (upstream) end of the reach. The Project Area boundaries have been narrowed in this area due to the presence of a rural subdivision.

Glide Ranch, Nishikawa

There are no significant contributors to seasonal flow or runoff in either of these reaches. In both reaches, the100-year floodplain is largely within the creek banks because the creek channel is deeply incised. The 100-year mapped floodplain does not appreciably extend beyond the Project Area in these reaches. The Glide Reach contains approximately 7 acres of in-channel pools, which have resulted in increased water temperatures.

Olmo-Hammond-UCD

There are no significant contributors to seasonal flow or runoff in this reach. In the upstream half of this reach, the creek is in an unleveed, incised channel, so the FEMA mapped floodplain is mostly within the creek banks, and 100-year flood flows remain within the channel. This reach contains approximately 17 acres of in-channel pools, which have resulted in increased water temperatures.

On the north bank, somewhat east of the middle of the reach, a smaller side branch of the creek splits off along the north bank of the creek. This northern side branch, which runs through the southern edge of the campus of the University of California, Davis (UC Davis) and then the City of Davis, is part of the historic channel of Putah Creek (not part of the Project). From this divergence point eastward, the main branch of the creek,

including the Project Area, enters an engineered, leveed channel. In this area, the 100-year mapped floodplain extends considerably beyond both leveed banks of the creek. Shallow flooding occurs in this area about one out of every 3 years.

I-80 to Old Davis Road, Old Davis Road to Mace

Both of these reaches are located in an area of flatter topography in which the channel is less incised. These reaches are located within the engineered, leveed channel, which ends at Mace Boulevard/Road 104. The 100-year mapped floodplain extends considerably beyond both banks of the creek in these reaches. The Old Davis Road to Mace Reach contains approximately 27 acres of in-channel pools, which have resulted in increased water temperatures.

These reaches receive treated wastewater from the UC Davis Wastewater Treatment Plant (UCD WWTP), which discharges treated wastewater from an outfall east of Old Davis Road, on the border between the two reaches (UC Davis, 2004, pp. 3-3 to 3-4 and Exhibit 3-2). The plant also discharges treated wastewater to the Arboretum Waterway on the UC Davis campus, outside of the Project Area (CVRWQCB, 2014, pp. 24 and F-2 to F-3). This waterway is located in the historical channel of the former North Fork of Putah Creek and is confined at both ends and used for stormwater management. The flow from the Arboretum Waterway is blended with stormwater and then pumped to Putah Creek (CVRWQCB, 2014, p. F-4).

The plant discharges a continuous flow to Putah Creek that averages approximately 2.5 cfs (EDAW, 2005, pp. 4-12 and 4-27; SWRCB, 2015a, p. 3; SWRCB, 2015b, p. 3). Under the flow regime instituted under the Putah Creek Accord, during normal, non-drought years, minimum mean daily flows measured at the I-80 gaging station in this section of the creek range from a low of 5 cfs in October to a high of 30 cfs in April (see Table 3.1-1; Sacramento Superior Court 2002, Exhibit A, pp. 1 to 2). Under these conditions, the plant makes a modest contribution to flow in this area of Putah Creek during the wetter months of the year. However, during drought years, the Putah Creek Accord requires minimum mean daily flow of only 2 cfs, and so under drought conditions, the plant makes a sizable contribution to flow in this portion of the creek.

Mace to Road 106A

There are no significant contributors to seasonal flow or runoff in these reaches. This reach is located within the floodplain of the Yolo Bypass and so is subject to flooding both inside and outside of the levee. One hundred-year flood events here are associated with sheet-flow across the land, towards the Yolo Bypass, as well as shallow flood flow from

the north that stops at the levee. At Road 106A at the far eastern edge of the reach, an earthen push-up dam is placed across the stream channel to impound water during the agricultural irrigation season, resulting in a long, wide pool of approximately 17 acres.

Road 106A to Yolo Bypass Wildlife Area

This reach contains approximately 11 acres of in-channel pools, which have resulted in increased water temperatures.

There are no significant contributors to seasonal flow or runoff in this reach. Like the Mace to Road 106A reach, this reach is located entirely within the floodplain of the Yolo Bypass and so is subject to flooding both inside and outside of the leveed channel, and 100-year flood events here are associated with sheet flow across the land, towards the Yolo Bypass. The earthen push-up dam at Road 106A on the far western edge of the reach (the dividing line between this reach and the Mace to Road 106A reach) controls flows into this reach in the summer months. The channel has very stable water levels due to the impoundments caused by the barriers at each end (the Los Rios check dam backs up water into this reach). In the eastern half of the reach, a seasonal overflow channel is located at the point where the channel forks (see Figure 3.1-1d). Shallow flooding in this area occurs about one out of every 3 years.

Regulatory Setting

Federal Regulations

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) implements the federal Clean Water Act Section 404. Any person, firm, or agency planning to alter or work in navigable waters of the U.S., including the discharge of dredged or fill material, must first obtain authorization from the USACE. Section 10 of the Rivers and Harbors Act of 1899 prohibits the obstruction or alteration of navigable waters of the U.S. without a permit from the USACE (33 U.S.C. Section 403). Section 301 of the Federal Water Pollution Control Act and Amendments of 1972 (CWA) prohibits the discharge of pollutants, including dredged or fill material, into waters of the U.S. without a Section 404 permit from USACE (33 U.S.C. Section 1344).

Putah Creek is a first-order tributary to the Sacramento River, and all tributaries to the Sacramento River are considered jurisdictional waters of the U.S. pursuant to Section 404 of the Clean Water Act (CWA) (USACE, 1987, p. 2; 33 CFR Section 328.3; cited in BSK, 2014,

p. 4). In order to assess which portions of the Project Area are located within jurisdictional "waters of the US" a field survey was completed to determine the OHWM (BSK, 2014).

USACE Regional General Permits

USACE oversees approval of Regional General Permits (RGPs) and Programmatic General Permits (PGPs) that are developed to avoid unnecessary regulatory control over activities that do not justify individual control or which are adequately regulated by another agency (33 CFR 320.1(a)(3)). These permits are issued for a category or categories of activities when: (a) those activities are substantially similar in nature and cause only minimal individual and cumulative environmental impacts; or (b) the RGP/PGP would result in avoiding unnecessary duplication of the regulatory control exercised by another federal, state, or local agency, provided it has been determined that the environmental consequences of the action are individually and cumulatively minimal.

As part of the permitting process for the proposed Project, a Regional General Permit is being sought for dredge and fill activities and associated maintenance associated with stream channel rehabilitation and riparian restoration activities in waters of the U.S. within the Project Area.

State Regulations

California Department of Fish and Wildlife

The California Department of Fish and Wildlife (CDFW) administers Lake and Streambed Alteration Agreements (LSAAs) pursuant to Fish and Game Code Section 1600 *et seq*. for any activity that will divert or obstruct the natural flow of any river, stream, or lake; change the bed, channel, or bank, including associated riparian or wetland/marsh resources, or use material from the stream channel bed. CDFW may require an LSAA for the proposed Project. CDFW is also a Responsible Agency for the proposed Project under CEQA and will review this PEIR (CDFW, 2015, p. 4).

Central Valley Regional Water Quality Control Board

The Central Valley Regional Water Quality Control Board (CVRWQCB) regulates water quality in the region surrounding the Project Area. CVRWQCB oversees enforcement of Section 401 of the federal Clean Water Act (CWA) through the Section 401 Water Quality Certification process where development results in fill of jurisdictional wetlands or waters of the U.S. under Section 404 of the CWA. For additional discussion of CVRWQCB regulations, see Section 3.2, *Water Quality*.

Central Valley Flood Protection Board

Under state Water Code Section 8520 *et seq*., the Central Valley Flood Protection Board (CVFPB) administers permits for any project that may encroach upon, improve, alter or affect adopted plans of flood control, including federal/state flood control systems, regulated streams and designated floodways under the Board's jurisdiction (CVFPB, 2014). It is anticipated that a CVFPB Encroachment Permit would be sought for the Project.

Local Regulations

Local regulation of water quality, hydrology, and flood protection is contained in the Solano and Yolo County General Plans, Municipal Codes, and other planning documents.

Solano County General Plan

The following Solano County General Plan objectives, policies, and implementation actions are relevant to the proposed Project (County of Solano, 2008, pp. HS-12).

Policies

HS.P-2: Restore and maintain the natural functions of riparian corridors and water channels throughout the county to reduce flooding, convey stormwater flows, and improve water quality.
HS.P-3: Require new developments to incorporate devices capable of detaining the stormwater runoff caused by a 100-year storm event or to contribute to regional solutions to improve flood control, drainage, and water recharge.

HS.P-6: Work with federal, state, and local agencies to improve flood control and drainage throughout the county.

HS.P-9: Preserve open space and agricultural areas that are subject to natural flooding and are not designated for future urban growth; prohibit permanent structures in a designated floodway where such structures could increase risks to human life or restrict the carrying capacity of the floodway.

Implementation Programs (County of Solano, 2008, pp. HS-12 to HS-19)

HS.I-5: Require periodic stream maintenance by private property owners, and undertake regular stream maintenance by the appropriate public agencies.
HS.I-6: Continue to make regular flood control and drainage improvements as recommended by local agency plans, the U.S. Army Corps of Engineers, and the

California Reclamation Board. These actions are independent of and in addition to the development review process.

HS.I-9: Work with the Solano County Water Agency (or successor agency) to review existing developments contributing to increased runoff and to reduce runoff wherever possible.

HS.I-15: Work with the Solano County Water Agency (or successor agency) in preparing a hydrological analysis of uplands, identifying the different watersheds that drain into the county, establishing flood-related objectives and priorities on a study area basis, and translating those into a coordinated series of flood-preventive measures for each watershed.

Yolo County General Plan

The following Yolo County General Plan goals, policies, and implementation actions are relevant to the proposed Project (County of Yolo 2009, pp. HS-17 to HS-18).

Goal HS-2 Flood Hazards. Protect the public and reduce damage to property from flood hazards.

Policy HS-2.1 Manage the development review process to protect people, structures, and personal property from unreasonable risk from flooding and flood hazards.

Policy HS-2.8 Consider and allow for the ecological benefits of flooding within historic watercourses while balancing public safety and the protection of property.

Implementation Programs (County of Yolo, 2009, p. HS-20)

Action HS-A13: Review development proposals to ensure that the need to maintain flood control capacity is balanced with consideration of the environmental health of watercourses that convey floodwaters so as not to cause significant erosion, sedimentation, water quality problems, or loss of habitat.

Action HS-A14: Require a minimum 50-foot setback for all permanent improvements from the toe of any flood control levee.

Action HS-A15: Restrict proposed land uses within 500 feet of the toe of any flood control levee, including but not limited to the items listed below, unless site-specific

engineering evidence demonstrates an alternative action that would not jeopardize public health or safety:

- Prohibit permanent unlined excavations; […]
- Engineered specifications for levee penetrations; and
- Require landscape root barriers within 50 feet of the toe.

The Yolo County General Plan has established broad descriptions of buffers for areas within its county that are protected natural resource areas. These buffers protect riparian areas similar to the proposed Project. These buffers are explained in the General Plan policies and actions below.

Policy CO-1.15: Support efforts to acquire either fee title or easements on additional open space areas adjoining existing protected natural resource areas to increase the size, connectivity, and buffering of existing habitat. (County of Yolo 2009, p. CO-15)

Action CO-A27: Protect the habitat value and biological function of oak woodlands, grasslands, riparian areas, and wetland habitats. Avoid activities that remove or degrade these habitats and establish buffers to avoid encroachment into sensitive areas. (County of Yolo 2009, pp. CO-41 to CO-42)

Solano County Code (Ord. No. 865, Section 1; Ord. No. 1427, Section 1)

The following Solano County Code provisions are relevant to analysis of Hydrology and flood risks in the Project Area.

12.2-13 Methods of reducing flood losses.

In order to accomplish its purposes, this ordinance includes methods and provisions for:

(a) Restricting or prohibiting uses which are dangerous to health, safety, and property due to water hazards, or which result in damaging increases in flood heights or velocities;

(b) Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;

(c) Controlling the alteration of natural floodplains, stream channels, and natural protective barriers which help accommodate or channel flood waters;

(d) Controlling filling, grading, dredging, and other development which may increase flood damage; and

(e) Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

Yolo County Code

The following Yolo County Code provisions are relevant to analysis of hydrology and flood risks in the Project Area.

Section 8-3.104: Methods of reducing flood losses.
In order to accomplish its purpose, this section includes methods and provisions to:

- Restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities;
- Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- Control the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;
- Control filling, grading, dredging, and other development which may increase flood damage; and
- Prevent or regulate the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

Section 8-3.208: Development.

"Development" means any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials. For the purposes of this section, the following activities shall not be considered development:

- Typical agricultural activities, such as plowing, seeding, cultivating, harvesting, field leveling, contouring, and planting; and
- Residential and commercial landscape maintenance.

Section 8-3.209: Encroachment.

"Encroachment" means the advance or infringement of uses, plant growth, fill, excavation, buildings, permanent structures or development into a floodplain which may impede or alter the flow capacity of a floodplain.

Section 8-3.301: Lands to which this chapter applies.

This chapter shall apply to all areas of special flood hazards within the jurisdiction of Yolo County.

Section 8-3.302: Basis for establishing the areas of special flood hazard.

The areas of special flood hazard identified by the Federal Insurance Administration (FIA) of the Federal Emergency Management Agency (FEMA) in the Flood Insurance Study for Yolo County, dated April 2, 2002 (and all subsequent revisions) and accompanying Flood Insurance Rate Maps (FIRMs), dated December 16, 1980, and all subsequent amendments and/or revisions, are hereby adopted by reference and declared to be a part of this chapter. The flood Insurance Study and FIRMs are on filed at the Yolo County Community Development Agency, 292 West Beamer Street, Woodland, CA, 95695. This Flood Insurance Study and attendant mapping is the minimum area of applicability of this chapter and may be supplemented by studies for other areas which allow implementation of this chapter and which are recommended by the Floodplain Administrator and adopted by the Planning Commission.

Section 8-3.401: Establishment of flood hazard development permit.

A Flood Hazard Development Permit shall be obtained before any construction or other development begins within any area of special flood hazards established in Section 8-3.302. Application for a Flood Hazard Development Permit shall be made on forms furnished by the Floodplain Administrator and may include, but not be limited to: plans in duplicate drawn to scale showing the nature, location, dimensions, and elevation of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities; and the location of the foregoing. Specifically, the following information is required:

(1) proposed elevation in relation to mean sea level, of the lowest floor (including basement) of all structures; in Zone AO elevation of highest adjacent grade and proposed elevation of lowest floor of all structures; or

(2) proposed elevation in relation to mean sea level to which any nonresidential structure will be floodproofed, if required in Section 8-3.501(c)(4); and

(3) all appropriate certifications listed in Section 8-3.403(d) of this chapter; and

(4) description of the extent to which any watercourse will be altered or relocated as a result of proposed development.

(5) in the A99 zone, base flood elevation and construction specifications shall be provided by a licensed engineer.

(6) all new proposed development (including proposals for manufactured home parks and subdivisions) greater than 50 lots of 5 acres, whichever is lesser, and located in areas of special flood hazards where base flood elevations have not been provided, shall include base flood elevation data prepared by a registered professional engineer.

In addition to the foregoing, the Floodplain Administrator may require such other information relevant to the Project as needed in order to enforce this chapter.

Other Requirements

Putah Creek Accord

On May 23, 2000, the Putah Creek Accord (Accord) between various parties from Solano County and Yolo County resulted from settlement of litigation between the Putah Creek Council (and other Yolo County-based parties), and the Solano County Water Agency, Solano Irrigation District, and other Solano County-based entities (EDAW, 2005, p. 5-31). The Accord set up a permanent dam release schedule based on the following goals:

(a) Flows for resident native fish, which include important spawning and rearing components and guarantee a continuous flow to the Yolo Bypass;

(b) Flows that will attract and support salmon and steelhead;

(c) A drought schedule that provides enough water to maintain Putah Creek as living stream but provides water users relief from other flow requirements;

(d) Creation of the Lower Putah Creek Coordinating Committee (LPCCC);

(e) Habitat restoration and monitoring funds for the creek; and

(f) A term requiring Solano County Water Agency to notify riparian water users of the amount of riparian water available in any given year and to prevent illegal water diversions in excess of the amount of riparian water available. (EDAW, 2005, p. 5-32)

The LPCCC promotes the adequacy of flows to protect fish and wildlife resources of Putah Creek and consists of representatives of Solano and Yolo counties with interests in the protection of Putah Creek resources. The LPCCC represents the Boards of Supervisors of Solano and Yolo counties; cities of Davis, Fairfield, Suisun, Vacaville, Vallejo, and Winters; Solano County Water Agency; Solano Irrigation District; Maine Prairie Water District; UC Davis; Putah Creek Council; and riparian landowners (EDAW, 2005, p. iii).

3.1.2 Significance Criteria

The following thresholds for measuring a project's environmental impacts are drawn from CEQA Guidelines Appendix G standards (OPR, 2013). An impact to surface hydrology or water quality is considered significant if implementation of the proposed Project will result in any of the following:

1. Substantially increase erosion or siltation on- or off-site.
2. Substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site.
3. Exceed the capacity of existing or planned stormwater drainage systems.

3.1.3 Impacts and Mitigation Measures

Impacts and mitigation measures are described below both generally and by reach. Applicable impacts and mitigation measures for each reach are summarized in **Table 3.1-3**, at the end of this section.

General Impacts and Mitigation Measures

Impact 3.1-1: Potential Erosion and/or Siltation Impacts.

Long-Term Impacts

The Project would not result in long-term adverse impacts to erosion or siltation because Project activities would have no effect on flow regimes that could affect erosion or siltation, and also because flow regimes and resulting velocities are controlled by Monticello Dam and regulated by the Putah Creek Accord, as discussed above. In addition, the Project would include a number of measures to reduce existing erosion problems.

Short-Term Impacts

Project activities could result in potential temporary impacts on erosion and siltation. The activities and effects are summarized below in **Table 3.1-2**, and are analyzed in further detail in below.

Project construction activities would not occur during the rainy season. In order to perform Project activities, occasional short-term diversions of low flows may be necessary to isolate the Project activity area from flowing water during the dry-season construction of channel improvements. However, this would be a portion of the creek; Project activities would not dewater the entire creek. These diversions would typically last no longer than two months and would be accomplished through installation of a temporary

coffer dam, diverting stream flows along a portion of a reach either into a pipe, or trench side channel. In areas where the channel is braided, flow may be diverted from one channel to another to allow work in a neighboring segment.

These short-term diversions of flows to newly trenched channels could result in potential erosion and sedimentation impacts including localized minor scour, increased erosion, and localized release of upland sediment that could be deposited downstream. Based on prior restorations on the Creek, potential erosion and sedimentation effects would be most likely to occur during brief periods when establishing or removing the diversion structure, when sediments are released into the water column and a brief pulse of water that had been backed-up behind the dam is released into the newly created channel. These impacts would be minimized or avoided through regulatory compliance (CDFW Lake and Streambed Alteration Agreements, required for all Project activities, and Stormwater Pollution Prevention Plans [SWPPPs], required for Project activities disturbing more than 1 acre) and the application of Mitigation Measure 3.1-1, described below.

Channel reconfiguration activities proposed for the Project, such as construction grading and clearing, could create short-term adverse erosion and siltation impacts to the stream channel by grading and scarifying soil in the active stream channel to create the new channel features.

Table 3.1-2 Summary of Erosion Effects of Project Activities

Project Activity or Action	Effect	Impact Significance
Narrow low-flow channel	Short term: Minor increases in erosion until channel is stabilized. Long term: Potential minor increase in lateral erosion from the average water elevation and velocity	No impact.
Increase creek substrate roughness	Short term: Minor increase in erosion post-construction Long term: Reduce flow velocity from operations	Less than significant.
Temporary flow diversion (pipe, trench, or temporary coffer dam)	Short term: Erosion and siltation from construction	Avoided/reduced to insignificance through regulatory compliance and Measure 3.1-1.
Channel reconfiguration (grading and clearing)	Short term: Erosion and siltation from construction	Avoided/reduced to insignificance through regulatory compliance and Measure 3.1-1.
Construction of access ramps	Short term: Erosion and siltation from construction	Avoided/reduced to insignificance through regulatory compliance and Measure 3.1-1.
Gravel augmentation, scarification, and maintenance	Short term: Erosion and siltation until scarified sediments stabilize; possible short-term impacts during maintenance	Less than significant: limited number of acres per year, activity and impact lasting only a few minutes, de minimus impact.
Project maintenance activities such as weed management	Short term erosion and siltation until revegetation occurs	Avoided/reduced to insignificance through regulatory compliance and Measure 3.1-1.

Construction of ramps for access to the creek also could create short-term adverse erosion and siltation impacts to the stream channel. These impacts would be minimized or avoided through regulatory compliance required for all Project activities, Stormwater Pollution Prevention Plans [SWPPPs] (required for Project activities disturbing more than one acre), and the application of Mitigation Measure 3.1-1. These would require stabilized ramps constructed to minimize erosion and sediment deposition in creek waters.

As described in Chapter 2, *Project Description*, irrigation is expected to be used for up to 3 years at revegetated sites to establish native plantings. Different irrigation methods may be used depending on the site, but all irrigation components would be above-ground and temporary. This could result in short-term erosion impacts, but these potential impacts would be minimized or avoided through regulatory compliance required for all Project activities, Stormwater Pollution Prevention Plans [SWPPPs] (required for Project

activities disturbing more than one acre), and the application of Mitigation Measure 3.1-1.

Short-term erosion or siltation could occur due to Project maintenance activities such as weed management that may expose soils in the channel banks and bottom. However, the CDFW Lake and Streambed Alteration Agreements that would be required for all Project activities would forbid leaving bare ground and would require revegetation of exposed soils, as well as soil stabilization until new vegetation becomes established. Storm Water Pollution Prevention Plans (SWPPPs) required for the Project would also require revegetation before closure of Project work sites. Additionally, for Project activities that that disturb less than one acre of soil, Mitigation Measure 3.1-1 would require the application of SWPPP-type Best Management Practices (BMPs) to avoid leaving exposed ground and prevent erosion. (For example, under Mitigation Measure 3.1-1 below, see BMPs EC-2 Preservation of Existing Vegetation, EC-4 Hydroseeding, and SE-5 Fiber Rolls.)

Gravel augmentation and scarification activities could contribute to erosion or siltation by leading to short-term fine sediment pulses. The gravel augmentation would occurring in a limited number of locations in the creek each year (61 riffles per year, with a maximum of about 10,000 cubic yards of gravel) for very brief periods and would release substantially less sediment than occurs under existing conditions of creek bank failures. Some minor internal channel movement which results in erosion and re-deposition of channel materials is part of the healthy function of the creek, and therefore this is not considered a significant adverse impact.

Short-term erosion or siltation impacts would be further minimized through regulatory compliance and the application of Mitigation Measure 3.1-1. Project activities would be subject to CWA Section 401 Water Quality Certification for discharges of dredged and fill materials through the CVRWQCB (SWRCB, 2014). As part of this certification, CVRWQCB would require erosion controls in all areas disturbed by Project activities, as is discussed in further detail in Section 3.2, *Water Quality,* of this EIR. These regulatory controls would ensure that the Project's erosion and siltation impacts would be less than significant.

SWPPPs would be required for Project activities that disturb one or more acres of soil under the National Pollution Discharge Elimination System (NPDES) General Permit for Construction Storm Water Discharges. The SWPPPs would also incorporate visual, chemical, and sediment monitoring programs as required. See Section 3.2, *Water Quality,* for additional detail on SWPPP requirements.

A SWPPP may not be required for certain Project activities, such as activities that disturb less than one acre of soil. In those situations, Mitigation Measure 3.1-1 would ensure that Project impacts remain less than significant by implementing BMPs designed to avoid or minimize adverse impacts associated with erosion and siltation.

Mitigation Measure 3.1-1: Implement Erosion and Sediment Control BMPs.

In the cases in which a SWPPP is not required for Project activities, the Project applicant shall implement BMPs selected by a Qualified SWPPP Developer. The BMPs shall be drawn from the Construction BMP Handbook published by the California Stormwater Quality Association (CASQA) or equivalent prior to the start of any ground-disturbing activities. These BMPs may include, but are not restricted to, the menu of measures listed below, and would be applied both during and after construction, until the work site is stabilized according to the same closure requirements that would be applicable were the work area subject to a SWPPP.

In order to ensure that the BMPs implemented are functioning to prevent erosion and sediment impacts, a California-qualified Qualified SWPPP Practitioner (QSP) must inspect functioning of the BMPs on a weekly basis. If the BMPs are insufficient, the QSP shall make recommendations for additional or sufficient BMPs.

Erosion Controls – Menu of Potential BMPs

- Stream Bank and Channel Stabilization: Where creek banks and channels are disturbed by construction, application of the full suite of available BMPs shall be coordinated by the QSP for application during and following construction to reduce the discharge of sediment and other pollutants from stream banks to minimize the impact of construction activities (CASQA, 2009, Fact Sheet EC-12).
- Scheduling: The QSP shall prepare a written plan to sequence construction activities and the implementation of other BMPs to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking. Environmental constraints such as nesting season prohibitions shall also be taken into account in developing a schedule (CASQA, 2009a, Fact Sheet EC-1).
- Preservation of Existing Vegetation: Where possible, existing non-invasive and native vegetation shall be preserved to minimize the potential of removing or injuring existing trees, vines, shrubs, and grasses that protect soil from erosion (CASQA, 2009, Fact Sheet EC-2).

- Hydroseeding: Where soil has been disturbed by construction and requires temporary protection until permanent stabilization is established, a mixture of hydraulic mulch, seed, fertilizer, and stabilizing emulsion shall be applied to temporarily protect exposed soils from erosion by water and wind (CASQA, 2009, Fact Sheet EC-4).
- Geotextiles and Mats: Where soil has been disturbed by construction on slopes where the erosion hazard is high and vegetation will be slow to establish, mattings shall be used to cover the soil surface to reduce erosion from rainfall, hold soil in place, and absorb and hold moisture near the soil surface (CASQA, 2009, Fact Sheet EC-7).
- Wood Mulching: Where soil has been disturbed by construction and temporary protection is needed until permanent stabilization is established, an applied mixture of shredded wood mulch, bark, or compost shall be applied to disturbed soils to reduce erosion by protecting bare soil from rainfall. This BMP shall not be used on areas exposed to concentrated flows or on slopes steeper than 3:1 (H:V) (CASQA, 2009, Fact Sheet EC-8).
- Velocity Dissipation Devices: Where needed, a physical device composed of rock, grouted riprap, or concrete rubble, shall be placed at the outlet of a pipe or channel to prevent scour of the soil caused by concentrated high velocity flows. This BMP will be applied to stormwater structures as needed to divert run-on flow during construction (CASQA, 2009, Fact Sheet EC-10).

Sediment Controls– Menu of Potential BMPs

- Silt Fence: Where needed, a woven geotextile that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support will be installed temporarily to detain sediment-laden water and promote sedimentation behind the fence. This shall be used in areas disturbed by construction as a perimeter control, above channels, and/or below the toe or downslope of exposed and erodible slopes (CASQA, 2009, Fact Sheet SE-1).
- Fiber Rolls: Where needed, fiber rolls shall be placed at the toe and on the face of slopes along the contours to intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff (CASQA, 2009, Fact Sheet SE-5).
- Gravel Bag Berm: Where needed, a series of gravel-filled bags shall be placed on a level contour to intercept sheet flow runoff, allow sediment to settle out, and release runoff slowly as sheet flow, preventing erosion (CASQA, 2009, Fact Sheet SE-6).

- Straw Bale Barrier: Where needed, a series of straw bales shall be placed on a level contour to intercept sheet-flow runoff and allow sediment to settle out (CASQA, 2009h).
- Compost Sock and Berm: Where needed, a three-dimensional biodegradable filtering structure shall be used at the site perimeter or at intervals on sloped areas to intercept runoff where sheet flow occurs to retain sediment (CASQA, 2009, Fact Sheet SE-13).
- Stabilized Construction Entrance and Exit: A pad of aggregate underlain with filter cloth shall be constructed at a point where traffic would be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto roadways and help prevent deposition of sediments into local storm drains and production of airborne dust (CASQA, 2009i).
- Stabilized Construction Roadway: Access roads and parking areas shall be stabilized immediately after any grading and maintained to prevent erosion and control dust after grading (CASQA, 2009, Fact Sheet TC-2).

Non-Stormwater Controls

- Temporary Stream Crossing: Where needed, a temporary culvert, ford, or bridge shall be placed across a waterway to provide access for construction purposes for a period of less than 1 year. These crossings are intended to eliminate erosion and downstream sedimentation caused by vehicles (CASQA, 2009, Fact Sheet NS-4).

Erosion and sediment controls implemented to comply with Federal Clean Water Act Section 401 Water Quality Certification, with any required SWPPP(s), and with Mitigation Measure 3.1-1 would ensure that Project impacts from erosion and siltation to the environment would remain **less than significant**. No additional mitigation is required.

Impact 3.1-2: Stream Diversion During Construction.

The Project would change flows in existing stream channels during and after construction. During construction, flows would be diverted in all reaches where channel reconstruction work is proposed in the existing channel. This diversion may be into temporary excavated bypass channels, existing braided channel segments not proposed for reconstruction, or pipes bypassing the construction areas. During these periods, the existing stream channel would be dewatered for a period of weeks or months. In the long term, flows would either resume in the existing channel areas (reconstructed) or through new channels. Although portions of the existing stream channel would be dewatered during construction, this is

not considered a significant impact on hydrology because flows would either be directed into other channels or, if bypass flows are piped, the piped areas would be limited in length, temporary and short-term in duration, and reconnected to upstream and downstream channels when channel work is completed in the reach or sub-reach. The impact would be less than significant.

Impact 3.1-3: Potential Changes to Flood Hazards.

The Project would narrow the low-flow channel. Such narrowing within the entrenched floodplain may cause minor increases in the average water elevation and velocity, but these minor elevations (a matter of a few inches) would not lead to greater out-of-bank flooding. The increased velocity would also increase the transport of coarser sediments downstream, a Project purpose. Thus, this particular type of erosion would be a Project benefit, not a negative impact. In addition, the Project aims to increase sinuosity of the creek, which increases overall channel length, effectively slowing the flow velocity and bringing the channel into “equilibrium”.

The Project could result in minor increases to creek substrate roughness¸ also effectively reducing velocity compared to existing conditions. Reduction of velocity has the potential to nominally raise flood elevations. However, this nominal raising of flood elevations would not result in any adverse environmental impacts for several reasons: first, the overall capacity of the channel would remain the same; second, the creek is well-entrenched throughout most of its length, and leveed through the remainder, which tends to confine water to the creek channel both under existing conditions and under projected Project and post-Project conditions; and lastly, invasive riparian vegetation is very rough hydraulically, but the Project is removing these dense thickets and replacing them with much less rough native species.

The Project would have no effect on flow volumes in the creek because flows are controlled by Monticello Dam and regulated by the Putah Creek Accord, as discussed above under Environmental Setting. Therefore the Project would not increase flooding risks or areas of flooding on- or off-site.

Therefore, the Project would have **no impact** on flooding on- or off-site. No mitigation is required.

Impact 3.1-4: Impacts to Existing Stormwater Drainage Systems.

Within the Project Area, occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. If modifications or replacement of these drainage systems were not performed according to current standards, they could be damaged or perform less efficiently or in a substandard manner. Implementation of Mitigation Measure 3.1-2 below would reduce impacts related to stormwater drainage systems to a **less-than-significant** level.

Mitigation Measure 3.1-2: Standards for Modification or Replacement of Storm Drains.

In the event roadway or agricultural storm drains need to be modified or replaced as a result of the channel alignment or other Project activities, such modification or replacement will be done in a manner to bring the drain(s) up to current standards. The Project would replace or upgrade the facility to applicable standards in consultation with property owner. Depending on the funding source or location for a given Project activity, the improvements would be conducted be under city, county, state, or federal standards. For drains in Solano County, the Project would rely on the Solano County Public Works specifications. For portions of the Project occurring exclusively within Yolo County (Mace Road to Road 106A Reach and Road 106A to the YBWA) replacement drains would rely on the Yolo County Public Works specifications.

In the event that roadway or agricultural storm drains within flood levees need to be modified or replaced as a result of Project activities, such modification or replacement shall be performed in strict consultation with the Central Valley Flood Protection Board (CVFPB) and according to CVFPB standards and requirements.

Site-Specific Impacts and Mitigation Measures

NAWCA/Mariani

<u>Erosion/Siltation</u>

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than**

significant. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measures 3.1-2 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

Duncan-Giovannoni

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level. No additional mitigation is necessary.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measure 3.1-2 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

Winters Putah Creek Nature Park

Erosion/Siltation

Except for a small portion of the reach far upstream, restoration activities have already been completed for this reach, so the only activities anticipated in this reach are maintenance, including weed control. The only potential erosion and siltation impacts resulting from the Project could be from mechanical weed-pulling or the inadvertent over-application of herbicide, in the event either of these activities disturbed and exposed soil that could run into the creek. However, the completed restoration project in this area achieved a low gradient floodplain by design, and so there is no mechanism by which unintended sediment could be released. Thus, the proposed Project would have **no impact** related to erosion or siltation. No mitigation is required in this reach.

Flooding

The only Project activities anticipated in this reach are maintenance activities, except for a far upstream portion of the reach. Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The Project would have **no impact** on flood risk related to alterations of the existing drainage pattern.

Stormwater Drainage Systems Impacts

Several municipal drains for the City of Winters are located in this reach, but because restoration activities have already been completed for this reach, proposed Project activities would only involve maintenance and would not alter stormwater drainage systems. In the far upstream portion of the reach, a large municipal drain is located in an area that may be subject to some Project construction activities. However, any activities will be performed in a manner to avoid any impacts to the drain, which is a 4-foot diameter concrete pipe with a concrete splashway that would not be practical to modify or relocate. Therefore, there would be **no impact** on stormwater drainage systems and no mitigation is required.

East of 505

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level. No additional mitigation is necessary.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measure 3.1-2 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

Warren

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with

Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

A Yolo County Flood Canal return outfall is located in this reach, but will not be moved or affected by the Project. Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measure 3.1-2 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

Upper McNamara

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measure 3.1-2 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

Lower McNamara

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measure 3.1-2 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

MacQuiddy (Lester)

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measure 3.1-2 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

Russell Ranch

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions;

channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measure 3.1-2 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

Stevenson Bridge

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measure 3.1-2 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

Glide Ranch

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measure 3.1-2 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

Nishikawa

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measure 3.1-2 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

Olmo-Hammond-UCD

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions;

channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level. No additional mitigation is necessary.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

Western Portion of Reach

Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measure 3.1-3 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

Eastern Portion of Reach

This portion of the reach is within the leveed channel. Any structures that penetrate the levee would require consultation with the CVFPB. It is not expected that these structures would be modified, but if so, Mitigation Measure 3.1-3 would be applied, and such work would be performed in strict consultation with the CVFPB to ensure that impacts related to stormwater drainage systems would be **less than significant**.

I-80 to Old Davis Road

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed

management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level. No additional mitigation is necessary.

Flooding

This reach is located in a portion of the creek that is leveed and is less entrenched, but because Project activities in this reach would not substantially alter the amount of water passing through the creek, or channel capacity, it would not increase flooding risks on- or off-site. The Project would have **no impact** on flood risk.

Stormwater Drainage Systems Impacts

Any structures that penetrate the levee would require consultation with the CVFPB. It is not expected that these structures would be modified, but if so, Mitigation Measure 3.1-2 would be applied, and such work would be performed in strict consultation with the CVFPB to ensure that impacts related to stormwater drainage systems remain **less than significant**.

Old Davis Road to Mace

Approximately the first one-quarter of this reach has undergone some restoration activities other than maintenance. Restoration activities have not been performed on the remainder of the reach.

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure

3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Flooding

As with the I-80 to Old Davis Road reach, this reach is located in a portion of the creek that is leveed and is less entrenched, but because Project activities in this reach would not alter the amount of water passing through the creek, or channel capacity, it would not increase flooding risks on- or off-site. The Project would have **no impact** on flood risk.

Stormwater Drainage Systems Impacts

This is a leveed reach. Any structures that penetrate the levee would require consultation with the CVFPB. It is not expected that these structures would be modified, but if so, Mitigation Measure 3.1-2 would be applied, and such work would be performed in strict consultation with the CVFPB to ensure that impacts related to stormwater drainage systems would be **less than significant**.

Mace to Road 106A

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Flooding

This reach is located within the floodplain of the Yolo Bypass and so is subject to flooding both inside and outside of the levee. Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or otherwise increase flooding risks on- or off-site. The Project would have **no impact** on flood risk.

Stormwater Drainage Systems Impacts

This is a leveed reach. Any structures that penetrate the levee would require consultation with the CVFPB. It is not expected that these structures would be modified, but if so, Mitigation Measure 3.1-2 would be applied, and such work would be performed in strict consultation with the CVFPB to ensure that impacts related to stormwater drainage systems would be **less than significant**.

Road 106A to Yolo Bypass Wildlife Area

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level. No additional mitigation is necessary.

Runoff and Flooding

Like the Mace to Road 106A reach, this reach is located within the floodplain of the Yolo Bypass and so is subject to flooding both inside and outside of the levee. Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

This is a leveed reach. Any structures that penetrate the levee would require consultation with the CVFPB. It is not expected that these structures would be modified, but if so, Mitigation Measure 3.1-2 would be applied, and such work would be performed in strict consultation with the CVFPB to ensure that impacts related to stormwater drainage systems would be **less than significant**.

Table 3.1-3 Summary of Hydrology Impacts and Mitigation Measures

Reach	Impact 3.1-1 Erosion or Siltation Impacts	Impact 3.1-2 Stream diversion during construction	Impact 3.1-3 Runoff and Flooding	Impact 3.1-4 Stormwater Drainage Systems	Applicable Mitigation Measures
NAWCA/Mariani	SM	LS	NI	SM	MM 3.1-1 MM 3.1-2
Duncan-Giovannoni	SM	LS	NI	SM	MM 3.1-1 MM 3.1-2
Winters Putah Creek Nature Park	NI	NI	NI	NI	none
East of 505	NI	LS	NI	NI	MM 3.1-1 MM 3.1-2
Warren	SM	LS	NI	SM	MM 3.1-1 MM 3.1-2
Upper McNamara	SM	LS	NI	SM	MM 3.1-1 MM 3.1-2
Lower McNamara	SM	LS	NI	SM	MM 3.1-1 MM 3.1-2
MacQuiddy (Lester)	SM	LS	NI	SM	MM 3.1-1 MM 3.1-2
Russell Ranch	SM	LS	NI	SM	MM 3.1-1 MM 3.1-2
Stevenson Bridge	SM	LS	NI	SM	MM 3.1-1 MM 3.1-2
Glide Ranch	SM	LS	NI	SM	MM 3.1-1 MM 3.1-2
Nishikawa	SM	LS	NI	SM	MM 3.1-1 MM 3.1-2
Olmo-Hammond-UCD	SM	LS	NI	SM	MM 3.1-1 MM 3.1-2
I-80 to Old Davis Road	SM	LS	NI	SM	MM 3.1-1 MM 3.1-2
Old Davis Road to Mace	SM	LS	NI	SM	MM 3.1-1 MM 3.1-2
Mace to Road 106A	SM	LS	NI	SM	MM 3.1-1 MM 3.1-2
Road106A to YBWA	SM	LS	NI	SM	MM 3.1-1 MM 3.1-2

Notes: NI = no impact, LS = LTS = Less than Significant Impact, SM = Significant but mitigatable to less than significant with measures identified in this section, and SU = Significant and Unavoidable, even after mitigation.

3.2 WATER QUALITY

This section discusses groundwater and surface water quality in the Project Area. The potential changes to water quality as a result of Project activities are analyzed. Information provided in this section is based on the Lower Putah Creek Watershed Management Action Plan, Solano and Yolo County planning documents, and planning documents and information from the Solano County Water Agency (SCWA), and the U.S. Environmental Protection Agency (US EPA), among other sources.

3.2.1 Setting

Environmental Setting

Regional Setting

Putah Creek is among the three major watersheds and surface water features in Yolo County, in addition to Cache Creek, the Sacramento River, and the Yolo Bypass (County of Yolo, p. CO-60). SCWA describes Solano Project water quality as "excellent for both agricultural and urban uses" (SCWA, 2010, p. 31). Factors contributing to the good water quality are the large volume of water contained in Lake Berryessa, which dilutes potential contaminants, and the fact that the Solano Project draws its water supply from the bottom of the reservoir, providing additional decomposition and dilution of contaminants before Solano Project water is released to Putah Creek (County of Solano 2008b, p. 4.5-13). This intake also provides cool water, beneficial for the creek's fisheries. Large storms can create short-term periods of a few days when Solano Project water is naturally high in suspended sediment, which causes turbidity resulting in temporary halting of water diversions from Lake Solano (SCWA 2010, p. 31).

Project Area Water Quality

<u>Overall Water Quality</u>

Water quality in the upper reach of lower Putah Creek is generally classified as "good" (EDAW, 2005, pp. 9-4 to 9-5; SWRCB, 2015b, p. 7; CVRQCB, 2014, p. E-3). Routine water quality monitoring data in the Project Area is limited to samples taken by SCWA in the Putah South Canal and by the University of California, Davis (UC Davis), upstream and downstream of the university wastewater treatment plant (EDAW, 2005, pp. 9-4; SWRCB, 2015a, 2015b). Putah Creek supports a wide variety of existing and potential designated beneficial uses, including:

- municipal and domestic water supply;
- agricultural water supply;
- primary contact (i.e., swimming) and secondary contact (e.g., canoeing) recreation;
- warm freshwater habitat;
- warm water fish habitat, for spawning; and
- wildlife habitat, and cold, freshwater habitat for spawning.

Protecting the beneficial uses of the creek is dependent on ongoing active management of stream flows, regulatory compliance among permitted dischargers, and developing/ maintaining a riparian buffer to protect the creek from indirect (nonpoint) runoff from adjacent land uses (EDAW, 2005, pp. 9-4 to 9-5).

Mercury

Naturally occurring mercury is present in trace quantities in Putah Creek waters, including the Project Area. Cinnabar, a naturally occurring mineral in the Coast Range above Putah Creek, washes down into the creek through erosion upstream of the Project reach. A secondary and lesser source of mercury in the creek is aerial deposition (entering the water through the air). This leads to trace concentrations of mercury in the water column and in sediments of the creek. These concentrations are far lower than those that would impact human health. The total mercury median concentration in Putah Creek is approximately 9.14 nanograms per Liter (ng/L) (CVRWQCB, 2008, p. 126, Table 7.5). This is considerably less than the US EPA's Maximum Contaminant Level (MCL) for inorganic mercury, which is 2,000 ng/L (US EPA, 2014d). The US EPA does not have a regulatory MCL for organic mercury, which typically is a risk to humans through eating contaminated fish rather than through direct ingestion of water (US EPA, 2009, p. 3; US EPA, 2013a).

Dynamic exchange of mercury occurs between the creek water, creek sediments, stream microorganisms, aquatic wildlife, and organisms that eat or consume (predate) them. This exchange leads to *mercury methylation*, a complex process through which bacteria convert mercury into methylmercury, an organic form of mercury that can be absorbed by living organisms, including fish and human beings; *bioconcentration*, by which mercury is accumulated in the tissues of the animal; and, *biomagnification*, by which very low concentrations of mercury can reach dangerous levels in fish that prey on smaller fish. Mercury also demethylates when ultraviolet light (present in sunlight) breaks down the methylmercury into its inorganic, and less toxic form. Methylmercury production is

associated with seasonally flooded wetlands, and there are wetland features in and along the Project Area, as described in the Wetland Delineation for the Project (BSK, 2015).

Due to the presence of methylmercury in the waterway, the California Office of Environmental Health Hazard Assessment (OEHHA) has issued a fish consumption advisory for fish and shellfish from Putah Creek, advising limits on eating certain fish, particularly by children and by women of childbearing age (OEHHA, 2009). The Central Valley Regional Water Quality Control Board (CVRWQCB) has set a 2016 deadline for development of a mercury control program for Putah Creek (CVRWQCB, 2011, p. 13).

Boron

Boron is another naturally occurring contaminant in Putah Creek, including the Project Area. Boron enters groundwater through leaching of rocks and soils that contain borate or borosilicate minerals (City of Davis, 2015). The groundwater then flows into Putah Creek.

Clean Water Act Section 303(d) Listing

Mercury and boron in Putah Creek have resulted in the Creek's listing under California's Clean Water Act Section 303(d) as Impaired. An impaired waterbody for CWA purposes is defined as a "waterbody (i.e., stream reaches, lakes, waterbody segments) with chronic or recurring monitored violations of the applicable numeric and/or narrative water quality criteria" (US EPA, 2012a). This impaired water quality extends from Solano Lake to the Putah Creek sinks in the Yolo Bypass and includes the Project Area. Section 303(d) requires the development of Total Maximum Daily Loads (TMDL) standards for the total amount of boron and mercury allowed to enter Putah Creek so that the creek will meet water quality standards for those pollutants. The creek's expected completion date for development of TMDLs for mercury is 2017 and for boron is 2021 (SWRCB, 2013d; SWRCB, 2010).

Additional discussion of the CWA Section 303(d) listing process is provided below under Regulatory Setting.

Dissolved Oxygen and Biochemical Oxygen Demand

Through its churning action, running water in streams and creeks dissolves oxygen, making it available for organisms living in the water, for decomposition, and for chemical reactions in the water. This dissolved oxygen (DO) can be measured. If more oxygen is consumed than produced, dissolved oxygen levels in the water decline and some organisms may move away, weaken, or die (US EPA, 2012c). The amount of oxygen

consumption in the water is called biochemical oxygen demand (BOD). In addition to being affected by the churning of water flow, DO levels are also dependent on temperature: warmer water holds less oxygen (US EPA, 2012c).

Portions of the Project Area contain long, deep, and overly wide pools that resulted from historic mining activities. Due to the relatively still water in these pools (which limits churning that would dissolve oxygen) and their exposure to sunlight (which heats the water, limiting the amount of DO it can hold), DO levels tend to be lower in these portions of the creek relative to the rest of the Project Area. Reaches containing these pools include Duncan-Giovannoni, Upper McNamara, Lower McNamara, Russell Ranch, Stevenson Bridge, Glide Ranch, Olmo-Hammond-UCD, Old Davis Road to Mace, Mace to Road 106A, and Road 106A to Yolo Bypass Wildlife Area.

For most of the Project Area, there is no systematic monitoring of DO at this time. The one exception to this is in the Interstate 80 (I-80) to Old Davis Road and Old Davis Road to Mace reaches, which are located near the UC Davis Campus Wastewater Treatment Plant (UCD WWTP). As part of State-required water quality monitoring, this plant monitors DO levels 800 feet upstream from where Old Davis Road crosses the Project Area (which is also 800 feet upstream from where flow from the UC Davis Arboretum Waterway is discharged into Putah Creek via pump) (CVRWQCB, 2014, pp. B-1, E-3, F-4). **Table 3.2-1** below presents the monthly average DO levels measured at this point in the Project Area from 2010 to 2015. As shown in Table 3.2-1, monthly average DO levels at this point during the past 5 years range between 7.9 to 11.2, meeting the 7.0 mg/L minimum level set by the CVRWQCB based on Basin Plan water quality objectives (CVRWQCB, 2014, p. 6, F-56).

Water Temperature

High water temperatures affect water quality by lowering the amount of DO that the stream can carry. Stream temperatures can exceed 68 degrees Fahrenheit (°F) during summer months by the time they reach Highway 505 (Yates, 2003; as referenced in Stillwater, 2015, p. 16). This increase in temperature is attributed to the large pools in the Project Area, which slow water down and have less stream shading, allowing for increased solar heating. By the time Putah Creek reaches I-80, summer water temperatures are typically near or above 77°F and continue to warm downstream (Yates, 2003; as referenced in Stillwater, 2015, p. 16). (See Section 3.4, *Biological Resources*, for discussion of existing condition temperature effects on species habitat.)

Table 3.2-1 UC Davis Main Wastewater Treatment Plant Self-Monitoring Report Monthly Averages 2010-2015

Month	Dissolved Oxygen (mg/L)	Electrical Conductivity @ 25°C (µmhos/cm)	Temperature (°F)	pH (SU)
January	10.9	391.3	47.2	7.7
February	11.2	387.6	52.6	8.0
March	9.6	371.3	58.1	7.7
April	8.6	413.5	60.7	7.9
May	7.9	429.8	67.2	7.7
June	8.3	402.2	74.0	7.8
July	8.3	402.1	75.0	8.1
August	8.7	424.8	75.3	8.1
September	8.1	436.7	72.4	8.0
October	8.9	444.0	63.3	7.9
November	9.6	409.3	55.5	7.8
December	10.0	354.7	49.8	7.6

Source: SWRCB, 2015b.

For most of the Project Area, there is no systematic monitoring of water temperature at this time. The one exception to this is in the I-80 to Old Davis Road and Old Davis Road to Mace reaches, which are located near the UCD WWTP. As part of state-required water quality monitoring program described above, the UCD WWTP monitors water temperature levels 800 feet upstream from where Old Davis Road crosses the Project Area (CVRWQCB, 2014, pp. B-1, E-3, F-4). Table 3.2-1 presents the monthly average water temperature levels measured at this point from 2010 to 2015.

Other Water Quality Parameters

The UCD WWTP monitoring point in the Project Area also provides data for two other water quality parameters, electrical conductivity and pH, presented in Table 3.2-1. Electrical conductivity and pH currently meet limits set by the CVRWQCB based on Basin Plan water quality objectives, as follows:

- Electrical conductivity target level is below 1,100 µmhos/cm.; UCD WWTP monthly Project Area measurements from 2010-2015 ranged from 371.3 to 436.7 µmhos/cm.
- pH target level is between 6.5 and 8.5; UCD WWTP monthly Project Area measurements from 2010-2015 ranged from 7.6 to 8.1 (CVRWQCB, 2014, pp. 6, F-56).

Agricultural Runoff

Extensive agriculture occurs immediately outside of most of the Project Area. This activity can result in incidental organic matter blowing or falling into the Project corridor, and potentially, chemical fertilizer or pesticide overspray.

First-flush flows each rainy season also can result in peaks of agricultural contaminants in the Project Area. Systematic monitoring data for agricultural runoff contaminants in the Project Area is not readily available at this time.

Urban Runoff

Stormwater drains associated with a municipal area may carry a variety of human-associated pollutants, including sediment, nutrients, trash, metals, bacteria, oil, grease, organics, pesticides, and oxygen-demanding substances that can deplete oxygen in aquatic environments (US EPA, 2014a, 2014b). Areas generating urban runoff along the Project reach include the Cities of Winters and Davis.

Groundwater

Lower Putah Creek, including the Project Area, overlies the northern end of the Solano Subbasin, a 664-square-mile subbasin of the Sacramento Valley Groundwater Basin (DWR, 2006, p. 1). The Solano Subbasin is the largest groundwater basin in Solano County. Groundwater within the Solano Subbasin is considered to be of generally good quality (SCWA, 2015; County of Solano, 2008b, pp. 4.5-10 to 4.5-11). Total dissolved solids (TDS) range from 250 parts per million (ppm) to 500 ppm in the northern portion of the basin (which includes the Project Area), below or approaching the 500-ppm secondary MCL. Most of the water within the subbasin is classified as hard to very hard. Boron concentrations are less than 0.75 ppm in the Project Area's portion of the basin (levels above 1.0 ppm can affect sensitive tree crops). Basin arsenic concentrations are typically between 0.02 ppm and 0.05 ppm (the primary MCL for arsenic is 0.05 ppm) (County of Solano, 2008b, p. 4.5-11).

Project Area Conditions by Reach

Specific information on water quality conditions along each Project reach is provided below.

NAWCA/Mariani

No unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area.

Duncan-Giovannoni

This reach contains approximately 5 acres of in-channel pools, which increase water temperatures and decrease DO levels, resulting in a lower existing condition of water quality relative to the creek generally. Under flood conditions, this reach receives flows from McCune/Pleasant Creek and Dry Creek, which enter the reach southwest of the City of Winters. Water quality in waterways can be subject to short-term impacts associated with flood water, including bacteria, raw sewage, agricultural and urban runoff, and other hazardous or toxic substances (US EPA, 2014c). However, under such conditions, flows are also greater, which may increase the dilution of such substances. First-flush flows each rainy season also can result in peaks of urban and agricultural contaminants in the Creek. Agricultural effects on water quality are as discussed above in the general setting.

Winters Putah Creek Nature Park

Several municipal storm water drains for the City of Winters are located in this reach. A 2-year study of fish, crayfish, and aquatic insects for mercury effects throughout the length of lower Putah Creek between Monticello Dam and the Yolo Bypass did not indicate contamination related to the City of Winters runoff (EDAW, 2005, p. 4-31). Under flood conditions, water quality in waterways can be subject to short-term impacts associated with flood water, including bacteria, raw sewage, agricultural and urban runoff, and other hazardous or toxic substances (US EPA, 2014c). However, under such conditions, flows also are greater, which may increase the dilution of such substances.

East of 505

No conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area. Agricultural effects on water quality are as discussed above in the general setting.

Warren

A Yolo County Flood and Irrigation District Canal return outfall is located in this reach. Under excess flow or flood conditions, water entering waterways can result in short-term impacts associated with flood water, including conveying bacteria, raw sewage, urban runoff, agricultural runoff which could contain herbicide or pesticide residues, and other hazardous or toxic substances into the waterway (US EPA, 2014c). However, under such conditions, flows are also greater, which may increase the dilution of such substances. Otherwise, no unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area.

Upper McNamara

This reach contains approximately 5 acres of in-channel pools, which have resulted in increased water temperatures and reduced DO levels. No other unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area. Agricultural effects on water quality are as discussed above in the general setting.

Lower McNamara

This reach contains approximately 7 acres of in-channel pools, which have resulted in increased water temperatures and reduced DO levels. No other unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area. Agricultural effects on water quality are as discussed above in the general setting.

MacQuiddy (Lester)

No unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area. Agricultural effects on water quality are as discussed above in the general setting.

Russell Ranch

This reach contains approximately 7 acres of in-channel pools, which have resulted in increased water temperatures and reduced DO levels. No other unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area. Agricultural effects on water quality are as discussed above in the general setting.

Stevenson Bridge

This reach contains approximately 1.5 acres of in-channel pools, which have resulted in increased water temperatures and reduced DO levels. No other unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area. Agricultural effects on water quality are as discussed above in the general setting.

Glide Ranch

This reach contains approximately 7 acres of in-channel pools, which have resulted in increased water temperatures and reduced DO levels. No other unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from

the general existing conditions in the Project Area. Agricultural effects on water quality are as discussed above in the general setting.

Nishikawa

No unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area. Agricultural effects on water quality are as discussed above in the general setting.

Olmo-Hammond-UCD

This reach contains approximately 17 acres of in-channel pools, which have resulted in increased water temperatures and reduced DO levels. In the upstream half of this reach, no other unusual water quality existing conditions exist that would distinguish water quality conditions in the Project Area.

In the downstream half of the reach, on the north bank, somewhat east of the middle of the reach, a smaller side branch of the creek splits off along the north bank of the creek. This northern side branch, which runs through the southern edge of UC Davis campus of and then the City of Davis, is part of the historic channel of Putah Creek and is not part of the Project Area. From this point eastward, the main branch of the creek, including the Project Area, enters the engineered, leveed channel. In contrast to the prior, leveed reaches, here the levees limit run-on water (water running into the creek) by blocking lateral flow across the landscape. This buffers the reach from potential water quality impacts from stormwater coming from the north or south.

Agricultural effects on water quality are discussed above in the general setting.

I-80 to Old Davis Road, Old Davis Road to Mace

This reach contains approximately 27 acres of in-channel pools, which have resulted in increased water temperatures and reduced DO levels. As described in Section 3.7, *Hazards and Hazardous Materials*, both of these reaches are located within the engineered, leveed channel, which ends at Mace Boulevard/Road 104, the Solano-Yolo County line. In contrast to the un-leveed reaches, here the levees limit run-on water by blocking lateral flow across the landscape. This buffers the reaches from water quality impacts from stormwater flows from the north and south. Agricultural effects on water quality are as discussed above in the general setting.

Both of these reaches are in the vicinity of the former Laboratory of Energy-related Health Research (LEHR) (UC Davis, 1995, p. 48, Figure 2). The LEHR site is northeast of the eastern

edge of the I-80 to Old Davis Road reach and directly north of the western end of the Old Davis Road to Mace reach. Groundwater monitoring wells are used to measure the movement of contaminants into the shallow aquifer below the site, including chloroform, hexavalent chromium, nitrate, and tritium (UC Davis, 2015a).

These reaches receive treated wastewater from the UCD WWTP, which discharges treated wastewater from an outfall east of Old Davis Road, on the border between the two reaches (UC Davis, 2004, pp. 3-3 to 3-4, Exhibit 3-2). The plant also discharges treated wastewater to the Arboretum Waterway on the UC Davis campus, outside of the Project Area (CVRWQCB, 2014, pp. 24, F-2 to F-3). This waterway is located in the historical channel of the former North Fork of Putah Creek and is confined at both ends and used for storm water management. The flow from the Arboretum Waterway is blended with stormwater and then pumped to Putah Creek (CVRWQCB, 2014, p. F-4).

The plant effluent is tertiary treated, which means it is oxidized, filtered, and disinfected before discharge into the creek, a continuous flow to Putah Creek that averages approximately 2.5 cubic feet per second (cfs) (EDAW, 2005, pp. 4-12, 4-27; SWRCB, 2015a, p. 3; SWRCB, 2015b, p. 3). During drought years when creek flow is low, this tertiary treated water can contribute up to half or slightly less than half the flow of Putah Creek from this point downstream (see Table 3.1-1 in Section 3.9, *Hydrology*). A NPDES permit issued by the CVRWQCB places limits on bacteria, chemicals, sediment, temperature and other potential contaminants in this tertiary treated effluent (CVRWQCB, 2014, pp. 4 to 8). As described above in the general setting, the UCD WWTP performs regular monitoring of water quality for the receiving waters of Putah Creek and for the effluent discharged into the creek; parameters measured include DO, electrical conductivity, temperature, pH, chemicals, and bacteria, among others. Recent monitoring data indicates that the UCD WWTP remains within the effluent contaminant limits set under its NPDES permit (CVRWQCB, 2014, pp. 4 to 8; SWRCB, 2015a; SWRCB 2015b).

Mace to Road 106A, Road 106A to Yolo Bypass Wildlife Area

Both of these reaches contain wide in-channel pools that increase water temperatures and decrease DO levels, resulting in a lower existing condition of water quality. The Mace to Road 106A reach contains approximately 17 acres of pools and Road 106A to Yolo Bypass Wildlife Area reach contains approximately 11 acres of pools.

Both of these reaches are located within the floodplain of the Yolo Bypass and so are subject to flooding both inside and outside of the levee. Under flood conditions, water quality in waterways can be subject to short-term impacts associated with flood water,

including bacteria, raw sewage, and other hazardous or toxic substances (US EPA, 2014c). However, under such conditions, flows are also greater, which may increase the dilution of such substances.

Under low flow drought conditions, up to half of the flow in these reaches may consist of tertiary treated water from the UCD WWTP upstream (see Table 3.1-1 in Section 3.1, *Hydrology* for minimum flow releases). As described above, this water is subject to regular monitoring and limits on bacteria, chemicals, sediment, temperature and other potential contaminants in the treated effluent (CVRWQCB, 2014, pp. 4 to 8). Agricultural effects on water quality are as discussed above in the general setting.

Regulatory Setting

Federal Regulations

Federal Clean Water Act

The Federal Clean Water Act (CWA) and related water quality programs and agencies applicable to the Project are discussed below.

CWA Water Quality Standards

Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States that accurately reflect the latest scientific knowledge on the kind and extent of all effects on health and welfare that may be expected from the presence of pollutants in the water. The State Water Resources Control Board (SWRCB) is responsible for assuring implementation and compliance with the provisions of the CWA and the Porter-Cologne Act.

As required by CWA Section 303(d), the SWRCB performs a biennial assessment of water quality data on state waters to determine whether their pollutant levels exceed water quality criteria and standards (SWRCB, 2013c). Waters that exceed the standard after the application of certain technology-based controls are placed on a list and scheduled for development of Total Maximum Daily Loads (TMDLs) (SWRCB, 2004, p. 1). A discussion of Putah Creek's listing for boron and mercury on the SWRCB's 303(d) list of waterbodies is presented in the *Clean Water Act Section 303(d) Listing* in the Environmental Setting, above.

CWA Sections 404 and 301

Any person, firm, or agency planning to alter or work in navigable waters of the U.S., including the discharge of dredged or fill material, must first obtain authorization from

the U.S. Army Corps of Engineers (USACE). Section 301 of the Federal Water Pollution Control Act and Amendments of 1972 (CWA) prohibits the discharge of pollutants, including dredged or fill material, into waters of the U.S. without a Section 404 permit from USACE (33 U.S.C. Section 1344).

Under Section 401 of the CWA, an applicant for a Section 404 permit must first obtain a certificate from the appropriate state agency stating that the fill is consistent with the state's water quality standards and criteria (County of Solano, 2008b, p. 4.5-21). Additional discussion of Section 404 and USACE jurisdiction and permitting is in Section 3.1, *Hydrology*, of this PEIR. For additional discussion of Section 401 Water Quality Certification, see below under the discussions of the Central Valley Regional Water Quality Control Board and the National Pollutant Discharge Elimination System.

State and Regional Regulations

Central Valley Regional Water Quality Control Board

In California, the US EPA delegates much of the implementation of the Clean Water Act to the SWRCB (County of Solano, 2008a, p. RS-74). The SWRCB and the nine Regional Water Quality Control Boards (RWQCBs) have the authority in California to protect and enhance water quality, both through their designation as the lead agencies in implementing the federal CWA Section 319 non-point source pollution control program (which regulates pollution from diffuse sources, such as stormwater runoff) and under the state Porter-Cologne Act. Under the Porter-Cologne Act, the state and RWQCBs maintain independent regulatory authority over the placement of waste, including fill, into waters of the state (County of Solano, 2008a, p. RS-73).

The CVRWQCB guides and regulates water quality in streams and aquifers of the region surrounding the Project Area through designation of beneficial uses, establishment of water quality objectives, administration of the National Pollutant Discharge Elimination System (NPDES) permit program for stormwater and construction site runoff, and Section 401 water quality certification where development results in fill of jurisdictional wetlands or waters of the U.S. under Section 404 of the CWA. The CVRWQCB is responsible for the issuance of NPDES permits under the CWA and on behalf of the SWRCB, and the US EPA is responsible for activities that could cause water quality impacts to surface waters and groundwater.

Water Quality Standards

Project activities may be subject to CWA Section 401 water quality certification for discharges of dredged and fill materials through the CVRWQCB (SWRCB, 2014). This certification would ensure that Project activities are consistent with the state's water quality standards and criteria (County of Solano, 2008b, p. 4.5-21). As part of this certification, CVRWQCB would require erosion controls in all areas disturbed by Project activities. Compliance with, and success of, erosion controls are monitored and measured through required water sampling that tests the water for settleable material and for turbidity as measured in nephelometric turbidity units (NTUs) (US EPA, 2012b). Settleable material is typically limited to no more than 0.1 ml/l in surface waters as measured in surface waters 300 feet downstream from the work area. NTU sampling under the CVRWQCB Section 401 certification typically includes the following limits on turbidity increases:

- where natural turbidity is less than 1 NTU, controllable factors shall not cause downstream turbidity to exceed 2 NTU;
- where natural turbidity is between 1 and 5 NTUs, increases shall not exceed 1 NTU;
- where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent;
- where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs;
- where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent.

CWA Section 401 water quality certification also requires monitoring through visual inspections consisting of observations to detect visible construction related pollutants, such as visible plumes of material in the water.

Waste Discharge Requirements

A Storm Water Pollution Prevention Plan (SWPPP) may be required for Project activities under the NPDES General Permit for Construction Storm Water Discharges and under the SCWA Grading Policy. The SWPPP(s) would be prepared by a Qualified SWPPP Developer and would incorporate Best Management Practices (BMPs) designed to protect against erosion and siltation impacts from water running on to the Project Area. BMPs would be developed from the Construction BMP Handbook published by the California Stormwater Quality Association (CASQA). The SWPPP(s) also would incorporate visual, chemical, and sediment monitoring programs as required.

CVRWQCB and the National Pollutant Discharge Elimination System (NPDES)

The purpose of the NPDES program is to establish a comprehensive stormwater quality program to manage urban stormwater and minimize pollution of the environment to the maximum extent practicable. The NPDES program consists of: 1) characterizing receiving water quality, 2) identifying harmful constituents, 3) targeting potential sources of pollutants, and 4) implementing a comprehensive stormwater management program. Each NPDES permit contains limits on allowable concentrations and mass emissions of pollutants contained in the discharge. Permits require the preparation of a SWPPP, which is an operational plan that describes best management practices to be implemented to reduce impacts on water quality and aquatic habitat.

NPDES General Permit for Construction Storm Water Discharges

The NPDES General Permit for Construction Storm Water Discharges sets Waste Discharge Requirements for projects that disturb one or more acres of soil, which the proposed Project would do in some cases when not otherwise exempted. Thus, certain Project activities the Project Area would be required to comply with this permit. Compliance with this permit is also required by the SCWA (see discussion of Local Regulations below). The permit requires that the following general measures be implemented during construction activity:

- Elimination or reduction of non-storm water discharges to storm water systems and other waters of the U.S.
- Development and implementation of a SWPPP prepared by a Qualified SWPPP Developer identifying BMPs the discharger will use to protect stormwater runoff and incorporating visual, chemical, and sediment monitoring programs.
- Inspections of stormwater control structures and pollution prevention measures (SWRCB, 2013a; SWRCB, 2013b, Section XIV).

Water Pollution

According to Fish and Game Code Section 5650, “it is unlawful to deposit in, permit to pass into, or place where it can pass into the waters of the state” any substance or material deleterious to fish, plant life, or bird life, including non-native species. This provision includes application of herbicides that could result in pollution of “Waters or the State” impacting fish and wildlife resources (CDFW, 2015, p. 3).

Local Regulations

Solano County Water Agency

SCWA was established by the state legislature in 1951 as a wholesale water supply agency to provide untreated water to water-service agencies in Solano County from the federal Solano Project and the North Bay Aqueduct of the State Water Project. SCWA also handles flood control matters within its boundaries and monitors efforts to mitigate storm water runoff. SCWA's boundaries encompass the entire County of Solano, the portion of UC Davis in Yolo County, and approximately 2,800 acres of Yolo County Reclamation District No. 2068 (SCWA, 2015; County of Solano, 2008a, p. RS-73).

SCWA Grading Policy

Acting under Chapter 31 of the Solano County Code, the county grading ordinance, SCWA has adopted a Grading Policy that allows the agency an exemption from the requirement to obtain a county grading permit from Solano County when conducting its work (SCWA, 2009). The SCWA Grading Policy incorporates several grading provisions from the Solano County Code, including the following erosion, sediment, and runoff control provisions relevant to analysis of potential water quality impacts of the proposed Project.[1]

> 31-16 Construction Season
> The construction season commences on April 15th and ends on October 15th of each calendar year. Work performed under this Chapter shall not occur at a time outside of the construction season without the written approval of the Director.
>
> All grading plans and permits with land disturbance equal to or greater than 1 acre shall comply with the provisions of this section for NPDES compliance.
>
> 31-31 National Pollution Discharge Elimination System (NPDES)
> All grading plans and permits with land disturbance equal to or greater than 1 acre shall comply with the provisions of this section for NPDES compliance.
>
> (a) No grading and drainage permit shall be issued unless the plans for such work include a Storm Water Pollution Prevention Plan with details of best management practices, including desilting basins or other temporary drainage or control measures, or both, as may be necessary to control construction-related pollutants which originate from the site as a result of construction related activities.

[1] The Grading Policy also incorporates County Code provision 31-12 Definitions.

(b) All best management practices shall be installed before grading begins. As grading progresses, all best management practices shall be maintained in good working order to the satisfaction of the Director unless final grading approval has been granted by the Director and all permanent drainage and erosion control systems, if required, are in place.

County Code Section 31-30 is a lengthy provision that has been incorporated into the Grading Policy. It is intended to assure that development be accomplished so as to minimize adverse effects upon the existing terrain and to minimize the potential for erosion. Control measures are to apply to all aspects of the proposed grading and are intended to be operational during all stages of development. The following basic design principles and standards shall serve as minimum guidelines for grading plans and erosion, sediment, and runoff control plans. Section 31-30 includes numerous policies relevant to analysis of potential water quality impacts of the proposed Project. Under the SCWA Grading Policy, SCWA applies the relevant Solano County Code provisions whenever it performs acts to "change the topography of any land in such manner that alters or interferes with existing drainage; fill, close, excavate, or clear vegetation" (SCWA, 2009).

Solano County General Plan

The following policies and implementation programs from the Solano County General Plan are relevant to analysis of the proposed Project's potential water quality impacts.

Policies

RS.P-64: Identify, promote, and seek funding for the evaluation and remediation of water resource or water quality problems through a watershed management approach. Work with the regional water quality control board, watershed-focused groups, and stakeholders in the collection, evaluation and use of watershed-specific water resource information.

RS.P-65: Require the protection of natural water courses.

RS.P-66: Together with the Solano County Water Agency, monitor and manage the county's groundwater supplies.

RS.P-70: Protect land surrounding valuable water sources, evaluate watersheds, and preserve open space lands to protect and improve groundwater quality, reduce polluted surface runoff, and minimize erosion.

S.P-71: Ensure that land use activities and development occur in a manner that minimizes the impact of earth disturbance, erosion, and surface runoff pollutants on water quality.

S.P-72: Preserve riparian vegetation along county waterways to maintain water quality.

(County of Solano, 2008a; p. RS-77)

Implementation Programs

RS.I-68: Seek funding opportunities for collaborative watershed planning approaches to water quantity and quality enhancement and protection, where such an approach is the desired method of accomplishing the program objectives.

RS.I-71: Require proposed projects located within the Putah Creek and Ulatis Creek watersheds to minimize project-related stormwater runoff and pollution. Stormwater runoff and pollution loads resulting after development of projects shall not exceed predevelopment conditions.

(County of Solano, 2008a; p. RS-79)

Yolo County General Plan

The following policies and actions from the Yolo County General Plan are relevant to analysis of the proposed Project's potential water quality impacts.

Policy CO-5.6: Improve and protect water quality for municipal, agricultural, and environmental uses. (County of Yolo 2009, p. CO-70)

Policy CO-5.23: Support efforts to meet applicable water quality standards for all surface and groundwater resources. (County of Yolo 2009, p. CO-72)

Action CO-A75: Participate in regional planning efforts regarding surface water resources, including the Sacramento River, Cache Creek, Putah Creek, Tehama-Colusa Canal, Yolo Bypass, and Sacramento-San Joaquin Delta.

(County of Yolo, 2009, p. CO-74)

3.2.2 Significance Criteria

The following thresholds for measuring a project's environmental impacts are based on CEQA Guidelines Appendix G standards of significance (OPR, 2013). For the purposes of this PEIR, an impact to water quality is considered significant if implementation of the proposed Project may result in any of the following:

- Violate any water quality standards or waste discharge requirements.
- Otherwise substantially degrade water quality.

3.2.3 Impacts and Mitigation Measures

Impacts and mitigation measures are described below both generally and by reach. Applicable impacts and mitigation measures for each reach are summarized in Table 3.2-2, at the end of this section.

General Impacts and Mitigation Measures

Impact 3.2-1: Water Quality Impacts from Erosion and Sediment Release.

As is discussed in greater detail in Chapter 3.1, *Hydrology*, the Project would not result in long-term adverse water quality changes from erosion or sediment release because Project activities would have no effect on flow regimes that could affect erosion or siltation. However, Project activities could generate short-term erosion and sediments that could affect water quality by increasing short-term turbidity. These activities include bank stabilization, temporary flow diversions (via pipe, trench, or temporary coffer dam), channel reconfiguration (grading and clearing), Project maintenance activities such as weed management, and gravel augmentation, scarification, and maintenance.

Erosion and sediment controls implemented to comply with Section 401 water quality certification, with any required SWPPP(s), and with the SCWA Grading Policy would ensure that Project activities would not result in significant turbidity, erosion, and other water quality impacts.

In some situations, a SWPPP may not be required for certain Project activities, such as activities that are limited in acreage or that otherwise do not trigger SWPPP requirements under NPDES. In those situations, Mitigation Measure 3.1-1 would be implemented (see Section 3.1, *Hydrology*).

Controls implemented to comply with Section 401 Water Quality Certification, with any required SWPPP(s), with the SCWA Grading Policy, and with Mitigation Measure 3.1-1

would ensure that Project impacts related to Water Quality Standards or Waste Discharge Requirements would remain **less than significant**. No additional mitigation is required.

Impact 3.2-2: Construction Equipment Impacts to Water Quality.

Project construction equipment operating in the stream channel area could adversely affect water quality through leaks, spills, or drips of fluids including motor oils, diesel fuel, and lubricants.

Mitigation 3.2-1: Procedures to Prevent Contamination from Construction Equipment.

In order to prevent contamination from vehicle or equipment leaks during Project activities, the Project Applicant shall implement the following actions:

1. Vehicles shall be maintained and operated in a leak-free condition.
2. Project vehicles shall not park or stored on impervious surfaces.
3. No fueling or maintenance of vehicles or equipment shall occur in the channel or floodplain. The exception would be if equipment that cannot be readily relocated (e.g., pumps and generators).
4. All off-site fueling sites (e.g., on access roads above the top-of-bank) shall be equipped with secondary containment and avoid a direct connection to underlying soil, surface water, or the storm drainage system.
5. For any stationary equipment (e.g., pumps and generators) that must be fueled on-site, secondary containment, such as a drain pan, drop cloth or booms, shall be provided in such a manner to prevent accidental spill of fuels to underlying soil, surface water, or the storm drainage system.
6. Petroleum products, chemicals, cement, fuels, lubricants, and non-storm drainage water or water contaminated with the aforementioned materials shall not be allowed to enter receiving waters or the storm drainage system.
7. Waste disposal containers shall be covered when they are not in use.

Impact 3.2-3: Impacts of Project on Water Temperature and Dissolved Oxygen/Biological Oxygen Demand (BOD).

Water Temperature

As described in the general setting, high water temperatures affect water quality by lowering the stream of DO (see Section 3.4, *Biological Resources,* for water temperature effects on organisms and habitat). Due to existing large pools in the Project Area, which

slow water down and expose it to solar heating, summer stream temperatures can exceed 68°F near Highway 505 and above 77°F near Interstate 80 (Yates, 2003; as referenced in Stillwater, 2015, p. 16). The Project's conversion of these large pools to riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. Additionally, the Project would decrease creek water temperatures by facilitating the growth of shade-providing riparian vegetation. Although the reaches containing pools would accrue the most direct temperature benefit (Duncan-Giovannoni, Upper McNamara, Lower McNamara, Russell Ranch, Stevenson Bridge, Glide Ranch, Olmo-Hammond-UCD, Old Davis Road to Mace, Mace to Road 106A, and Road 106A to Yolo Bypass Wildlife Area), the lower water temperatures would benefit the entire creek. Therefore, the Project's impacts would be beneficial.

Dissolved Oxygen and Biochemical Oxygen Demand

As described in Chapter 2, *Project Description*, excessively long, deep, and overly wide pools that resulted from historic mining activities would be converted from open water to floodplain, including new riffles and runs. These new riffles and runs would increase oxygenation of the water and reduce solar heating of the water, both of which would increase DO and diminish BOD imbalances (US EPA, 2012c). Although the reaches containing pools would accrue the most direct benefit (Duncan-Giovannoni, Upper McNamara, Lower McNamara, Russell Ranch, Stevenson Bridge, Glide Ranch, Olmo-Hammond-UCD, Old Davis Road to Mace, Mace to Road 106A, and Road 106A to Yolo Bypass Wildlife Area), the increased levels of DO would benefit the entire creek. Therefore, the Project's impacts would be beneficial.

Impact 3.2-4: Potential Release of other Contaminants into Creek Waters.

The Project could potentially result in release of boron, mercury, herbicides, fertilizers, and pesticides into the creek waters. Impacts of these potential contaminants are described below.

Boron

As identified above under Environmental Setting, boron is a naturally occurring element present in Putah Creek that enters the creek and the Project Area through groundwater leaching of boron-containing rocks and soils. The Project would not alter the amount or the content of groundwater entering the creek and so the Project would have **no impact** on the amount of boron in the creek and the Project Area.

Mercury

As described above, methylmercury production is associated with seasonal wetlands and disturbance of sediments containing mercury. The Project would not significantly increase the acreage of wetlands in the Project Area that are known to methylate mercury. The Project has the potential minimally contribute to mercury methylation through the incidental disturbance of mercury-containing sediments. Based on the experience of the Lead Agency (SCWA) and on 401 water quality certification requirements, construction-related activities generate only a very small temporary increase in sediment resuspension, observed repeatedly in numerous projects in Putah Creek. By contrast, ordinary stream bedload movement has orders of magnitude higher suspended sediment concentrations. Based on the Lead Agency's experience with turbidity monitoring through 401 certification requirements, turbidity monitoring and control is an effective tool, and the CWA Section 401 certification program serves as an effective standard for minimizing sediment disturbance that could directly or indirectly affect mercury methylation or concentrations. As discussed under Impact 3.2-1 above, erosion and sediment controls implemented to comply with Section 401 water quality certification, with any required SWPPP(s) required under the NPDES program, and with the SCWA Grading Policy would minimize sediment disturbance. This approach is consistent with the CVRWQCB Delta Mercury Control Program, which uses NPDES permits as the regulatory mechanism for point sources of the contaminant (CVRWQCB, 2011, p. 4).

Additionally, the Project's proposed conversion of the creek's long, deep, and overly wide pools to floodplain would the amount of bioavailable mercury in the creek by replacing anoxic pools with oxygenated riffles and runs.

The regulatory erosion and sediment control programs identified above and implementation of Mitigation Measure 3.1-1 (see Section 3.1, *Hydrology*) would reduce or eliminate the Project's contribution to methylation in the waterway, resulting in a **less-than-significant** impact. No additional mitigation is required.

Fertilizers and Pesticides

The Project would not utilize fertilizers or pesticides and therefore would have **no impact** on water quality from these pollutant sources.

Herbicides

As described in Chapter 2, *Project Description*, herbicides approved by the California Department of Pesticide regulation may be used in accordance with their labels as part of Project activities to reduce invasive weed species that may be contributing to water

quality problems through accelerated erosion, channel roughness and channel deflection. Herbicides anticipated to be used include glyphosate, triclopyr, imazapyr, aminopyralid, chlorsulfuron, dithiopyr, and isoxaben. Some form of chemical weed control is anticipated to be used in every reach for channel maintenance (see Chapter 2, *Project Description*, Table 2-1: Invasive Weed Control).

Section 3.4, *Biological Resources,* includes a discussion of herbicides that may be used as part of Project activities and their potential effects to fish and wildlife (CDFW, 2015, p. 3). Potential Project herbicide impacts specifically related to water quality are discussed below.

Glyphosate

Glyphosate accidentally oversprayed on the water could contaminate surface waters because it would not be broken down readily by water or sunlight (US EPA, 1993, p. 4). Mitigation Measure 3.4-12 would require all Project use of glyphosate to be applied only by a licensed applicator in accordance with label directions and US EPA recommendations to avoid overspray and avoid application to water during non-aquatic uses (US EPA, 1993) (see Section 3.4, *Biological Resources*). Therefore, after mitigation, potential water quality impacts related to Project use of glyphosate would be reduced to **less than significant**.

Triclopyr

US EPA has concluded that use of triclopyr in accordance with product labeling does not pose unreasonable risks of adverse effects to humans or the environment (US EPA, 1998, pp. 3, 6). In water, triclopyr primarily breaks down through exposure to light (photodegradation). US EPA notes that flowing water systems would result in rapid dissipation of triclopyr (US EPA, 1998, pp. 4 to 5).

Given triclopyr's rapid dissipation and US EPA's conclusion that its use in accordance with product labeling does not pose unreasonable environmental risks, Project use of triclopyr is not considered likely to result in significant impacts to water quality. Mitigation Measure 3.4-12 would reduce the potential impacts further. Therefore, both before and after mitigation, potential Project water quality impacts related to use of triclopyr would be **less than significant**.

Imazapyr

Imazapyr can move via runoff to surface water and to leach to groundwater. Imazapyr breaks down in the environment only through photolysis (breakdown by photons, including visible light, ultraviolet light, x-rays and gamma rays). US EPA considers human

health risks from imazapyr to be below the level of concern, and imazapyr is not expected to bioaccumulate in aquatic organisms (US EPA, 2006, pp. 1, 17).

Given imazapyr's low toxicity and its US EPA-registered use for aquatic and semi-aquatic weed control, Project use of imazapyr is not considered likely to result in significant impacts to water quality (US EPA, 2006, p. 33.). Mitigation Measure 3.4-12 would reduce the potential impacts further by requiring all Project application of imazapyr to be only by a licensed applicator in accordance with label directions and US EPA recommendations to prevent overspray and unnecessary aquatic use (US EPA, 1993, pp. 32 to 33) (see Section 3.4, *Biological Resources*). Therefore, both before and after mitigation, potential water quality impacts related to use of imazapyr would be reduced to **less than significant**.

Aminopyralid

The primary way aminopyralid breaks down in by photolysis (breakdown by photons, including visible light, ultraviolet light, x-rays and gamma rays). US EPA has concluded that aminopyralid poses no risk to humans (US EPA, 2005a, p. 2). Given Aminopyralid's low toxicity and lack of persistence in the environment, Project use of imazapyr is not considered likely to result in significant impacts to water quality (US EPA, 2006, pp. 2, 6, 20). Mitigation Measure 3.4-12 would reduce the potential impacts further by requiring all Project application to be only by a licensed applicator in accordance with label directions and US EPA recommendations to apply aminopyralid using hand-spray and spot treatments only (US EPA, 2005a, p. 19) (see Section 3.4, *Biological Resources*). Therefore, both before and after mitigation, potential water quality impacts related to use of aminopyralid would be **less than significant**.

Chlorsulfuron

US EPA has concluded that ecological risks of chlorsulfuron are below the level of concern, provided that chlorsulfuron is applied to minimize spray drift (US EPA, 2005b, p. 5), therefore, Project use of chlorsulfuron is not considered likely to result in significant impacts to water quality (US EPA, 2006, pp. 2, 6, 20). Mitigation Measure 3.4-12 would reduce the potential impacts further by requiring all Project application to be only by a licensed applicator in accordance with label directions and US EPA recommendations to avoid spray drift and limit use to one application per growing season (US EPA, 2005b, pp. 5 to 6) (see Section 3.4, *Biological Resources*). Therefore, after mitigation, potential water quality impacts related to Project use of chlorsulfuron would be reduced to **less than significant**.

Dithiopyr

In water, dithiopyr breaks down through photodegradation (US EPA, 1991, p. 2). Given dithiopyr's tendency to break down in water, Project use of dithiopyr is not considered likely to result in significant impacts to water quality (US EPA, 1991, p. 2). Mitigation Measure 3.4-12 would reduce the potential impacts further by requiring all Project application of dithiopyr to be only by a licensed applicator in accordance with label directions and US EPA recommendations to refrain from use in or near water (US EPA, 1991, pp. 7 to 8) (see Section 3.4, *Biological Resources*). Therefore, both before and after mitigation, potential water quality impacts related to use of dithiopyr would be **less than significant**.

Isoxaben

This herbicide is considered to have low toxicity (WSDOT, 2006, p. 2). Microbes and sunlight break down isoxaben, and the herbicide has a low potential to leach to groundwater. The herbicide is highly persistent in soil but breaks down quickly in water. Given isoxaben's low toxicity, low potential for groundwater contamination, and tendency to break down quickly in water, Project use of isoxaben is not considered likely to result in significant impacts to water quality (WSDOT, 2006, pp. 2-3). Mitigation Measure 3.4-12 would reduce the potential impacts further by requiring all Project application to be only by a licensed applicator in accordance with label directions and agency recommendations to control spray drift and refrain from use in water or to intertidal areas below the mean high water mark (WSDOT, 2006, p. 3) (see Section 3.4, *Biological Resources*). Therefore, both before and after mitigation, potential water quality impacts related to use of isoxaben would be **less than significant**.

Site-Specific Impacts and Mitigation Measures

NAWCA/Mariani

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project short-term impacts would remain **less than significant**. Over the long-term, the Project would improve water quality by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert approximately 5 acres of pool of from open water to floodplain, riffles and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c). Although this reach does not contain such pools, it would indirectly benefit from increased levels of DO generated in other reaches.

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's overall conversion of large pools to new riffles and runs would lower water temperature by increasing flow velocity and by reducing solar heating of the creek. Although this reach does not contain such pools, its water quality would benefit from water temperature decreases in other reaches.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

As described above, implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Duncan-Giovannoni

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project impacts would remain **less than significant**, while over the long-term, the Project would improve sediment-related water quality by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert approximately 5 acres of pool from open water to floodplain, riffles and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 5 acres of pools to new floodplain, riffles, and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 5 acres of in-channel pools to new floodplain, riffles, and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. This reach contains and would directly benefit from water temperature decreases.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use along this reach to **less than significant**.

Winters Putah Creek Nature Park

Erosion/Sedimentation Impacts to Water Quality

Except for a small portion of the reach far upstream, restoration activities have already been completed for this reach, so the only activities anticipated in this reach are maintenance, including weed control. The only potential Project impacts on water quality standards or waste discharge requirements could be from mechanical weed-pulling or the inadvertent over-application of herbicide, in the event either of these activities disturbed and exposed soil that could erode into the creek. Mitigation Measure 3.1-1 (see Section 3.1, *Hydrology*) would ensure that Project sediment-related water quality impacts would be **less than significant**.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Because restoration activities have already been completed for most of this reach, the only potential water quality impacts resulting from the Project could be from maintenance activities such as mechanical weed-pulling or the inadvertent over-

application of herbicide, in the event either of these activities disturbed and exposed soil that could erode into the creek. Mitigation Measure 3.1-1 (see Section 3.1, *Hydrology*) would be implemented to avoid or minimize disturbance of mercury-containing sediments and ensure that Project impacts related to mercury remain **less than significant**.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c). Although this reach does not contain such pools, its DO levels would benefit from increased DO levels generated in other reaches.

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of large to new riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. Although this reach does not contain such pools, its water quality would benefit from water temperature decreases in other reaches.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use along this reach to **less than significant**.

East of 505

<u>Erosion/Sedimentation Impacts to Water Quality</u>

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project impacts would remain **less than significant**, while over the long-term, the Project

would improve sediment-related water quality by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Potential impacts of proposed Project activities in this reach are identical to those analyzed in Impact 3.2-2 above: no unusual conditions exist in this reach, and the Project would not significantly increase the acreage of wetlands that are known to methylate mercury.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of excessively long, deep, and overly wide pools to new riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c). Although this reach does not contain such pools, it would indirectly benefit from increased levels of DO generated in other reaches.

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new floodplain, riffles, and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. Although this reach does not contain such pools, it would indirectly benefit from water temperature decreases in other reaches.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use along this reach to **less than significant**.

Warren

Erosion/Sedimentation Impacts to Water Quality

Potential impacts of proposed Project activities in this reach to turbidity are identical to those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project impacts would be **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Potential impacts of proposed Project activities in this reach are identical to those analyzed in Impact 3.2-2 above: no unusual conditions exist in this reach, and the Project would not significantly increase the acreage of wetlands that are known to methylate mercury.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new floodplain, riffles, and runs would increase DO and diminish BOD imbalances (US EPA, 2012c). Although this reach does not contain such pools, its DO concentrations would benefit from increased DO levels generated in other reaches upstream.

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new floodplain, riffles, and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. Although this reach does not contain such pools, it would benefit from water temperature decreases in other reaches.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Upper McNamara

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert an approximately 5-acre pool of from open water to floodplain, riffles, and runs. This would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 5 acres of pools to new floodplain, riffles, and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of about 5 acres of in-channel pools to new floodplain, riffles, and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Lower McNamara

<u>Erosion/Sedimentation Impacts to Water Quality</u>

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

<u>Impacts to Other Water Quality Constituents</u>

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of

groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert a 7-acre pool from open water to floodplain, riffles, and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of 7 acres of in-channel pools to new floodplain, riffles, and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of 7 acres of pools to new floodplain, riffles, and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

MacQuiddy (Lester)

<u>Erosion/Sedimentation Impacts to Water Quality</u>

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with

Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Potential impacts of proposed Project activities in this reach are identical to those analyzed in Impact 3.2-2 above: no unusual conditions exist in this reach, and the Project would not significantly increase the acreage of wetlands that are known to methylate mercury.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of excessively long, deep, and overly wide pools to new riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c). Although this reach does not contain such pools, it would benefit from increased DO generated in other reaches.

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. Although this reach does not contain such pools, it would indirectly benefit from water temperature decreases in other reaches.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide

overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Russell Ranch

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert approximately 7 acres of pools from open water to floodplain, riffles, and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of 7 acres of pools to new riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of 7 acres of pools to new riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Stevenson Bridge

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert approximately 1.5 acres of pools from open water to floodplain, riffles, and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of 1.5 acres of pools to new floodplain, riffles, and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of 1.5 acres of pools to new floodplain, riffles, and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Glide Ranch

<u>Erosion/Sedimentation Impacts to Water Quality</u>

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term,

the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert an overly large pool of approximately 15 acres from open water to floodplain, riffles, and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 7 acres of pools to new floodplains, riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 7 acres of pools to new floodplains, riffles, and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Nishikawa

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Potential impacts of proposed Project activities in this reach are identical to those analyzed in Impact 3.2-2 above: no unusual conditions exist in this reach, and the Project would not significantly increase the acreage of wetlands that are known to methylate mercury.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of excessively long, deep, and overly wide pools to new riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c). Although this reach does not contain such pools, it would benefit from increased DO generated in other reaches.

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. Although this reach does not contain such pools, it would indirectly benefit from water temperature decreases in other reaches.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Olmo-Hammond-UCD

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Potential impacts of proposed Project activities in this reach are identical to those analyzed in Impact 3.2-2 above: no unusual conditions exist in this reach, and the Project would not significantly increase the acreage of wetlands that are known to methylate mercury and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert approximately 17

acres of pool from open water to floodplain, riffles and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 17 acres of in-channel pools to new floodplain, riffles, and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 17 acres of in-channel pools to floodplain, riffles, and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. This reach contains and would directly benefit from water temperature decreases.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

I-80 to Old Davis Road

<u>Erosion/Sedimentation Impacts to Water Quality</u>

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Potential impacts of proposed Project activities in this reach are identical to those analyzed in Impact 3.2-2 above: no unusual conditions exist in this reach, and the Project would not significantly increase the acreage of wetlands that are known to methylate mercury.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new floodplain, riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c). Although this reach does not contain such pools, it would indirectly benefit from increased levels of DO generated in other reaches.

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new floodplain, riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. Although this reach does not contain such pools, it would indirectly benefit from water temperature decreases in other reaches.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Old Davis Road to Mace

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert approximately 27-acres of pool from open water to floodplain, riffles and runs. This would significantly reduce anaerobic areas and replace an anoxic pool with oxygenated riffles and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of 27 acres of pools to new floodplain, riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 27 acres of in-channel pools to new floodplain, riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Mace to Road 106A

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert approximately 17-acres of pool from open water to floodplain, riffles and runs. This would significantly reduce anaerobic areas and replace an anoxic pool with oxygenated riffles and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of 17 acres of pools to new floodplain, riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 17 acres of in-channel pools to new floodplain, riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Road 106A to Yolo Bypass Wildlife Area

<u>Erosion/Sedimentation Impacts to Water Quality</u>

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that

Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert approximately 11 acres of pool from open water to floodplain, riffles and runs. This would significantly reduce anaerobic areas and replace an anoxic pool with oxygenated riffles and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of 11 acres of pools to new floodplain, riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 27 acres of in-channel pools to new floodplain, riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide

overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Table 3.2-2 Summary of Water Quality Impacts and Mitigation Measures

Reach	Impact 3.2-1: Erosion and sedimentation	Impact 3.2-2: Construction Equipment	Impact 3.2-3: Water Temperature and Dissolved Oxygen	Impact 3.2-4 Potential Release of Other Contaminants	Applicable Mitigation Measures
NAWCA/Mariani	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Duncan-Giovannoni	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Winters Putah Creek Nature Park	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
East of 505	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Warren	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Upper McNamara	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Lower McNamara	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
MacQuiddy (Lester)	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Russell Ranch	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Stevenson Bridge	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Glide Ranch	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Nishikawa	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Olmo-Hammond-UCD	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
I-80 to Old Davis Road	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Old Davis Road to Mace	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12

Reach	Impact 3.2-1: Erosion and sedimentation	Impact 3.2-2: Construction Equipment	Impact 3.2-3: Water Temperature and Dissolved Oxygen	Impact 3.2-4 Potential Release of Other Contaminants	Applicable Mitigation Measures
Mace to Road 106A	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Road 106A to YBWA	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12

Notes: B - Beneficial impact, NI = no impact, LS = LTS = Less than Significant Impact, SM = Significant but mitigatable to less than significant with measures identified in this section, and SU = Significant and Unavoidable, even after mitigation.

3.3 GEOLOGY AND SOILS, AND MINERAL RESOURCES

This section describes existing soils and geologic conditions of the Project Area and analyzes the potential impacts associated with the Project, with respect to the exposure of people and property to geologic hazards (including seismic hazards) and erosion. This section also describes the existing mineral resources in the Project Area and vicinity and analyzes the Project's potential impacts on those resources. This section is based on published information, including U.S. Department of Agriculture (USDA) data, Natural Resources Conservation Survey (NRCS) GIS Database files, maps and studies of fault zones and seismic risks in the Project vicinity, the Solano and Yolo County General Plans and associated Mineral Resource Zone maps.

Criteria for measuring a project's environmental impacts in this Program EIR (PEIR) are drawn from CEQA Guidelines Appendix G standards (OPR, 2013). The following Appendix G impact topics are not addressed in this PEIR because the Project has no potential to affect them:

- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.
- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.

3.3.1 Setting

Environmental Setting

Regional Geologic Setting

The Project is located in the northwestern portion of Great Valley Geomorphic Province. The California Coast Range rises to the west of the Project alignment, and consists of uplifted northwest-trending mountain ranges and valleys. The Coast Range generally consists of metamorphosed igneous and sedimentary rocks of the Franciscan Complex and the overlying unmetamorphosed sedimentary rocks.

Lower Putah Creek is situated on a broad alluvial fan that originates in the Coast Ranges to the west and extends to the deep alluviums of the valley floor at the Yolo Bypass. Stream and overbank silt and sand deposits are typical of the surface geology in this type of depositional environment. Rock outcrops are generally not present along the Lower Putah Creek stream channel. Limited exposures of a type of bedrock known as the

Pliocene age Tehama Formation are present in the area north of Putah Creek, just west of the town of Winters, but not in the stream channel (Helley and Barker, 1979, Sheet 4).

Local Geologic Setting

Topography

The topography of the Project Area on a regional scale is generally flat lying and slopes down slightly to the east. Elevations range from 130 feet above mean sea level (msl) near the Putah Diversion Dam (PDD) at the west end of the Project Area, to 15 feet msl near Yolo Bypass at the eastern end of the Project Area.

Area Faults

Area faults include the Great Valley Fault 4 (Great Valley 4b, Gordon Valley), which is mapped as crossing the Project Area in the MacQuiddy (Lester) reach of the Project Area (County of Solano, 2008a, p. HS-23, Figure HS-3). The Great Valley Fault is considered a "blind thrust" fault, which displays no surface evidence of faulting (USGS, 2012a). The Great Valley Fault is capable of a maximum earthquake magnitude of 6.8 Mw (Moment Magnitude scale),[1] but is not currently considered an active fault (USGS, 2012b; USGS, 2012c; County of Solano, 2008b, p. 4.7-10).

The Solano County General Plan identifies the approximate location of the Midland Fault, branching off of the Great Valley Fault (County of Solano, 2008a, p. HS-23, Figure HS-3). This fault passes through the Project Area on the far downstream portion of the reach, near Interstate 505 (I-505) (County of Solano, 2008a, p. HS-23, Figure HS-3). This fault has no history of seismicity in the past 700,000 years and is not considered an active fault (County of Solano, 2008b, p. 4.7-10).

Other faults located in the vicinity of the Project include:

- Hunting Creek-Berryessa Fault located approximately 11 kilometers west of the western Project Area boundary (maximum magnitude = 7.1 Mw)
- Green Valley Connected Fault located approximately 12 kilometers west of the western Project Area boundary (maximum magnitude = 6.8 Mw)

[1] The **moment magnitude scale** (abbreviated as **MMS**; denoted as $\mathbf{M_W}$ or **M**) is used by seismologists to measure the size of earthquakes in terms of the energy released. The scale was developed in the 1970s to succeed the 1930s-era Richter magnitude scale (ML). Even though the formulae are different, the new scale retains the familiar continuum of magnitude values defined by the older one.

- Great Valley Fault 3 (Mysterious Ridge) located approximately 13 kilometers north of the northern Project Area boundary (maximum magnitude = 7.1 Mw)
- Great Valley Fault 5 (Pittsburg Kirby Hills) located approximately 15 kilometers south of the Project Area (maximum magnitude = 6.7 Mw)
- West Napa Fault located approximately 20 kilometers west of the western Project Area boundary (maximum magnitude = 6.7 Mw)Surface Soil Conditions

Soil Types

According to the Soil Survey Geographic (SSURGO) database for Yolo and Solano Counties, California, obtained from USDA and NRCS, the predominant soil types in the Project Area are Riverwash (Rh- Yolo County, Rw- Solano County), Yolo loam (Yo), Yolo silt loam (Ya), Sycamore silt loam-flooded (Sr), and Sycamore silt loam-drained (Sp) (USDA, 2014). Project Area soil types are shown on the Soils Map, **Figures 3.3-1A through 3.3-1D**.

Table 3.3-1 below summarizes characteristics of Project Area soil classes, including where they occur, their stability, ability to drain, ability to hold water, and relative tendency to erode. Descriptions of terms used in Table 3.3-1 follow after the table.

Soil Erosion

As indicated in Table 3.3-1, below, Project Area soil erosion potentials range from negligible to very high. Erosion potential of the most common, predominant soil types in the Project Area ranges from *negligible* (Riverwash, typically present in the creek channel) to *low* (Yolo loam, Yolo silt loam, Sycamore silt loam-flooded, and Sycamore silt loam-drained, all typically present in the creek's alluvial fans). Though they are significantly less common overall in the Project Area, certain soil types that are found on the creek banks have a very high erosion potential: Corning gravelly loam, present on terraces with 2 to 15 percent slopes, and Altamont clay, present on terraces with 30 to 50 percent slopes (see Table 3.3-1). Erosion also is dependent upon slope angle or surface topography, wind or water velocity and vegetative cover.

The "K factor" represents the combination of detachability of the soil, runoff potential of the soil, and the transportability of the sediment eroded from the soil. The K factor is commonly used for estimating soil erosion potential, and therefore is relevant to

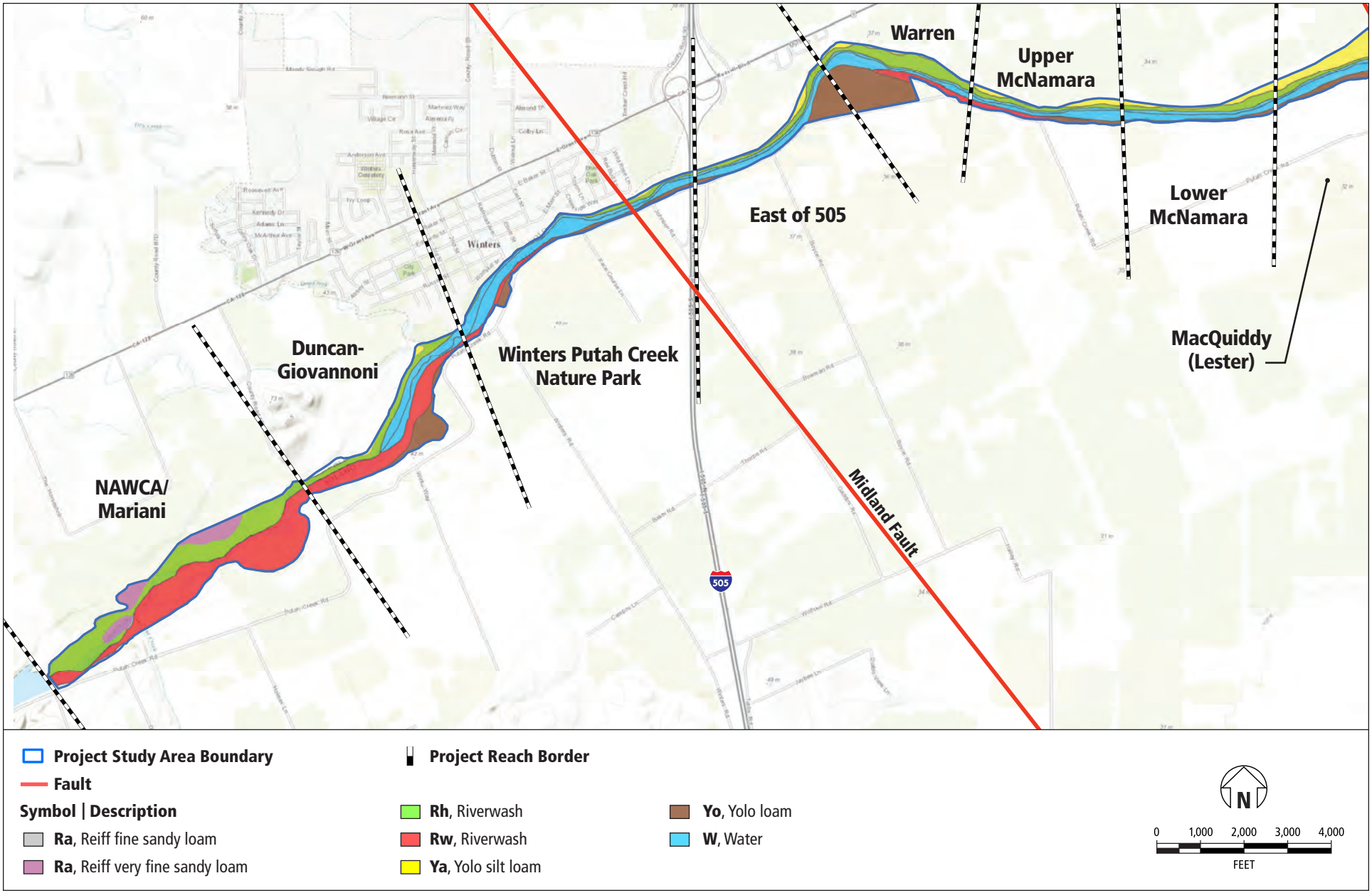


Figure 3.3-1A

Soils Map

Source: USDA SSURGO GIS Database

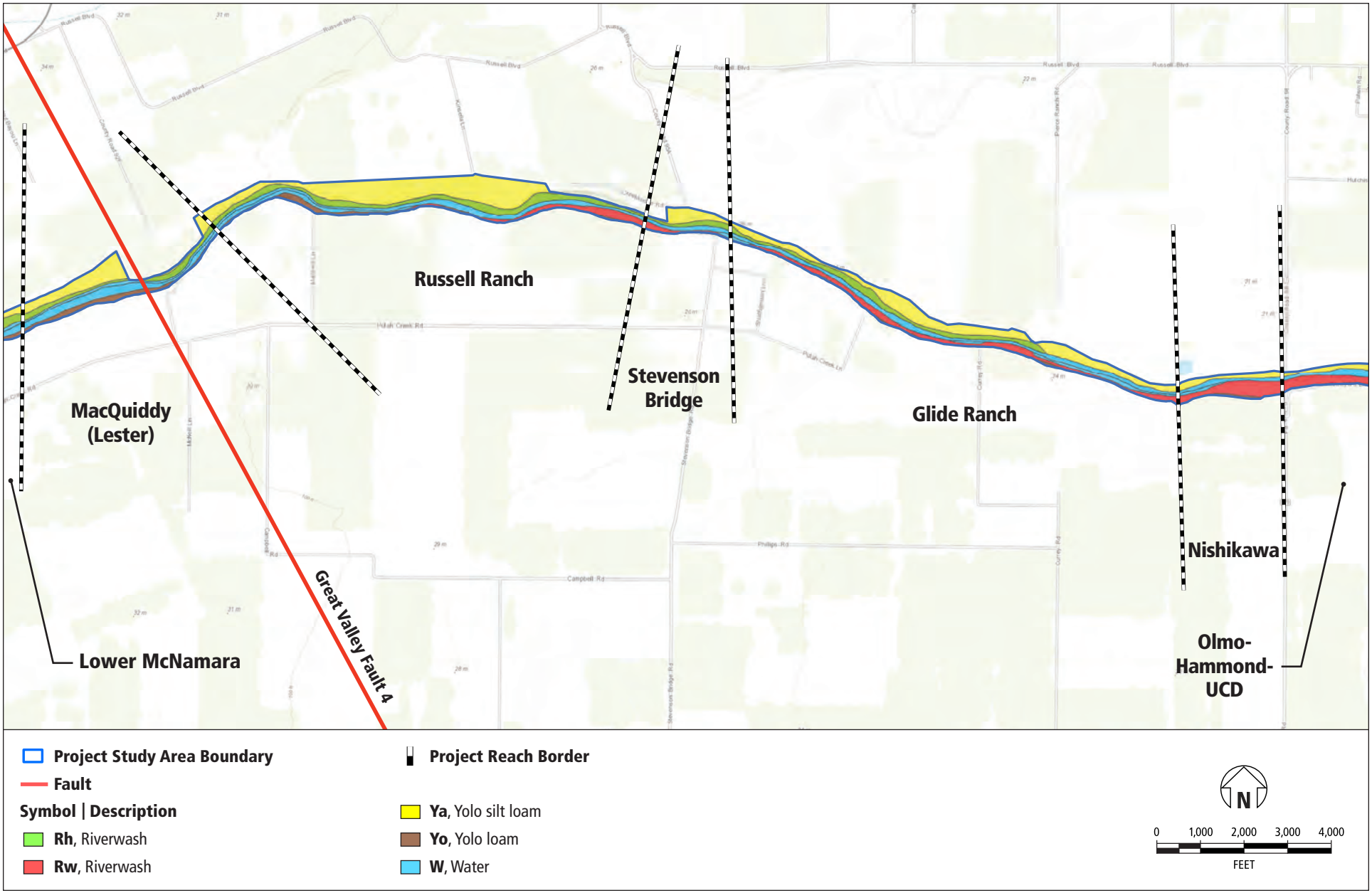


Figure 3.3-1B

Soils Map

Source: USDA SSURGO GIS Database

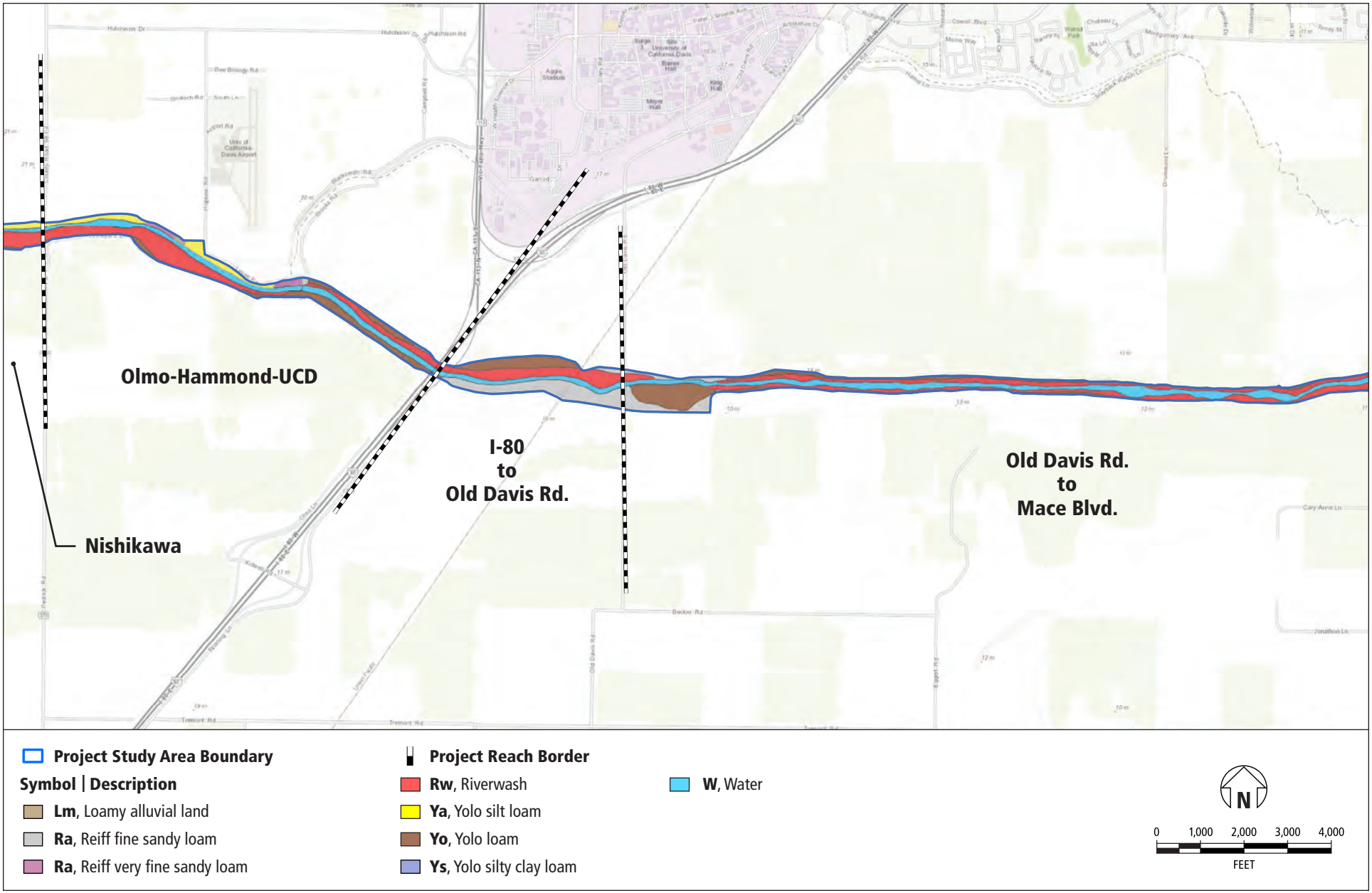


Figure 3.3-1C

Soils Map

Source: USDA SSURGO GIS Database

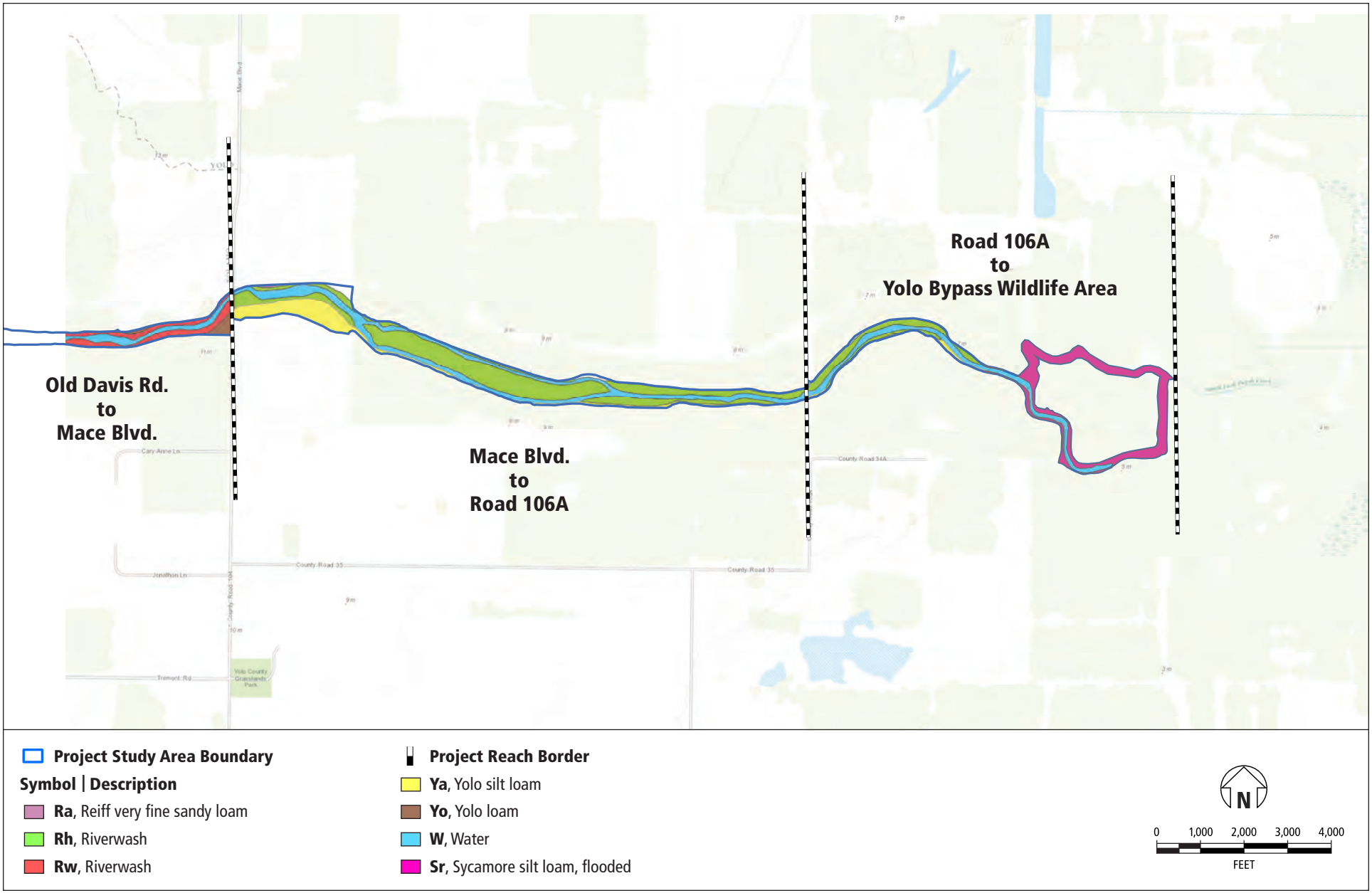


Figure 3.3-1D

Soils Map

Source: USDA SSURGO GIS Database

Table 3.3-1 Lower Putah Creek Restoration Project Soils

Soil Type	Land Forms[a]	Hydrologic Group[a]	Drainage Class[a]	Runoff/Soil Erosion from Water[a]	USCS[a]
Altamont clay, 30-50% slopes eroded (AcF2)	Terraces	D	Well- drained	Very High	CH, CL
Brentwood (silty) clay loam, 0-2% slopes (BrA)	Alluvial fans	B	Well- drained	Medium	CL, ML
Corning gravelly loam, 2-15% slopes, eroded (CtD2)	Terraces	D	Well- drained	Very High	SC-SM, SM, CH, CL, GC
Corning gravelly loam, 2-15% slopes, eroded (CvD2)	Terraces	D	Well- drained	Very High	SC-SM, GC-GM, SM, CH, CL, GC
Loamy alluvial land (Lm)	Flood plains	B	N/A	Very low	ML, SM, SP-SM
Reiff fine sandy loam (Ra)	Alluvial fans	B	Well- drained	Very low	CL-ML, ML, SM SC-SM
Riverwash (Rh-Yolo County)	Stream channels	D	N/A	Negligible	SP, SP-SM, SW
Riverwash (Rw-Solano County)	Channels	D	N/A	Negligible	N/A
Sycamore silt loam, drained (Sp)	Alluvial fans	B	Somewhat poorly drained	Low	ML, CL, CL-ML
Sycamore silt loam, flooded (Sr)	Alluvial fans	C	Somewhat poorly drained	Low	ML, CL, CL-ML
Yolo silt loam (Ya)	Alluvial fans	B	Well- drained	Low	ML, CL, CL-ML
Yolo Loam (Yo)	Alluvial fans	B	Well- drained	Low	ML, CL, CL-ML

[a] See definitions below for additional explanation:

Landforms – Where the soil type is most likely found.

Hydrologic soil groups – are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms. The four hydrologic soil groups are:

- **Group A.** Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well-drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
- **Group B.** Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well-drained or well-drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
- **Group C.** Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
- **Group D.** Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils associated with a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Water Capacity – The amount of plant-available water that a soil can provide.

Drainage Class – (natural) refers to the frequency and duration of wet periods under conditions similar to those under which a soil formed.

Runoff – The rate of runoff and potential for soil erosion from water.

USCS – The Unified Soil Classification System classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.
Source: NRCS Soil Database, 2003. *Soil Survey of Yolo County/Soil Survey of Solano County.*

analyzing potential erosion impacts of the Project. The State and federal RUSLE K Factor Watershed Mapping program indicates that the soils present along the Lower Putah Creek Project Area have a K factor of 0.37, indicating a moderate to moderately high erosion potential due to the combination of erosive soils and steep banks along the creek (NRCS/SWRCB, 2015). Erosion as a result of sheet flow, water moving over the top of the soil, is minor along the creek, mainly due to the high surface area covered by plants.

Geologic and Seismic Hazards

Project Area Faults

As stated above under “Area Faults,” the Great Valley Fault 4, located near County Road 87E, is the only mapped fault that crosses the Project Area.

California Fault Rupture Hazard Zones

The purpose of the Alquist-Priolo Geologic Hazards Zones Act (AP Act), as summarized in California Department of Mines and Geology (CDMG) Special Publication 42 (SP 42), is to “prohibit the location of most structures for human occupancy across the traces of active faults and to mitigate thereby the hazard of fault-rupture” (DOC, 2014, p. 1). No mapped earthquake fault rupture hazard zones are present in the Project Area.

Project Area Earthquake Shaking

The Project Area is located in an area with a high potential for generating moderate to intense ground shaking[2]. The application indicates that PGA values range from 0.708g near the west end of the Project Area to 0.287g near the east end.

Slope Stability and Potential for Slope Failure

Slope stability is generally dependent upon slope steepness, strength and orientation of the underlying material, surface water and groundwater conditions, vegetative cover,

[2] Peak ground acceleration (PGA) for the Maximum Considered Earthquake (MCE) was obtained from the USGS Ground Motion Parameter Application, which is available at:
http://earthquake.usgs.gov/designmaps/us/application.php.

rainfall amount, and seismic forces. With the exception of the stream channel banks, there are no steep slopes in the Project Area that could become unstable.

The Solano County General Plan identifies the Project Area as having slopes of less than 4 percent and does not include the Project Area as an area of slope hazard (County of Solano, 2008a, Figure HS-4). The Solano County General Plan also observes that creek banks in general may become unstable during seismic events, and it restricts development, particularly housing and workplaces, along stream banks for this reason (County of Solano, 2008, pp. HS-22 and HS-34). The General Plan does not discuss or identify slope stability risks for Putah Creek in particular.

The Yolo County General plan identifies multiple stream bank areas along Cache Creek that are unstable, but it concludes, "Elsewhere in the County however, landslides are generally not a significant hazard." and does not identify Putah Creek stream banks as an area of particular risk (County of Yolo, 2009a, p. HS-8). The Yolo County General plan identifies multiple stream bank areas along Cache Creek that are susceptible to landslide, but it concludes that landslides are generally not a significant hazard in the rest of the county and does not identify Putah Creek stream banks as an area of landslide risk (County of Yolo, 2009a, p. HS-8).

Liquefaction and Seismic Settlement

Liquefaction describes a condition in which a saturated, cohesionless soil loses shear strength during earthquake shocks. Historically, liquefaction of soils has caused severe damage to structures, berms, levees, and roads. Soils most susceptible to liquefaction are saturated, loose, clean, uniformly graded, and fine-grained sand deposits. If liquefaction occurs, foundations resting on or within the liquefiable layer may undergo settlements. This will result in reduction of foundation stiffness and capacities. Areas of liquefaction potential would include areas with recent granular deposits or low plasticity sandy silts with the depth to groundwater less than 50 feet.

Lateral spreading is a type of land failure that occurs on gentle slopes due to liquefaction of the laterally supporting soil. Stream bank failures could occur due to lateral spread during seismic events. The Solano County General Plan also notes that creek banks, which may be underlain by loosely consolidated soils, are susceptible to lurching, the horizontal movement of ground next to slope faces (County of Solano, 2008, p. HS-22). The Solano County General Plan and earthquake planning documents indicate that liquefaction potential in the Project Area is moderate (County of Solano, 2008, p. HS-29, Figure HS-6; County of Solano, 2012, p. 6). The Yolo County General Plan and emergency planning

documents do not identify the level of liquefaction risk in the Project Area (County of Yolo, 2009a, p. HS-9, Figure HS-2; see also County of Yolo, 2012 and County of Yolo, 2013).

Zones of Required Evaluation, referred to as "Seismic Hazard Zones" in Article 10, Section 3722 of the California Code of Regulations, are areas shown on Seismic Hazard Zone Maps where site evaluations are required to determine the need for mitigation of potential liquefaction and/or earthquake-induced landslide ground displacements. No areas in the Project Area have been mapped as Seismic Hazard Zones on state maps, and the Solano and Yolo County General Plans do not identify any Seismic Hazard Zones in the Project Area (DOC, 2015c; County of Solano, 2008; County of Yolo, 2009a).

Mineral Resources Project Area Conditions

Aggregate (Gravel) Mineral Resources

Under State law, the California Department of Conservation (DOC) maps mineral resources in the state. DOC reports and maps identify Mineral Resource Zone (MRZ) classifications. Classifications are based on the relative economic and resource value of the mineral resources in an area. There are four Mineral Resource Zone classifications: MRZ-1, a lower value designation for areas where geologic information indicates no significant mineral deposits exist; MRZ-2, areas containing identified mineral resources; MRZ-3, areas of undetermined mineral resource significance that cannot be evaluated from available data; and MRZ-4, areas of unknown mineral resource potential (DOC, 2000, p. 3).

The DOC has mapped one MRZ near the Project Area and another in the Project Area (DOC, 1988, Plates 18 to 20). The MRZ in the Project Area, located in and north of the Nishikawa and the western half of the Olmo-Hammond-UCD reaches, is classified as MRZ-1 (no significant mineral deposits) (DOC, 1988, Plate 18). An MRZ-3 zone (area of undetermined mineral resource significance) is located east of the City of Davis, approximately 0.25 miles north of the Project Area, north of the eastern half of the Olmo-Hammond-UCD reach and the western end of the I-80 to Old Davis Road reach (DOC, 1988, Plate 18).

The Lower Putah Creek floodplain was the site of historic aggregate (sand and gravel) mining operations (County of Yolo, 2005, p. 6-18; Bradley, 1915, p. 198). The Solano County General Plan Mineral Resources Map identifies one former sand and gravel mine location along Putah Creek, within the Project Area near the City of Winters, but does not identify this area or any others in the Putah Creek vicinity as Mineral Resource Zones

(County of Solano, 2008a, p. RS-33, Figure RS-4). No aggregate mining is currently occurring in Putah Creek.

Petroleum and Natural Gas Resources

Lower Putah Creek, including portions of the Project Area, is located over the Winters Gas and Putah Sink Gas fields and the abandoned Dixon Gas and Davis Southeast Gas fields (DOC, 1999, Quads 8N 1E and 8N 3E). These natural gas fields are also identified in the Yolo County General Plan (County of Yolo, 2009a, pp. CO-44, CO-46, Figure CO-5). The Solano County General Plan does not identify any petroleum or natural gas resources in the Project Area (County of Solano, 2008a, pp. RS-51 to RS-52).

Existing Conditions in Individual Project Reaches

Specific information on the geological conditions, soil types, and mineral resources along each Project reach are described below. The underlying geology in each reach is the source of the soils, and in turn the physical characteristics of the soils define their properties, mineral resource value, and relative susceptibility to erosion, stability, liquefaction, and other factors relevant to analysis of potential Project impacts.

NAWCA/Mariani

Geology and Surface Soil Conditions

Like the rest of the Project Area, topography in this reach is generally flat except for the incised channel. No faults pass through this reach. Similar to the rest of the Project Area, this reach is located in an area of moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones or Seismic Hazard Zones are present. The Solano and Yolo County General Plans do not identify this reach, including stream banks, as an area of slope or landslide hazard, but the Solano County General Plan does observe that creek banks generally may be susceptible to lurching if they are underlain by loosely consolidated soils (County of Solano, 2008, Figure HS-4, p. HS-22; County of Yolo, 2009a, pp. HS-8 to HS-9).

Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Riverwash (Rw), Reiff fine sandy loam (Ra), Brentwood clay loam, 0 to 2 percent slopes (BrA), Corning gravelly loam, 2 to 15 percent slopes, eroded (CvD2), Altamont clay, 30 to 50 percent slopes eroded (AcF2), Riverwash (Rh), Reiff very fine sandy loam (Ra), Corning gravelly loam, 2 to 15 percent slopes, eroded (CtD2), Yolo silt loam (Ya), Reiff very fine sandy loam (Ra), Water (W).

Mineral Resources

The DOC has not identified any MRZs in this reach (DOC 2015a; DOC, 1988, Plates 18 to 20). The Solano and Yolo County General Plans do not identify any mineral resources within this reach. The DOC maps and the Solano and Yolo County General Plans do not identify any natural gas fields within this reach (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5).

Duncan-Giovannoni

Geology and Surface Soil Conditions

Topography in this reach is generally flat except for the incised channel. No faults pass through this reach. This reach is located in an area with a high potential for moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones or Seismic Hazard Zones are present. The Solano and Yolo County General Plans do not identify this reach, including stream banks, as an area of slope or landslide hazard, but the Solano County General Plan does observe that creek banks generally may be susceptible to lurching if they are underlain by loosely consolidated soils (County of Solano, 2008, Figure HS-4, p. HS-22; County of Yolo, 2009a, pp. HS-8 to HS-9).

Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Yolo loam (Yo), Riverwash (Rw), Riverwash (Rh), Yolo Silt loam (Ya), Corning gravelly loam, 2 to 15 percent slopes, eroded (CtD2), Brentwood silty clay loam, 0 to 2 percent slopes (BrA), Water (W).

Mineral Resources

The DOC has not identified any MRZs in this reach (DOC 2015a; DOC, 1988, Plates 18 to 20). The Solano and Yolo County General Plans do not identify any mineral resources within this reach. The DOC maps and the Solano and Yolo County General Plans do not identify any natural gas fields within this reach (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5).

Winters Putah Creek Nature Park

Geology and Surface Soil Conditions

Topography in this reach is generally flat except for the incised channel. According to the Solano County General Plan, the Midland Fault passes through the Project Area on the far downstream portion of the reach, near I-505 (County of Solano, 2008a, p. HS-23, Figure

HS-3). This fault has no history of seismicity in the past 700,000 years and is not considered an active fault (County of Solano, 2008b, p. 4.7-10). This reach is located in an area with a high potential for moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones or Seismic Hazard Zones are present. The Solano and Yolo County General Plans do not identify this reach, including stream banks, as an area of slope or landslide hazard, but the Solano County General Plan does observe that creek banks generally may be susceptible to lurching if they are underlain by loosely consolidated soils (County of Solano, 2008, Figure HS-4, p. HS-22; County of Yolo, 2009a, pp. HS-8 to HS-9).

Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Riverwash (Rw), Brentwood silty clay loam, 0 to 2 percent slopes (BrA), Riverwash (Rh), Yolo silt loam (Ya), Yolo Loam (Yo), Water (W).

Mineral Resources

This reach contains a former sand and gravel mine but the DOC has not identified any MRZs in this reach (DOC, 2015a; DOC, 1988, Plates 18 to 20). The Solano County General Plan Mineral Resources Map identifies a former sand and gravel mine location within this reach (County of Solano, 2008a, p. RS-33, Figure RS-4 Mineral Resources). The DOC maps and the Solano and Yolo County General Plans do not identify any natural gas fields within this reach (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5).

East of 505

Geology and Surface Soil Conditions

Topography in this reach is generally flat except for the incised channel. No faults pass through this reach. Similar to the rest of the Project Area, this reach is located in an area with a high potential for moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones or Seismic Hazard Zones are present. The Solano and Yolo County General Plans do not identify this reach, including stream banks, as an area of slope or landslide hazard, but the Solano County General Plan does observe that creek banks generally may be susceptible to lurching if they are underlain by loosely consolidated soils (County of Solano, 2008, Figure HS-4, p. HS-22; County of Yolo, 2009a, pp. HS-8 to HS-9). Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Yolo loam (Yo), Yolo silt loam (Ya), Brentwood silty clay loam, 0 to 2 percent slopes (BrA), Riverwash (Rh), and Water (W).

Mineral Resources

The DOC has not identified any MRZs in this reach (DOC, 2015a; DOC, 1988, Plates 18 to 20). The Solano and Yolo County General Plans do not identify any mineral resources within this reach. The DOC maps and the Solano and Yolo County General Plans do not identify any natural gas fields within this reach (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5).

Warren

Geology and Surface Soil Conditions

Topography in this reach is generally flat lying except for the incised channel. No faults pass through this reach. This reach is located in an area with a high potential for moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones or Seismic Hazard Zones are present. The Solano and Yolo County General Plans do not identify this reach, including stream banks, as an area of slope or landslide hazard, but the Solano County General Plan does observe that creek banks generally may be susceptible to lurching if they are underlain by loosely consolidated soils (County of Solano, 2008, Figure HS-4, p. HS-22; County of Yolo, 2009a, pp. HS-8 to HS-9).

Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Yolo loam (Yo), Yolo silt loam (Ya), Riverwash (Rh), and Water (W).

Mineral Resources

The DOC has not identified any MRZs in this reach (DOC, 2015a; DOC, 1988, Plates 18 to 20). The Solano and Yolo County General Plans do not identify any mineral resources within this reach. The DOC and the Solano and Yolo County General Plans do not identify any natural gas fields within this reach (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5).

Upper McNamara

Geology and Surface Soil Conditions

Like the rest of the Project Area, topography in this reach is generally flat except for the incised channel. No faults pass through this reach. This reach is located in an area with a high potential for moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones or Seismic Hazard Zones are present. The Solano and Yolo

County General Plans do not identify this reach, including stream banks, as an area of slope or landslide hazard, but the Solano County General Plan does observe that creek banks generally may be susceptible to lurching if they are underlain by loosely consolidated soils (County of Solano, 2008, Figure HS-4, p. HS-22; County of Yolo, 2009a, pp. HS-8 to HS-9)).

Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Yolo loam (Yo), Yolo silt loam (Ya), Riverwash (Rw), Riverwash (Rh), and Water (W).

Mineral Resources

This reach lacks designated MRZs but does contain a natural gas field, Winters Gas. This gas field is identified in the DOC maps and the Yolo County General Plan (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5). The Solano and Yolo County General Plans do not identify any mineral resource areas within this reach.

Lower McNamara

Geology and Surface Soil Conditions

Topography in this reach is generally flat except for the incised channel. No faults pass through this reach. This reach is located in an area with a high potential for moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones or Seismic Hazard Zones are present. The Solano and Yolo County General Plans do not identify this reach, including stream banks, as an area of slope or landslide hazard, but the Solano County General Plan does observe that creek banks generally may be susceptible to lurching if they are underlain by loosely consolidated soils (County of Solano, 2008, Figure HS-4, p. HS-22; County of Yolo, 2009a, pp. HS-8 to HS-9).

Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Yolo loam (Yo), Yolo silt loam (Ya), Riverwash (Rh), and Water (W).

Mineral Resources

Like the Upper McNamara Reach, this reach lacks mineral resources but does contain a natural gas field, Winters Gas. This gas field is identified in the DOC maps and the Yolo County General Plan (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5). The DOC has not identified

any MRZs in this reach (DOC, 2015a; DOC, 1988, Plates 18 to 20). The Solano and Yolo County General Plans do not identify any mineral resource areas within this reach.

MacQuiddy (Lester)

Geology and Surface Soil Conditions

Topography in this reach is generally flat except for the incised channel. The Great Valley Fault 4 (Great Valley 4b, Gordon Valley) is mapped as crossing the Project Area in this reach (County of Solano, 2008a, p. HS-23, Figure HS-3). The Great Valley Fault is capable of a maximum earthquake magnitude of 6.8 Mw, but is not currently considered an active fault (County of Solano, 2008b, p. 4.7-10). Similar to the rest of the Project Area, this reach is in an area with a high potential for moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones or Seismic Hazard Zones are present. The Solano and Yolo County General Plans do not identify this reach, including stream banks, as an area of slope or landslide hazard, but the Solano County General Plan does observe that creek banks generally may be susceptible to lurching if they are underlain by loosely consolidated soils (County of Solano, 2008, Figure HS-4, p. HS-22; County of Yolo, 2009a, pp. HS-8 to HS-9).

Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Yolo loam (Yo), Yolo silt loam (Ya), Riverwash (Rh), and Water (W)

Mineral Resources

This reach lacks mineral resources but does contain a natural gas field, Winters Gas. This gas field is identified in the DOC maps and the Yolo County General Plan (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5). The DOC has not identified any MRZs in this reach (DOC, 2015a; DOC, 1988, Plates 18 to 20). The Solano and Yolo County General Plans do not identify any mineral resource areas within this reach.

Russell Ranch

Geology and Surface Soil Conditions

Topography in this reach is generally flat except for the incised channel. No faults pass through this reach. This reach is located in an area with a high potential for moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones or Seismic Hazard Zones are present. The Solano and Yolo County General Plans do not identify this reach, including stream banks, as an area of slope or landslide hazard, but

the Solano County General Plan does observe that creek banks generally may be susceptible to lurching if they are underlain by loosely consolidated soils (County of Solano, 2008, Figure HS-4, p. HS-22; County of Yolo, 2009a, pp. HS-8 to HS-9).

Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Yolo loam (Yo), Yolo silt loam (Ya), Riverwash (Rw), Riverwash (Rh), and Water (W).

Mineral Resources

Like the three reaches upstream, this reach lacks mineral resources but does contain a natural gas field, Winters Gas. This gas field is identified in the DOC maps and the Yolo County General Plan (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5). The DOC has not identified any MRZs in this reach (DOC, 2015a; DOC, 1988, Plates 18 to 20). The Solano and Yolo County General Plans do not identify any mineral resource areas within this reach.

Stevenson Bridge

Geology and Surface Soil Conditions

Topography in this reach is generally flat except for the incised channel. No faults pass through this reach. Similar to the rest of the Project Area, this reach is located in an area with a high potential for moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones or Seismic Hazard Zones are present. The Solano and Yolo County General Plans do not identify this reach, including stream banks, as an area of slope or landslide hazard, but the Solano County General Plan does observe that creek banks generally may be susceptible to lurching if they are underlain by loosely consolidated soils (County of Solano, 2008, Figure HS-4, p. HS-22; County of Yolo, 2009a, pp. HS-8 to HS-9).

Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Yolo loam (Yo), Yolo silt loam (Ya), Riverwash (Rw), Riverwash (Rh), and Water (W).

Mineral Resources

The DOC has not identified any MRZs in this reach (DOC, 2015a; DOC, 1988, Plates 18 to 20). The Solano and Yolo County General Plans do not identify any mineral resources within this reach. The DOC and the Solano and Yolo County General Plans do not identify any natural gas fields within this reach (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5).

Glide Ranch

Geology and Surface Soil Conditions

Topography in this reach is generally flat except for the incised channel. No faults pass through this reach. This reach is located in an area with a high potential for moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones or Seismic Hazard Zones are present. The Solano and Yolo County General Plans do not identify this reach, including stream banks, as an area of slope or landslide hazard, but the Solano County General Plan does observe that creek banks generally may be susceptible to lurching if they are underlain by loosely consolidated soils (County of Solano, 2008, Figure HS-4, p. HS-22; County of Yolo, 2009a, pp. HS-8 to HS-9).

Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Yolo loam (Yo), Yolo silt loam (Ya), Riverwash (Rw), Riverwash (Rh), and Water (W).

Mineral Resources

The DOC has not identified any MRZs in this reach (DOC, 2015a; DOC, 1988, Plates 18 to 20). The Solano and Yolo County General Plans do not identify any mineral resources within this reach. The DOC and the Solano and Yolo County General Plans do not identify any natural gas fields within this reach (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5).

Nishikawa

Geology and Surface Soil Conditions

Topography in this reach is generally flat lying except for the incised channel. No faults pass through this reach. Similar to the rest of the Project Area, this reach is located in an area with a high potential for moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones or Seismic Hazard Zone are present. The Solano and Yolo County General Plans do not identify this reach, including stream banks, as an area of slope or landslide hazard, but the Solano County General Plan does observe that creek banks generally may be susceptible to lurching if they are underlain by loosely consolidated soils (County of Solano, 2008, Figure HS-4, p. HS-22; County of Yolo, 2009a, pp. HS-8 to HS-9).

Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Yolo loam (Yo), Yolo silt loam (Ya), Riverwash (Rw), and Water (W).

Mineral Resources

In a report on aggregate resources, the DOC has mapped an MRZ-1 zone (no significant mineral deposits) in this reach (DOC, 1988, Plate 18). This zone extends into the adjoining reach to the east. The DOC maps and the Solano and Yolo County General Plans do not identify any natural gas fields within this reach (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5).

Olmo-Hammond-UCD

Geology and Surface Soil Conditions

Topography in this reach is generally flat except for the incised channel. No faults pass through this reach. This reach is located in an area with a high potential for moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones or Seismic Hazard Zones are present. The Solano and Yolo County General Plans do not identify this reach, including stream banks, as an area of slope or landslide hazard, but the Solano County General Plan does observe that creek banks generally may be susceptible to lurching if they are underlain by loosely consolidated soils (County of Solano, 2008, Figure HS-4, p. HS-22; County of Yolo, 2009a, pp. HS-8 to HS-9).

Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Yolo loam (Yo), Yolo silt loam (Ya), Riverwash (Rw), Reiff fine sandy loam (Ra), Yolo silty clay loam (Ys), Loamy alluvial land (Lm) and Water (W).

Mineral Resources

The DOC has mapped an MRZ-1 zone (no significant mineral deposits) in this reach (DOC, 1988, Plate 18). The zone straddles the western portion of this reach and the Nishikawa reach to the west. The DOC maps and the Solano and Yolo County General Plans do not identify any natural gas fields within this reach (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5).

I-80 to Old Davis Road

Geology and Surface Soil Conditions

Topography in this reach is generally flat except for the incised channel. No faults pass through this reach. This reach is located in an area with a high potential for moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones or Seismic Hazard Zones are present. The Solano County General Plan does not identify this

reach, including stream banks, as an area of slope or landslide hazard, but the plan does observe that creek banks generally may be susceptible to lurching if they are underlain by loosely consolidated soils (County of Solano, 2008, Figure HS-4, p. HS-22).

Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Yolo loam (Yo), Riverwash (Rw), Reiff fine sandy loam (Ra), and Water (W).

Mineral Resources

The DOC has not identified any MRZs in this reach (DOC, 2015a; DOC, 1988, Plates 18 to 20). The Solano and Yolo County General Plans do not identify any mineral resources within this reach. The DOC maps and the Solano and Yolo County General Plans do not identify any natural gas fields within this reach (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5).

Old Davis Road to Mace

Geology and Surface Soil Conditions

Topography in this reach is generally flat except for the incised channel. No faults pass through this reach. This reach is located in an area with a high potential for moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones or Seismic Hazard Zones are present. The Solano County General Plan does not include this reach, including stream banks, as an area of slope hazard, but the plan does observe that creek banks generally may be susceptible to lurching if they are underlain by loosely consolidated soils (County of Solano, 2008, Figure HS-4, p. HS-22).

Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Yolo loam (Yo), Yolo silt loam (Ya), Riverwash (Rw), Riverwash (Rh), Reiff fine sandy loam (Ra), Loamy alluvial land (Lm), and Water (W).

Mineral Resources

This reach lacks mineral resources but does contain a natural gas field, Davis Southeast Gas. This gas field is identified in the DOC maps and the Yolo County General Plan (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5). The DOC has not identified any MRZs in this reach (DOC, 2015a; DOC, 1988, Plates 18 to 20). The Solano and Yolo County General Plans do not identify any mineral resource areas within this reach.

Mace to Road 106A

Geology and Surface Soil Conditions

Topography in this reach is generally flat except for the incised channel. No faults pass through this reach. This reach is located in an area with a high potential for moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones or Seismic Hazard Zones are present. The Yolo County General Plan does not identify this reach, including stream banks, as an area of slope or landslide hazard (County of Yolo, 2009a, pp. HS-8 to HS-9).

Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Reiff fine sandy loam (Ra), Sycamore silt loam, drained (Sp), Riverwash (Rh) Yolo silt loam (Ya), and Water (W).

Mineral Resources

The DOC has not identified any MRZs in this reach (DOC, 2015a; DOC, 1988, Plates 18 to 20). The Solano and Yolo County General Plans do not identify any mineral resources within this reach. The DOC maps and the Solano and Yolo County General Plans do not identify any natural gas fields within this reach (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5).

Road 106A to Yolo Bypass Wildlife Area

Geology and Surface Soil Conditions

Topography in this reach is generally flat except for the incised channel. No faults pass through this reach. Similar to the rest of the Project Area, this reach is located in an area with a high potential for moderate to intense ground shaking, although no mapped earthquake fault rupture hazard zones (areas unfit for most habitable structures) or Seismic Hazard Zones (zones of special risk for liquefaction and landslides) are present. The Yolo County General Plan does not identify this reach, including stream banks, as an area of slope or landslide hazard (County of Yolo, 2009a, pp. HS-8 to HS-9).

Soils in this reach have a moderate to moderately high erosion potential. Soil types occurring in this reach include Sycamore silt loam, drained (Sp), Sycamore silt loam, flooded (Sr), Riverwash (Rh) Yolo silt loam (Ya), and Water (W).

Mineral Resources

This reach lacks mineral resources but does contain a natural gas field, Putah Sink Gas. This gas field is identified in the DOC maps and the Yolo County General Plan (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5). The DOC has not identified any MRZs in this reach (DOC 2015a; DOC, 1988, Plates 18 to 20). The Solano and Yolo County General Plans do not identify any mineral resources within this reach.

Regulatory Setting

State Regulations

Alquist-Priolo-Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. The Alquist-Priolo Earthquake Fault Zoning Act's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults (DOC, 2014, p. 1). The Act only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act (1990) addresses non-surface fault rupture earthquake hazards such as liquefaction and seismically induced landslides. This Act requires the State Geologist to designate Seismic Hazard Zones. These zones assist cities and counties in fulfilling their responsibilities for protecting the public from the effects of non-surface fault rupture earthquake hazards such as strong ground shaking, earthquake-induced landslides, liquefaction, or other ground failures.

Surface Mining and Reclamation Act of 1975

The California Legislature enacted the Surface Mining and Reclamation Act of 1975 (SMARA) to protect the State’s supply of mineral resources while also minimizing negative effects of surface mining on public health, property, and the environment. SMARA is administered by the DOC's Office of Mine Reclamation (DOC-OMR) and the State Mining and Geology Board (SMGB) (DOC, 2013). Under SMARA, cities and counties adopt land use and reclamation procedures through ordinances that regulate local mining and reclamation activities. These ordinances are subject to review by the SMGB for consistency with SMARA. SMARA requires all city and county general plans to identify mapped mineral resource designations approved by the SMGB (County of Solano, 2008a, p. RS-32).

Local Regulations Pertaining to Geology

Solano County General Plan

The following goals, policies, and regulations from the Solano County General Plan are relevant to the proposed Project related to geology and soils.

Resources Element

Goal RS.G-10: Foster sound management of the land and water resources in Solano County's watersheds to minimize erosion and protect water quality using best management practices and protect downstream waterways and wetlands. (County of Solano, 2008a, p. RS-6)

Public Health and Safety Element

Goal HS.G-1: Minimize the potential for loss of life and property resulting from natural or human-caused hazards. (County of Solano, 2008a, p. HS-5)

Policy HS.P-12. Require new development proposals in moderate or high seismic hazard areas to consider risk caused by seismic activity and to include project features that minimize these risks. (County of Solano, 2008a; p. HS-33)

Yolo County General Plan

The policies, goals, and implementation actions from Yolo County's 2030 Countywide General Plan are relevant to geology and soils impacts:

Conservation and Open Space Element

Policy CO-3.5: Preserve and protect the County's unique geologic and physical features, which include geologic or soil "type localities", and formations or outcrops of special interest. (County of Yolo, 2009a, p. CO-46)

Health and Safety Element

Policy HS-1.1: Regulate land development to avoid unreasonable exposure to geologic hazards.

Policy HS-1.3: Require environmental documents in connection with CEQA to address seismic safety issues and to provide adequate mitigation for existing and potential hazards identified.

Action HS-A2: Rely upon the most current and comprehensive hazard mapping available in the evaluation of potential seismic hazards associated with proposed new development. (County of Yolo, 2009a; p. HS-11)

Local Regulations Pertaining to Mineral Resources

Solano County General Plan

The Solano County General Plan identifies mineral resources produced in the county: mercury, sand and gravel, clay, stone products, calcium, and sulfur (County of Solano, 2008a, pp. RS-32 to RS-36). The General Plan Mineral Resources Map identifies a sand and gravel mine location near the City of Winters, along Lower Putah Creek and within the Project Area, but does not identify any Mineral Resource Zones in the Putah Creek area (County of Solano, 2008a, p. RS-33, Figure RS-4 Mineral Resources). The county also contains natural gas fields, although the General Plan does not specifically identify any in the Putah Creek area (County of Solano, 2008a, pp. RS-51 to RS-52). The following General Plan policies and regulations are relevant to mineral resource impacts:

> Policy RS.P-33: The County shall preserve, for future use, areas with important mineral resources by preventing residential, commercial, and industrial development that would be incompatible with mining practices to the extent feasible. (County of Solano, 2008a, p. RS-35)

Yolo County General Plan

Yolo County's 2030 Countywide General Plan discusses mineral resources in its Conservation and Open Space element (County of Yolo, 2009a, pp. CO-43 to CO-48). The following General Plan policies, goals, and implementation actions are relevant to mineral resource impacts:

> Goal CO-3: Mineral Resources. Protect mineral and natural gas resources to allow for their continued use in the economy.
>
> Policy CO-3.1: Encourage the production and conservation of mineral resources, balanced by the consideration of important social values, including recreation, water, wildlife, agriculture, aesthetics, flood control, and other environmental factors.
>
> Action CO-A37: Designate and zone lands containing identified mineral deposits to protect them from the encroachment of incompatible land uses so that aggregate resources remain available for the future. (Policy CO-3.1)
>
> Action CO-A39: Encourage the responsible development of aggregate deposits along Cache Creek as significant both to the economy of Yolo County and the region. (Policy CO-3.1)

Action CO-A45: Prohibit commercial mining in or adjoining Putah Creek. (Policy CO-3.1, Policy CO-3.2)

Action CO-A47: Ensure that mined areas are reclaimed to a usable condition that is readily adaptable for alternative land uses, such as agriculture, wildlife habitat, recreation, and groundwater management facilities.

Action CO-A49: Consider the exploration, drilling, and extraction of natural gas as compatible with agriculture and open space uses. (Policy CO-3.3)

Action CO-A50: Evaluate any impacts to identified natural gas fields as part of the development review process. (Policy CO-3.3)
(County of Yolo, 2009a, pp. CO-47 to CO-49)

Solano County Code

Chapter 29 of the Solano County Code, Surface Mining and Reclamation, establishes procedures for mining operations permitting and reclamation (County of Solano, 2013). It does not contain any restrictions on the location of mining operations.

Yolo County Code of Ordinances

The following Yolo County ordinance in Title 10 Environment, Chapter 4, Off-Channel Surface Mining, of the county code is relevant to mineral resource impacts:

Section 10-4.103. Purposes.
The purposes of this chapter are as follows:

(a) The extraction of sand and gravel is essential to the continued economic well-being of the State and to the needs of society. Although the County encourages the production of sand and gravel, consideration must also be balanced by other societal values, including but not limited to recreation, water resources, wildlife, agriculture, and aesthetics;

(b) The potential environmental impacts, operational methods, and reclaimed end uses of in-channel surface excavation are significantly different from those associated with off-channel surface mining. Thus, it is appropriate to provide separate performance standards and findings for both in-channel and off-channel activities, so that regulations contained within this title are sensitive to the specific issues involved in each of the two (2) types of operations;

(c) Due to concerns about the impacts of excavation within the channel to structures, property, and riparian habitat, in-stream surface excavation will be minimized and will

only be permitted as part of erosion control, flood control, and similar channel maintenance activities. Therefore, in order to provide the aggregate necessary for the County's needs, off-channel mining will be encouraged;

(d) Off-channel surface mining must be carefully monitored, in order to eliminate residual hazards to the public health and safety, and to maximize the benefits to the County from surface mining operations; and

(e) Off-channel surface mining takes place in diverse areas, where the geologic, climatic, biological, and social conditions are significantly different. Surface mining permits must be specifically adapted to the requirements of the particular land being mined. Therefore, this chapter imposes general performance standards, by which off-channel surface mining operations shall be measured in order to ensure that resources and infrastructure are managed in a consistent manner to maximize their overall benefit.
(County of Yolo, 1996.)

3.3.2 Significance Criteria

The following thresholds for measuring a project's environmental impacts are based on CEQA Guidelines Appendix G (OPR, 2013). For the purposes of this PEIR, impacts are considered to be significant if any of the following would result from implementation of the proposed Project:

1. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
   a. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. (Refer to Division of Mines and Geology Special Publication 42)
   b. Strong seismic ground shaking.
   c. Seismic-related ground failure, including liquefaction.
   d. Landslides.
2. Result in substantial soil erosion or the loss of topsoil.
3. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.
4. Result in loss of availability of a known mineral resource that would be of value to the region and the residents of the State.

5. Result in loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

3.3.3 Impacts and Mitigation Measures

Impacts and mitigation measures are described below both generally and by reach. Applicable impacts and mitigation measures for each reach are summarized in **Table 3.3-2**, at the end of this section.

General Impacts and Mitigation Measures

Impact 3.3-1: Impacts from Seismic Activity.

Faults and Ground Shaking

As described above in the Local Geologic Setting/Project Area Conditions, the Project is located in an area with a high potential for moderate to intense ground shaking and low likelihood of ground rupture. Most Project activities would occur on private lands and would not involve creating new or additional public access.

The California Building Standards Code (which has been adopted by both Solano and Yolo Counties) contains a broad definition of "structure" ("that which is built or constructed"). However, the Project would not erect habitable structures of any kind; any structures would be limited to those described in Chapter 2, *Project Description*, such as those for bank stabilization (which would improve bank stability compared with existing conditions) and temporary flow diversion. Project activities would not bring large numbers of people to the Project Area: during construction and during operational maintenance activities, an average of six workers would be in the area at any given time. Therefore, even in the event of strong seismic ground shaking, any damage to structures installed by the Project would be unlikely to injure people or result in major damage to Project structures.

Liquefaction

As described above in the Local Geologic Setting/Project Area Conditions, Seismic Hazard Zone Maps show no liquefaction areas within the Project Area. The Solano County General Plan and earthquake planning documents indicate that liquefaction potential in the Project Area is moderate (County of Solano, 2008, p. HS-29, Figure HS-6; County of Solano, 2012, p. 6). The Yolo County General Plan and emergency planning documents do not identify the level of liquefaction risk in the Project Area, but the General Plan identifies the Project Area's landslide susceptibility as low (County of Yolo, 2009a, p. HS-9, Figure HS-2; see also County of Yolo, 2012 and County of Yolo, 2013). Thus, the Project would have a **less-than-significant impact** related to exposing people or structures to

potential substantial adverse effects involving seismic-related ground failure, including fault rupture, seismic ground shaking, and liquefaction. No mitigation measures are required.

Impact 3.3-2: Result in New or Exacerbated Slope Failure Hazards.

As described above Local Geologic Setting/Project Area Conditions, no Project Areas at risk and potentially requiring mitigation for landslides are shown on Seismic Hazard Zone Maps. The Solano County General Plan identifies the Project Area as having slopes of less than 4 percent and does not include the Project Area as an area of slope hazard (County of Solano, 2008a, Figure HS-4). With the exception of the stream banks, there are no steep slopes in the Project Area that could become unstable.

Regarding slope failure risks from the streambanks themselves, one of the purposes of Project activities is to stabilize streambanks in the Project Area, which would reduce risk of landslides compared with existing conditions. As described in Chapter 2, *Project Description*, a variety of creek bank stabilization methods would be implemented within the Project footprint, including installing natural rock boulders at the toe of the bank, minor bank filling, and "laying back" of the bank to decrease its relative angle. Application of these methods would decrease the Project-associated slope failure risk and would not increase existing risks of from landslides. These methods would also reduce risks related to liquefaction.

There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Under these conditions, the construction manager and equipment operators would take all precautions to minimize this hazard as part of normal operations.

Finally, Project activities would not bring large numbers of people to the Project Area: during construction and during operational maintenance activities, an expected an average of six workers would be in the Project Area at any given time, and so, even in the unlikely event of a stream bank collapse, any structural damage to structures erected by the Project would be unlikely to injure people or to result in substantial economic loss or other substantial adverse effects.

Therefore, the Project would have a **less-than-significant impact** related to potential substantial adverse effects involving landslides of the stream bank or other on- or off-site features. No mitigation measures are required.

Impact 3.3-3: Potential for Substantial Soil Erosion During or After Project Construction.

Channel Erosion

As described above in the Local Geologic Setting/Project Area Conditions, the soils present along Lower Putah Creek have a K factor of 0.37, indicating a moderate to moderately high erosion potential. However, as is discussed in Chapter 2, *Project Description*, one of the purposes of Project activities is to reduce existing erosion in the Project reaches. The Project would utilize a number of stabilization methods, including slope recontouring, constructing rock cross-vane grade/flow control structures and installing of rock revetment, log revetment, and/or root wads to stabilize stream banks and reduce erosion. Meandering of the low-flow stream channel within the incised larger channel over time is a natural process and would not be considered an adverse impact if sediment inputs and outputs are more or less in equilibrium. However, in a few places the lateral erosion has been exacerbated by historic channel manipulations and these require site-specific modifications. In those places, reduced erosion would be a long-term benefit of the Project.

Project activities could result in potentially significant temporary increases in within-channel and bank erosion during construction activities, including channel reconfiguration (grading and clearing); maintenance activities such as weed management; and gravel augmentation, scarification, and maintenance. These activities and potential effects are analyzed in additional detail in Section 3.1, *Hydrology*.

Construction and temporary post-construction bank erosion impacts to the low-flow channel and terrace (below stream banks) would be reduced to a **less-than-significant level** through regulatory compliance and the application of Mitigation Measure 3.1-1 (see Section 3.1, *Hydrology,* for this measure). Project activities would be subject to CWA Section 401, Water Quality Certification, for discharges of dredged and fill materials through the Central Valley Regional Water Quality Control Board (CVRWQCB) (SWRCB, 2014). As part of this certification, CVRWQCB would require erosion controls in all areas disturbed by Project activities, as is discussed in further detail in Section 3.2, *Water Quality*, of this EIR. These regulatory controls would ensure that the Project's erosion impacts are less than significant.

A Storm Water Pollution Prevention Plan (SWPPP) would be required for Project activities that disturb one or more acres of soil under the National Pollution Discharge Elimination System (NPDES) General Permit for Construction Storm Water Discharges. The SWPPP(s) would also incorporate visual, chemical, and sediment monitoring programs as required.

See Sections 3.1, *Hydrology*, and 3.2, *Water Quality*, for additional detail on SWPPP requirements.

A SWPPP may not be required for certain Project activities, such as weed control and activities that disturb less than one acre of soil. In those situations, Mitigation Measure 3.1-1 (see Section 3.1, *Hydrology*) would ensure that Project impacts remain less than significant by implementing best management practices (BMPs) designed to avoid or minimize adverse impacts associated with erosion.

Erosion and sediment controls implemented to comply with Section 401, Water Quality Certification, with any required SWPPPs, combined with Mitigation Measure 3.1-1 would ensure that Project impacts resulting in substantial soil erosion or the loss of topsoil would be **less than significant**. No additional mitigation is required.

Impact 3.3-4: Loss of Important Mineral Resources.

<u>Aggregate (Gravel) Resources</u>

The California DOC identifies an MRZ-3 in Davis that contains mineral deposits of which the significance cannot be evaluated from available data. The MRZ-3 is located 0.25 miles north and outside of the Project Area and therefore would not be impacted by the Project.

The Lower Putah Creek floodplain was the site of at least one historic gravel-mining operation (County of Yolo, 2005, p. 6-18; Bradley, 1915, p. 198). The Solano County General Plan Mineral Resources Map identifies one sand and gravel mine location along Putah Creek, near the City of Winters, but does not identify this area or any others in the Putah Creek vicinity as a Mineral Resource Zone (County of Solano, 2008a, p. RS-33, Figure RS-4 Mineral Resources). Gravel mining in the Putah Creek area is no longer commercially viable because gravel from the area is low quality and there are now less expensive substitutes available from nearby sources, such as the high-grade aggregate deposit in the Cache Creek area (County of Yolo, 2009a, pp. CO-43 to CO-44). All current commercial aggregate operations in Yolo County are located on the stream terraces of Cache Creek (County of Yolo, 2009b, p. 683). In addition, Yolo County General Action CO-A45 prohibits commercial mining in or adjoining Putah Creek. (See also Policy CO-3.1 and Policy CO-3.2, which require balancing of mineral resource production, conservation, and extraction with environmental and land use compatibility factors.) (County of Yolo, 2009a, pp. CO-46, CO-48)

Following SMARA, the Putah Creek area became a minor source of lower quality aggregate for a time, but has been long superseded by the development of high-value gravel resources throughout the region (such as Cache Creek). The Putah Creek area was not historically a significant source of aggregate resources of value to the region and residents of the State, and now extraction is prohibited by Yolo County (County of Yolo, 2009a, pp. CO-48). (Solano County's General Plan and county code do not specifically prohibit mining in or near Putah Creek.) The Project would have **no impact** on the availability of aggregate to the region and residents of the State. No mitigation is required.

Natural Gas Resources

The Solano County General Plan does not identify any petroleum or natural gas resources in the Project Area (County of Solano, 2008a pp. RS-51 to RS-52). The Yolo County General Plan does identify several natural gas fields located in the Project Area (County of Yolo, 2009a, pp. CO-44 and CO-46, Figure CO-5). These are the Winters Gas and Putah Sink Gas fields, and the abandoned Dixon Gas and Davis Southeast Gas fields (DOC, 1999, Quads 8N 1E and 8N 3E respectively). Project activities would not damage or otherwise impact the natural gas fields because Project activities would take place only on the surface and would not prevent use or development of the natural gas fields; therefore, the Project would have **no impact** on mineral or natural gas resources. No mitigation is required.

Site-Specific Impacts and Mitigation Measures

NAWCA/Mariani

Geology

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2; the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations would include consideration of these hazards. Therefore, in this reach, the Project would have a **less-than-significant** impact related to seismic hazards and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPPs would ensure that short-term construction-related Project erosion and siltation impacts would

be **less than significant**. In the event an SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4; Project activities would not heighten the existing condition lateral spread risk of the creek. This is because the Project entails creek restoration activities aimed at stabilizing the stream banks. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

There are no known mineral resources or natural gas fields in this reach. The proposed Project would have **no impact**.

Duncan-Giovannoni

Geology

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2; the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations would include consideration of these hazards; therefore, in this reach, the Project would have a **less-than-significant** impact related to seismic hazards and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPPs would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4; Project activities would not heighten the existing condition lateral spread risk of the creek. This is because

the Project entails creek restoration activities aimed at stabilizing the stream banks. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

There are no known mineral resources or natural gas fields in this reach. The proposed Project would have **no impact**.

Winters Putah Creek Nature Park

Geology

According to the Solano County General Plan, the Midland Fault passes through the Project Area on the far downstream portion of the reach, near I-505 (County of Solano, 2008a, p. HS-23, Figure HS-3). This fault has no history of seismicity in the past 700,000 years and is not considered an active fault (County of Solano, 2008b, p. 4.7-10).

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2; the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations would include consideration of these hazards; therefore, in this reach, the Project would have a **less-than-significant** impact related to seismic hazards and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPPs would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4; Project activities would not heighten the existing condition lateral spread risk of the creek. This is because the Project entails creek restoration activities aimed at stabilizing the stream banks. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

The Solano County General Plan Mineral Resources Map identifies a former sand and gravel mine located within this reach, but the General Plan does not identify this area or any others in the Putah Creek vicinity as MRZs (County of Solano, 2008a, p. RS-33, Figure RS-4). Gravel mining in the Putah Creek area is no longer commercially viable because gravel from the area is low quality and there are now less expensive substitutes available from nearby sources (County of Yolo, 2009a, pp. CO-43 to CO-44). In addition, Yolo County General Action CO-A45 prohibits commercial mining in or adjoining Putah Creek (County of Yolo, 2009a, pp. CO-46, CO-48). There are no known natural gas fields in this reach. Therefore the Project would have **no impact** on mineral or natural gas resources in this reach.

East of 505

Geology

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2; the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations would include consideration of these hazards; therefore, in this reach, the Project would have a **less-than-significant** impact related to seismic hazards and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPPs would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4; Project activities would not heighten the existing condition lateral spread risk of the creek. This is because the Project entails creek restoration activities aimed at stabilizing the stream banks, which

could act to minimize lateral spread risk. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

There are no known mineral resources or natural gas fields in this reach. The proposed Project would have **no impact**.

Warren

Geology

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2; the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations would include consideration of these hazards; therefore, in this reach, the Project would have a **less-than-significant** impact related to seismic hazards and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPPs would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4: Project activities would not heighten the existing condition lateral spread risk of the creek. This is because the Project entails creek restoration activities aimed at stabilizing the stream banks. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

There are no known mineral resources or natural gas fields in this reach. The proposed Project would have **no impact**.

Upper McNamara

Geology

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2; the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations would include consideration of these hazards; therefore, in this reach, the Project would have a **less-than-significant** impact related to seismic hazards and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPPs would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4; Project activities would not heighten the existing condition lateral spread risk of the creek. This is because the Project entails creek restoration activities aimed at stabilizing the stream banks, which could act to minimize lateral spread risk. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

This reach lacks mineral resources but does contain a natural gas field, Winters Gas. Project activities would not damage or otherwise impact the natural gas fields because they would take place only on the surface and would not involve deep subsurface activities. Project activities also would not prevent use or development of the natural gas fields because they would not preclude access to future development of the gas fields; therefore the Project would have **no impact** on mineral or natural gas resources in this reach.

Lower McNamara

Geology

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2: the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations would include consideration of these hazards; therefore, in this reach, the Project would have a **less-than-significant** impact related to seismic hazards and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPPs would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4; Project activities would not heighten the existing condition lateral spread risk of the creek. This is because the Project entails creek restoration activities aimed at stabilizing the stream banks. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

Like the Upper McNamara Reach, this reach lacks mineral resources but does contain a natural gas field, Winters Gas. Project activities would not damage or otherwise impact the natural gas fields because they would take place only on the surface and would not involve deep subsurface activities. Project activities also would not prevent use or development of the natural gas fields because they would not preclude access to future development of the gas fields; therefore the Project would have **no impact** on mineral or natural gas resources in this reach.

MacQuiddy (Lester)

Geology

The Great Valley Fault 4 crosses the Project Area in this reach (County of Solano, 2008a, p. HS-23, Figure HS-3). Although the fault is capable of a maximum earthquake magnitude of 6.8 Mw, it is not currently considered an active fault (County of Solano, 2008b, p. 4.7-10) and there are no mapped earthquake fault rupture hazard zones or Seismic Hazard Zones present in this segment.

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2; the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations would include consideration of these hazards; therefore, in this reach the Project would have a **less-than-significant** impact related to seismic hazards and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPPs would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4; Project activities would not heighten the existing condition lateral spread risk of the creek. This is because the Project entails creek restoration activities aimed at stabilizing the stream banks. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

Like the Upper and Lower McNamara Reaches, this reach lacks mineral resources but does contain a natural gas field, Winters Gas. Project activities would not damage or otherwise impact the natural gas fields because they would take place only on the surface and would not involve deep subsurface activities. Project activities also would not prevent use or

development of the natural gas fields because they would not preclude access to future development of the gas fields; therefore, the Project would have **no impact** on mineral or natural gas resources in this reach.

Russell Ranch

Geology

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2: the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations would include consideration of these hazards; therefore, in this reach, the Project would have a **less-than-significant** impact related to seismic hazards and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPPs would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4: Project activities would not heighten the existing condition lateral spread risk of the creek. This is because the Project entails creek restoration activities aimed at stabilizing the stream banks. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

Project activities would not damage or otherwise impact the natural gas fields because Project activities would take place only on the surface and would not involve deep subsurface activities. Project activities also would not prevent use or development of the natural gas fields because they would not preclude access to future development of the gas fields; therefore the Project would have **no impact** on mineral or natural gas resources.

Stevenson Bridge

Geology

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2; the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations would include consideration of these hazards. Therefore, in this reach, the Project would have a **less-than-significant** impact related to seismic hazards and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with section 401 Water Quality Certification and any required SWPPPs would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4: Project activities would not heighten the existing condition lateral spread risk of the creek. This is because the Project entails creek restoration activities aimed at stabilizing the stream banks. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

There are no known mineral resources or natural gas fields in this reach. The proposed Project would have **no impact**.

Glide Ranch

Geology

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2; the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations

would include consideration of these hazards; therefore, in this reach, the Project would have a **less-than-significant** impact related to seismic hazards and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPPs would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4; Project activities would not heighten the existing condition lateral spread risk of the creek. This is because the Project entails creek restoration activities aimed at stabilizing the stream banks. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

There are no known mineral resources or natural gas fields in this reach. The proposed Project would have **no impact**.

Nishikawa

Geology

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2; the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations would include consideration of these hazards; therefore, in this reach, the Project would have a **less-than-significant** impact related to seismic hazards and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPPs would

ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4; Project activities would not heighten the existing condition lateral spread risk of the creek. This is because the Project entails creek restoration activities aimed at stabilizing the stream banks. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

There are no known mineral resources or natural gas fields in this reach. In a report on aggregate resources, the DOC has mapped an MRZ-1 zone (no significant mineral deposits) in this reach (DOC, 1988, Plate 18). The proposed Project would have **no impact**.

Olmo-Hammond-UCD

Geology

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2; the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations would include consideration of these hazards; therefore, in this reach, the Project would have a **less-than-significant** impact related to seismic hazards and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPPs would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4; Project activities would not heighten the existing condition lateral spread risk of the creek. This is because the Project entails creek restoration activities aimed at stabilizing the stream banks. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

There are no known mineral resources or natural gas fields in this reach. In a report on aggregate resources, the DOC has mapped an MRZ-1 zone (no significant mineral deposits) in the western portion of this reach (DOC, 1988, Plate 18). The proposed Project would have **no impact**.

I-80 to Old Davis Road

Geology

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2; the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations would include consideration of these hazards; therefore, in this reach, the Project would have a **less-than-significant** impact related to seismic hazards and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPPs would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4; Project activities would not heighten the existing condition lateral spread risk of the creek. This is because the Project entails creek restoration activities aimed at stabilizing the stream banks. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

There are no known mineral resources or natural gas fields in this reach. The proposed Project would have **no impact**.

Old Davis Road to Mace

Geology

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2; the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations would include consideration of these hazards; therefore, in this reach, the Project would have a **less-than-significant** impact related to exposing people or structures to potential substantial adverse effects involving seismic activity and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPPs would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4; Project activities would not heighten the existing condition lateral spread risk of the creek. This is because the Project entails creek restoration activities aimed at stabilizing the stream banks. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

This reach lacks mineral resources but does contain a natural gas field, Davis Southeast Gas. This gas field is identified by the DOC and the Yolo County General Plan (DOC, 1999, Quads 8N 1E and 8N 3E; County of Solano, 2008a, pp. RS-51 to RS-52; County of Yolo, 2009a, p. CO-44, Figure CO-5). Project activities would not damage or otherwise impact the natural gas fields because Project activities would take place only on the surface and

would not involve deep subsurface activities. Project activities also would not prevent use or development of the natural gas fields because they would not preclude access to future development of the gas fields; therefore the Project would have **no impact** on mineral or natural gas resources.

Mace to Road 106A

Geology

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2; the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations would include consideration of these hazards; therefore, in this reach, the Project would have a **less-than-significant impact** related to seismic hazards and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPPs would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4; Project activities would not heighten the existing condition lateral spread risk of the creek. This is because the Project entails creek restoration activities aimed at stabilizing the stream banks. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

There are no known mineral resources or natural gas fields in this reach. The proposed Project would have **no impact**.

Road 106A to Yolo Bypass Wildlife Area

Geology

Impacts from seismic activity and landslides in this reach are the same as those generally analyzed in Impacts 3.3-1 and 3.3-2; the proposed Project would not increase existing seismic and landslide risks and would not increase long-term seismic or landslide risks. There is a small potential for inadvertent, short-term bank destabilization during construction, which could present a hazard to workers on-site. Normal grading operations would include consideration of these hazards; therefore, in this reach, the Project would have a **less-than-significant impact** related to exposing people or structures to potential substantial adverse effects involving seismic activity and landslides.

Impacts related to soil erosion in this reach are the same as those generally analyzed in Impact 3.3-2; Project activities would not increase existing erosion or increase long-term erosion risks. Project activities could result in potential short-term effects related to erosion during construction activities. Erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPPs would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Impacts related to on- or off-site, lateral spreading, subsidence, liquefaction or collapse in this reach are the same as those generally analyzed in Impact 3.3-4; Project activities would not heighten the existing condition lateral spread risk of the creek. This is because the Project entails creek restoration activities aimed at stabilizing the stream banks. The proposed Project would have **no impact** in this reach related to geologic stability.

Mineral Resources

This reach lacks mineral resources but does contain a natural gas field, Putah Sink Gas. Project activities would not damage or otherwise impact the natural gas fields because Project activities would take place only on the surface and would not involve deep subterranean activities. Project activities also would not prevent use or development of the natural gas fields because they would not preclude access to future development of the gas fields; therefore, the Project would have **no impact** on mineral or natural gas resources.

Table 3.3-2 Summary of Geologic Impacts and Mitigation Measures

Reach	Impact 3.3-1 Seismic Hazards	Impact 3.3-2 Slope Failure	Impact 3.3-3 Erosion	Impact 3.3-4 Loss of Mineral Resources	Applicable Mitigation Measures
NAWCA/Mariani	LS	LS	SM	NI	MM 3.1-1
Duncan-Giovannoni	LS	LS	SM	NI	MM 3.1-1
Winters Putah Creek Nature Park	LS	LS	SM	NI	MM 3.1-1
East of 505	LS	LS	SM	NI	MM 3.1-1
Warren	LS	LS	SM	NI	MM 3.1-1
Upper McNamara	LS	LS	SM	NI	MM 3.1-1
Lower McNamara	LS	LS	SM	NI	MM 3.1-1
MacQuiddy (Lester)	LS	LS	SM	NI	MM 3.1-1
Russell Ranch	LS	LS	SM	NI	MM 3.1-1
Stevenson Bridge	LS	LS	SM	NI	MM 3.1-1
Glide Ranch	LS	LS	SM	NI	MM 3.1-1
Nishikawa	LS	LS	SM	NI	MM 3.1-1
Olmo-Hammond-UCD	LS	LS	SM	NI	MM 3.1-1
I-80 to Old Davis Road	LS	LS	SM	NI	MM 3.1-1
Old Davis Road to Mace	LS	LS	SM	NI	MM 3.1-1
Mace to Road 106A	LS	LS	SM	NI	MM 3.1-1
Road 106A to YBWA	LS	LS	SM	NI	MM 3.1-1

Notes: NI = No Impact, LTS = Less than Significant Impact, SM = Significant but mitigable to less than significant with measures identified in this section, SU = Significant and Unavoidable, even after mitigation.

3.4 BIOLOGICAL RESOURCES

This section evaluates potential impacts to biological resources resulting from the proposed Program. Biological resources include known or potentially occurring special-status species, wildlife habitats, and vegetation communities. In preparing this analysis, publically available documents were reviewed, including the Lower Putah Creek Watershed Management Action Plan (WMAP) (EDAW, 2005) and the Habitat Assessment (Stillwater Sciences, 2015) as well as relevant databases (California Natural Diversity Database) (CNDDB), U.S. Fish & Wildlife Service (USFWS) Critical Habitat Mapper, and other resources. This section also incorporates the results of a draft wetland delineation for the Program Area (BSK, 2015a). The Habitat Assessment appears as **Appendix D** in this EIR.

The following CEQA Guidelines Appendix G biological resources topic is not addressed in this Program EIR (PEIR) because no conservation plans are applicable to the Project Area:

- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

3.4.1 Setting

Environmental Setting

Changes from Historic Conditions

Putah Creek's channel, floodplain and riparian zone are all directly influenced by the creek's hydrology. Much of the streamflow in the Program watershed is regulated by dam operations, resulting in changed riparian conditions and habitat compared to historic conditions (EDAW, 2005). Periodic high flows that maintained the channel by flushing out fine sediment, moving the gravel bed-load, and overturning the organic matter in the corridor have been substantially diminished by upstream diversion. These reduced high flows have resulted in less stream energy to create and maintain aquatic habitat complexity and new growing space for different classes of riparian vegetation.

Biological Communities

The biological communities expected or known to occur within the general Program Area, and their associated special-status wildlife species, sensitive plants, and critical habitat, are discussed in this section.

Overview of Habitat Types

Habitat within the Program Area consists of a deeply entrenched, single-thread stream channel with a few small islands and limited floodplains, within stream terraces bordered by a narrow band of transitional valley oak woodlands, surrounded by ruderal grassland and cultivated fields and orchards. The channel in the Program Area consists primarily of pools that contain slow-moving water. Human-created pools along lower Putah Creek typically have higher water temperatures and create different habitat characteristics than the natural state of the creek (Stillwater Sciences, 2015). The tributaries that enter the Program Area provide nutrients and sediment to Putah Creek. These tributaries provide additional habitat for Putah Creek species.

Habitat types transition from the most upstream reaches, just below the Putah Diversion Dam (PDD), where there is some distinct floodplain, to the leveed reaches beginning at the City of Davis, to the seasonally impounded reaches near the Yolo Bypass Wildlife Area (YBWA). Cross-sections of the Program Area identifying the change between top of bank, low-flow channel, and entrenched reaches were prepared for the Draft Ordinary High Water Mark (OHWM) and Wetland Delineation Report (BSK, 2015a). The different floodplain characteristics create the different dominant habitats throughout the Program Area. Most of Putah Creek is entrenched; these entrenched reaches typically have several internal, low terraces with different soils and vegetation. These provide internal connectivity where nutrients and species can move within and between the terraces. This connectivity and complexity of different habitat patches is critical for aquatic and riparian functions. It provides riparian aestivation habitat for special-status species such as western pond turtle (*Emys marmorata)*, and habitat for Swainson's hawk (*Buteo Swainsoni),* song sparrow (Modesto population, *Melospiza melodia*), white-tailed kite (*Elanus leucurus)* and valley elderberry longhorn beetle (VELB, *Desmocerus californicus dimorphus*). Leveed reaches are completely disconnected from the potential natural floodplain; the channels consist primarily of pools, and these reaches do not provide significant amounts of sufficient habitat for the above special-status species.

Habitat Types

The Program Area contains primarily slow-water aquatic habitat separated by shallow riffles. Aquatic habitat in the Program Area is used by a variety of resident and migratory species such as North American river otter (*Lontra canadensis)*, North American beaver (*Castor canadensis),* western pond turtle,-Chinook salmon (*Oncorhynchus tshawytscha*) and other fish species. EDAW 2004-5 surveys of habitats between the PDD and the Yolo Bypass found that over 72 percent of aquatic habitat was comprised of pool habitat, 23 percent of run habitat, and 5 percent of riffle habitat (EDAW 2005, pp. 5-47-5-48). Much

of the pool habitat is a result of historic in-channel gravel mining. Some reduction in pool habitat and increase in run habitat has resulted from restoration projects implemented since 2005 (e.g., Winters Putah Creek Nature Park restoration). The extensive pools limit available salmonid spawning habitat and increase water temperatures, both of which are adverse to native fish species such as Chinook salmon, and beneficial for non-native species such as largemouth bass (*Micropterus salmoides*).

As discussed in Section 3.1, *Hydrology*, gravel recharge in the Program Area has been substantially reduced compared with natural conditions, because coarser sediments have been captured behind dams or in the former gravel mining pits along the channel. This has deprived the creek of necessary materials to build riffles and other spawning beds.[1] As a result, spawning gravel for salmonids downstream of the PDD is limited, particularly for Chinook salmon. Surveys estimate that only approximately 1.9 miles of Chinook salmon spawning habitat exists within the approximately 24.2 miles of Putah Creek between the Yolo Bypass and the PDD (Stillwater Sciences, 2015, p. 10).

Relative to the rest of the Program Area, a unique floodplain habitat exists along the lower reaches (Mace to Road 106A project reach and Road 106A to Yolo Bypass Wildlife Area project reach). During high flow events, when the Yolo Bypass is inundated and high flow events occur in Putah Creek, the Bypass floodplain habitats are connected to the Putah Creek channel. In such seasonal flood periods, the floodplain habitat of the Yolo Bypass is used by out-migrating juvenile Chinook salmon for rearing.

Riparian habitat is found parallel to the aquatic and wetland habitats throughout the Program Area. This habitat is largely dependent on the water flow in relation to the edges of the creek. Riparian habitat throughout the Program Area contains special-status species such as VELB, western pond turtle, song sparrow (Modesto population), white-tailed kite, and Swainson's hawk. Non-special-status species of interest found throughout riparian habitat include North American beaver and North American river otter. Both of these species move between aquatic and riparian habitat. In addition to the aforementioned special-status and non-special-status species of interest, a wide variety of regionally abundant fauna can be found within the riparian habitat of the Program Area.

[1] A Central Valley river analysis for spawning habits of Chinook salmon revealed that Chinook salmon preferentially use riffles with gravel for spawning (Pasternack, 2010, p. 15).

The Program Area includes approximately 556 acres of National Wetland Inventory defined wetlands. These wetlands are found mainly within the channel, with one identified adjacent wetland located in the Duncan-Giovannoni Reach. The riparian habitat consists of these wetlands.

Terrestrial habitat is found in the upper terraces of the reaches upstream of the Olmo-Hammond-UC Davis project reach of the Program Area, and outside of the incised channel below this reach. Terrestrial habitat many contain special-status species such as VELB, Swainson's hawk, song sparrow (Modesto population) and white-tailed kite.

Plant and Animal Species and Communities

Plant Communities

Most reaches are dominated by non-native invasive weeds in at least one, and typically two, canopy layers. The classified plant community types in the Program Area are mixed riparian forest, disturbed riparian woodland and riparian and transitional valley oak woodland. Less contiguous and less common plant community types include narrow fringes of riverine emergent wetlands in slow-moving sections of the creek (small patches of cattails [*Typha* spp.] and tules [*Schoenoplectus* spp.]), and small patches of annual grassland dominated by invasive annual plants (Mediterranean barley [*Hordeum marinum* subsp*. gussoneum*] and slender oat [*Avena barbata*]). Other plant community types include ruderal associations and agricultural crops, as well as one seasonal wetland.

The following plant community descriptions are derived largely from the WMAP (EDAW, 2005), and are considered representative of current plant community conditions:

<u>Mixed Riparian Forest</u>

The most common plant community in the lower Putah Creek riparian corridor is Mixed Riparian Forest. The width and complexity of Mixed Riparian Forest varies and is characterized by one or more well-developed canopy layers, consisting of an upper layer of tall Fremont cottonwood trees (*Populus fremontii*); intermediate canopy layers composed of valley oak, (*Quercus lobata*), Oregon ash (*Fraxinus latifolia*), Goodding's willow (*Salix gooddingii*), box elder (*Acer negundo var. californica*), and live oak (*Quercus wislizeni*); and a discontinuous shrub layer comprised of blue elderberry (*Sambucus nigra* ssp. *caerulea*), button bush (*Cephalanthus occidentalis*), Himalayan blackberry (*Rubus armeniacus*), wild rose (*Rosa californica*), poison oak (*Toxicodendron diversilobum*), and wild grape (*Vitis californica*). In some areas of the creek, a sub-canopy layer consists of

dense riparian vegetation dominated by willow species including arroyo willow (*Salix lasiolepis*) and sandbar willow (*S. exigua*). Many invasive plants have colonized the Mixed Riparian Forest, including but not limited to tamarisk (*Tamarix* spp.), arundo (*Arundo donax*), and tree-of-heaven (*Ailanthus altissima*) in the subcanopy and shrub layers, and Northern California black walnut hybrids (*Juglans spp.*) in the upper canopy (EDAW, 2005).

Disturbed Riparian Woodland

Disturbed Riparian Woodland is dominated by invasive tree species such as Eucalyptus (*Eucalyptus* spp.) and tree-of-heaven. Eucalyptus leaves and roots alter soil chemistry and inhibit the germination and growth of other species. Invasive plants can quickly proliferate and displace native plant populations and contribute to a loss of habitat to native wildlife dependent on those plants. Invasive plants can also affect the balance of natural processes such as the frequency and extent of fires, flooding, sediment transport, erosion and channel formation, and nutrient cycling. Such alterations can contribute to further habitat loss and damage human infrastructure and land uses causing economic hardship and safety concerns (EDAW, 2005). Disturbed Riparian Woodland can also include native tree, shrub, and herbaceous species such as cottonwood, Goodding's willow, alder (*Alnus* spp.), Oregon ash, box elder and walnut hybrids (Stillwater Sciences, 2015, pp. 8-9).

Agricultural Crops

Agricultural crops make up the vast majority of vegetation either just within or adjacent to the top of the creek bank within the Program Area. Typical agricultural crops include walnut (*Juglans* spp.) and almond (*Prunus* spp.) orchards, vineyards (*Vitis* spp.), barley (*Hordeum vulgare*), wheat (*Triticum* spp.), tomatoes (*Solanum lycopersicum*), safflower (*Carthamus tinctorius*), milo (*Sorghum* spp.), ryegrass (*Lolium* spp.), Japanese millet (*Echinochloa esculenta*), and vetch (*Vicia* spp.) (Stillwater Sciences, 2015, p. 10).

Annual Grasslands

Small patches of Annual Grasslands are distributed throughout the Program Area in places that are slightly upland and not used as cropland. These areas can support non-wetland species and are typically grazed by livestock in the spring and summer. Common species include a variety of non-native grasses and forbs such as medusahead (*Elymus caput-medusae*), soft chess (*Bromus hordeaceus*), filaree (*Erodium botrys*), Mediterranean barley, slender oat, ripgut brome (*Bromus diandrus*), and rose clover (*Trifolium hirtum*). Annual Grasslands may occasionally contain small areas of perennial native grasses, including purple needlegrass (*Stipa pulchra*) and creeping wildrye (*Elymus triticoides*)

(Stillwater Sciences, 2014, p. 15). These patches of native grasslands are very small and scattered in areas with relict floodplains, and prior restoration areas.

Riverine Wetland

Riverine Wetlands within the Program Area are perennial wetlands along the creek channel and lower bank, instream wetlands that formed on sand or gravel bars, and patches of emergent freshwater marsh. Riverine Wetlands are influenced by frequent flooding, scour, and seasonal and annual water level fluctuations.

In areas most clearly defined as freshwater emergent marsh, the habitat type is dominated by cattails, tules, and California bulrush (*Schoenoplectus californicus*). Common associates in these and more seasonal types of Riverine Wetlands include smartweed (*Polygonum* spp.), umbrella sedge (*Cyperus eragrostis*), sedges (*Carex* spp.), common rush (*Juncus effusus*), mugwort (*Artemisia douglasiana*), cocklebur (*Xanthium strumarium*), rice cutgrass (*Leersia oryzoides*), canary grass (*Phalaris* spp.), field mint (*Mentha arvensis*), and western goldenrod (*Euthamia occidentalis*) (Stillwater Sciences, 2015, p. 9).

Seasonal Wetland

One Seasonal Wetland was identified within the Program Area. This habitat is dominated by invasive species including rabbitsfoot grass (*Polypogon monspeliensis*), Italian ryegrass (*Festuca perennis*), curly dock (*Rumex crispus*), perennial pepperweed (*Lepidium latifolium*), and dallisgrass (*Paspalum dilitatum*) (Stillwater Sciences, 2014, p. 16).

Ruderal

Ruderal vegetation occurs throughout the Program Area in the riparian corridor and particularly along the edge of agricultural fields. These areas are generally disturbed by adjacent land uses (farming, roadsides) and are therefore dominated by non-native herbs such as yellow starthistle (*Centaurea solstitialis*), milk thistle (*Silybum marianum*), Italian thistle (*Carduus pycnocephalus*), prickly lettuce (*Lactuca serriola*), mustard species (*Brassica nigra* and *Hirschfeldia incana*), soft chess, ripgut brome, and wild oat (*Avena fatua*) (EDAW 2005, as referenced in Stillwater Sciences, 2015, p. 9).

Riparian Shrublands

Riparian shrubs and shrub complexes occur throughout the Program Area along the channel and within the streambed on gravel bars. Dominant species in this shrub dominated habitat type include sandbar willow, arroyo willow, Gooding's willow, and red willow. Sometimes the early-successional stage stands of mixed riparian forest (e.g.,

arroyo willow) are considered part of Riparian Shrubland because of the shrub-like low stature of the trees. Stands typically lack a developed understory, but may support an understory of wild rose, wild grape, and various non-native grasses. Riparian Shrublands can be overtopped by Himalayan blackberry or English ivy (EDAW, 2005 as referenced in Stillwater Sciences, 2015, p. 8).

Special-Status Vegetation Alliances

The vegetation alliances found within the Program Area have global rankings and/or state rankings that rank their rarity, threat level, and viability trends. Global rankings reflect the overall status of an alliance element throughout its global range, while state rankings reflect the imperilment status of an element within California only (CNPS, 2001, pp. 5-6). Rankings are critical at the G1, G2, S1, and S2 levels. These ranking descriptions are as follows:

A. G1 = Critically Imperiled—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.

B. G2 = Imperiled—At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

C. S1 = Critically Imperiled—Critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.

D. S2 = Imperiled—Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province (CNPS, 2001, pp. 5-6).

The following vegetation alliances and their rankings are found throughout the Lower Putah Creek Program Area (CDFG, 2010; Stillwater Sciences, 2015):

- *Quercus lobata* (valley oak woodland) Alliance:

  Valley Oak Woodland: (*G3 S2*)

- *Populus fremontii* (Fremont cottonwood forest) Alliance:

  Great Valley Cottonwood Riparian Forest (*G2 S2*)

- *Sambucus nigra* (Blue elderberry stands) Alliance:

  Elderberry Savanna: (*G2 S2*)

Special-Status Species

In general, special-status species include plants and wildlife that are:

- Listed and protected under the Federal and/or California Endangered Species Acts
- Protected under other federal and/or state laws and regulations (CDFG, 2011, pp. 1-2; USACE, 2006; p. 1)

Specifically, special-status species are those that are officially designated as "threatened" or "endangered," species by USFWS; are officially designated as "rare," "threatened," "endangered," or "candidate" species by California Department of Fish and Wildlife (CDFW); are listed as "Fully Protected" (FPS) or "Species of Special Concern" (SSC) by the CDFW; or are considered rare, threatened, or endangered under the conditions of Section 15380 of the CEQA Guidelines, such as plant taxa identified on lists 1A, 1B, 2A, 2B, 3, and 4 in the California Native Plant Society (CNPS) Inventory of Rare and Endangered Vascular Plants of California. Some species also may be designated as species of special concern by local jurisdictions (often due to limited data regarding distribution, which precludes listing them as threatened or endangered at the state or federal level).

This analysis compiled a list of special-status species that have potential to occur in the Program Area, which is provided in **Appendix E**. Following the compilation, the species habitat requirements were compared to available habitat and relative habitat factors such as density, age, size, nearest occurrence, and others, to create a consolidated list of species that have a likelihood of occupying the Program Area.

Special-Status Species Likely to be Present in the Program Area

Table 3.4-1 below lists the special-status species that are likely to be present in the Program Area, describes their status and habitat, and lists the rationale for why they may be present. The species that may be present in the Program Area were determined by reviewing existing species data and an analysis of habitat conditions. All of the special-status species likely to occur in the Program Area are animal species; no special-status plant species are likely to occur in the Program Area (also see Figures 3.4-1 and 3.4-2).

The following species have a high likelihood to be present within the Program Area: Pacific lamprey (*Entosphenus tridentatus)*, Chinook salmon, song sparrow (Modesto population), Swainson's hawk, white-tailed kite, valley elderberry longhorn beetle, western pond turtle, and western red bat (*Lasiurus blossevillii*).

Table 3.4-1 Special-Status Animal Species Present in the Program Area

Common Name	Scientific Name	Status Fed/ State	Habitat	Rationale
Pacific lamprey	*Entosphenus tridentatus*	FSC/ SSC	Cold, clear water for spawning and incubation. Require gravel to build nests, and soft sediment to burrow during rearing.	Pacific lamprey have been reported to maintain small runs in Putah Creek (Moyle, 2002). Ammocoetes and juveniles are expected to be present year-round upstream of approximately Highway 505.
Central Valley fall-run Chinook salmon	*Oncorhynchus tshawytscha*	FSC/ SSC	Freshwater streams with cold water and available spawning gravel. Typically rear in freshwater for one or more years before migrating to the ocean.	Within species known range. Rearing and migratory habitat is present in Putah Creek with observations documented in the Yolo Bypass and Putah Creek (Stillwater Sciences 2015). Fall-run Chinook may occur within the Program area from fall through early summer.
Song sparrow (Modesto population)	*Melospiza melodia*	--/SSC	Dense vegetation, water source, semi-open canopies to allow light and exposed ground or leaf litter.	CNDDB has mapped this species to within 1 mile of the Program Area. Habitat within the Program Area is suitable for use by this species. *Melospiza melodia* are known to be widespread and successfully breeding throughout the Program Area (M. Truan, Pers. Comm.).
Swainson's hawk	*Buteo Swainsoni*	--/ST	Open grassland areas with scattered trees. Nesting occurs in trees and shrubs that are isolated, clumped or part of shelterbelts.	Habitat is suitable for Swainson's hawk nesting and foraging. CNDDB maps multiple recorded occurrences of this species within the Program Area. It is likely that Swainson's hawk would be present within all reaches of the Program Area.
white-tailed kite	*Elanus leucurus*	--/FP	Oak woodlands or trees along marsh edges. Typical trees include eucalyptus, cottonwoods, toyons, and coyote brush.	Program Area contains mainly foraging habitat for this species. CNDDB maps this species within the Program Area. White-tailed kite has been documented as breeding within the Program Area, although this is not common or widespread (M. Truan, Pers. Comm.). It is possible that this species may be present within all reaches of the Program Area.
valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT/--	Riparian habitats and associated upland habitats where elderberry (*Sambucus* spp.) grows.	CNDDB maps this species within the Program Area and the species' host plant (i.e., suitable habitat) exists throughout the Program Area. It is possible that valley elderberry longhorn beetle would be present within all reaches of the Program Area.
western pond turtle	*Emys marmorata*	--/SSC	Calm waters, such as streams or pools,	Habitat is suitable for nesting and foraging. CNDDB maps this species within the

Common Name	Scientific Name	Status Fed/ State	Habitat	Rationale
			with vegetated banks and log or rock basking sites.	Program Area. The species is known to be relatively widespread and common throughout the Program Area (Truan et al. 2010). It is possible that western pond turtle would be present within all reaches of the Program Area.
western red bat	*Lasiurus blossevillii*	--/SCC	Riparian forest, woodlands near streams, fields, and orchards.	Suitable habitat is present within the work area and five observations have been made of western red bat within the Program Area in 2016 (M. Truan, Pers. Comm.).

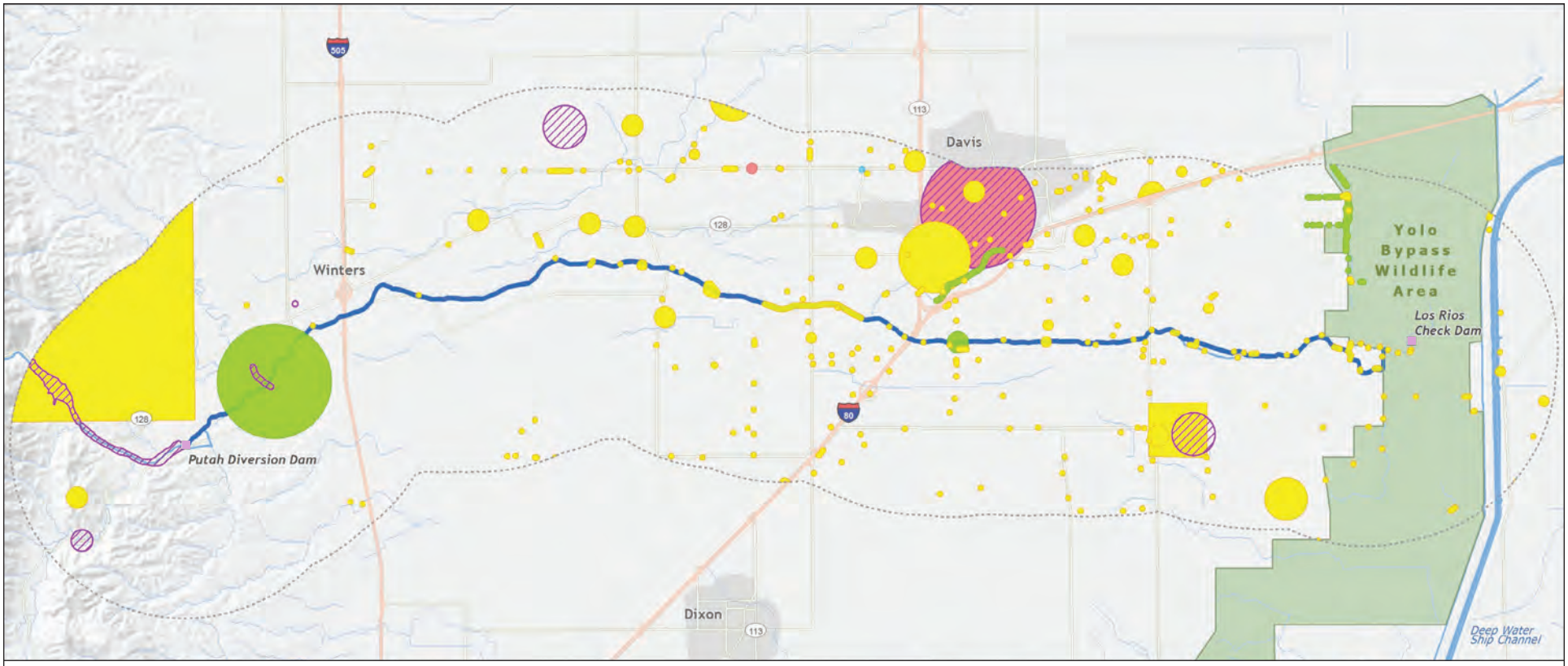
It should be noted that Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*), vernal pool fairy shrimp (*Branchinecta lynchi*), steelhead (*Oncorhynchus mykiss)*, least Bell's vireo (*Vireo Bellii pusillus*), tricolored blackbird (*Agelaius tricolor*), northern harrier (*Circus cyaneus*), western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), giant garter snake (*Thamnophis gigas*), California red-legged frog (*Rana draytonii)*, and pallid bat (*Antrozous pallidus*) have been identified regionally, but only occasionally, and in habitat types different than what is found in the vast majority of the Program Area. These species are considered to have moderate, low, or no likelihood to be present due to lack of suitable habitat or lack of documented occurrences. Species noted as being unlikely to occur within the Program Area are considered to be beyond their known range or to have low habitat suitability for reproduction, cover, and/or foraging (Appendix E). The following are the characteristics and habitats of special-status species that have been identified regionally in the area. As stated above, not all of these species are likely to be present in the Program Area. Information on species determined not to be present is included as background information.

Raptors and Migratory Birds

Active bird nests are typically protected under the Migratory Bird Treaty Act (MBTA) and Section 3503.5 of the California Fish and Game Code (CDFGC), which prohibits their disturbance or destruction, with certain exceptions.

Song Sparrow (Modesto Population) (*Melospiza melodia)*

Song sparrow can be found in the north-central portion of the Central Valley, with the densest populations in the Butte Sink area of the Sacramento Valley and the Sacramento-San Joaquin River Delta (Shuford and Gardali, 2008). The species prefers emergent freshwater marshes dominated by tules, and requires dense vegetation to supply cover for nest sites, a source of standing or running water, semi-open canopies to allow light,



CNDDB Animal Occurrences
(with map code and species)

- Invertebrate
  - Valley elderberry longhorn beetle
  - Vernal pool fairy shrimp
  - Vernal pool tadpole shrimp
- Amphibian
  - California tiger salamander
- Reptile
  - Giant garter snake
  - Western pond turtle
- Bird
  - American perigrine falcon
  - Burrowing owl
  - Least Bell's vireo
  - Song sparrow ("Modesto" population)
  - Swainson's hawk
  - Tricolored blackbird
  - White-tailed kite
  - Yellow-breasted chat
- Mammal
  - American badger
  - Pallid bat

- 3-mile buffer
- Urban Areas
- Yolo Bypass Wildlife Area
- Dams
- Upper Reach
- Streams and Rivers
- Canal/Ditch

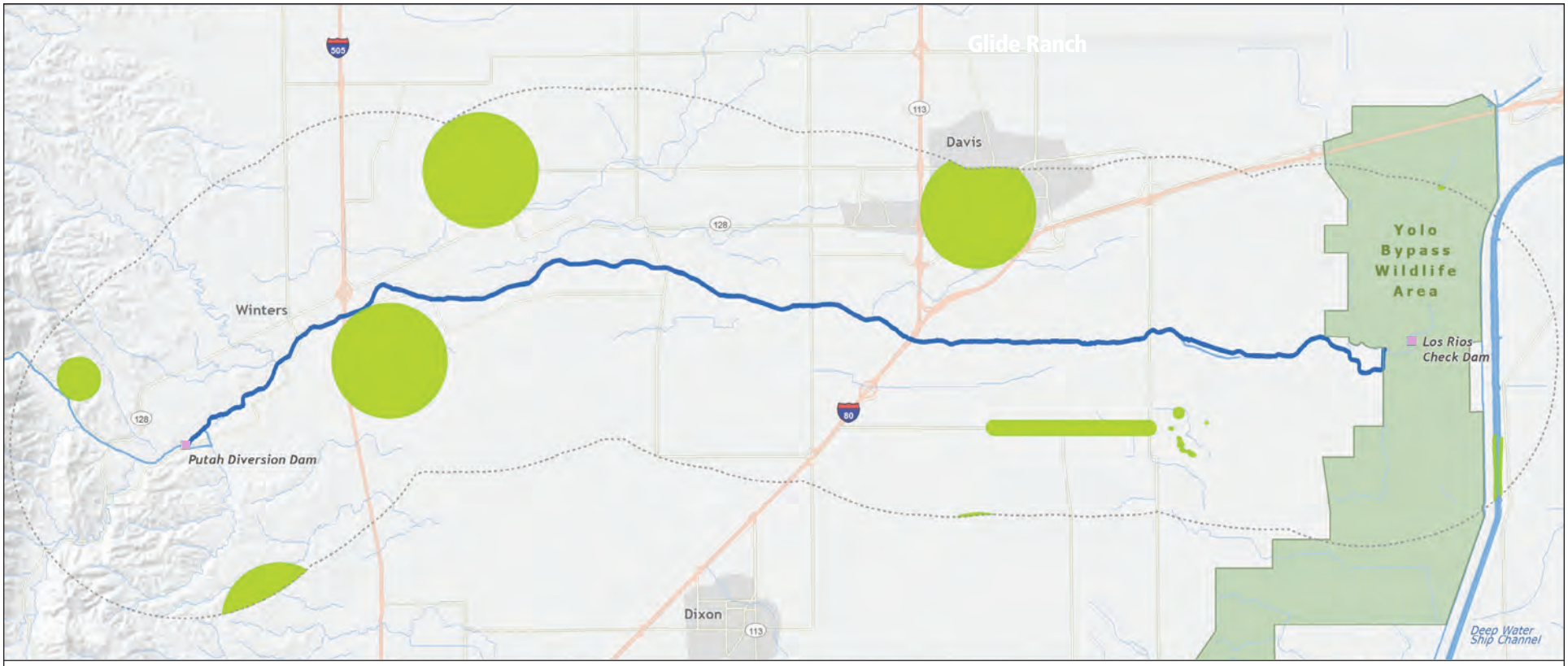
N

0 1 2 3 4 5
MILES

Figure 3.4-1

Special Status Animals in Project Vicinity

Source: Stillwater Sciences



CNDDB Plant Occurrences

- Alkali milk-vetch
- Baker's navarretia
- Colusa grass
- Crampton's tuctoria or Solano grass
- Ferris' milk-vetch
- Keck's checkerbloom
- Mason's lilaeopsis
- Round-leaved filaree
- San Joaquin spearscale
- Suisun Marsh aster

- 3-mile buffer
- Urban Areas
- Yolo Bypass Wildlife Area
- Dams
- Upper Reach
- Streams and Rivers
- Canal/Ditch

N

0 1 2 3 4 5

MILES

Figure 3.4-2

Special Status Plants in Project Vicinity

Source: Stillwater Sciences

and exposed ground or leaf litter for foraging (Shuford and Gardali, 2008). This species has the potential to be present in the Program Area, especially in the downstream reaches east of Interstate 80 (I-80). This species is a CDFW species of special concern (SSC) (CDFW, 2016).

Swainson's Hawk (*Buteo Swainsoni)*

Swainson's hawk primarily nest in a few species of trees, including oaks, cottonwoods, sycamores, or willows (Schlorff and Bloom, 1983; CDFG, 1994 as referenced in Stillwater Sciences, 2015). These species of trees are found throughout the entire Program Area. While not necessarily a riparian species, nesting trees associated with Swainson's hawk are found in riparian areas, usually associated with main river channels (Bloom, 1980; Estep, 1989, as referenced in Stillwater Sciences, 2015). This species has been observed within the Program Area. This species is classified "threatened" under California Endangered Species Act (CESA) (CDFW, 2016).

White-tailed Kite (*Elanus leucurus)*

White-tailed kite is a resident species throughout central and coastal California (Stillwater Sciences, 2015). This species is found primarily in riparian corridors and prefer habitat with lowland grasslands, tree groves for perching and nesting, and open areas that support small mammals (Stillwater Sciences, 2015). White-tailed kite is a fully protected species by CDFW (CDFW, 2016). This species is present within the Program Area.

Least Bell's Vireo (*Vireo Bellii pusillus*)

Least Bell's vireo prefer habitat that has dense riparian shrubs near flowing water or dry watercourses in the desert. The Program Area does contain riparian shrubs and habitat suitable for this species. Very few observations of this species have been documented in the region. There are three documented occurrences of individuals within the Program Area (Trochet et al. *In Press*, Dybala et al. 2015). This species has the potential to be present within the Program Area, but it is unlikely this species would be nesting within the Program Area. This species is both federally and state "endangered" (CDFW, 2016).

Tricolored Blackbird (*Agelaius tricolor*)

This species is a year-round resident in California, where it is largely endemic. Nesting colonies of tricolored blackbirds are protected as a candidate species for listing under the CESA (CDFW, 2016). The large nesting colonies typically occur within protected stands of cattails, tules, blackberry brambles, or willows, and near open, accessible water (Beedy and Hamilton, 1997; Hamilton 2004). There may be suitable nesting habitat in expansive marsh vegetation or large blackberry thickets along Putah Creek. There have been eight

documented sightings of tricolored blackbird during surveys reported by Truan et al. (2010) from 1997 to 2010, though their surveys were not designed to detect tricolored blackbird in numbers. Tricolored blackbirds were observed at Los Rios Farms, Putah Creek Sinks, Mace Boulevard, and the Center for Land-based Learning (Truan et al., 2010). However, no nesting colonies have been found within the riparian zone immediately adjacent to Putah Creek, and due to limited preferred nesting habitat available it is unlikely any nesting colonies will be present within the Program Area.

Northern Harrier (*Circus cyaneus*)

Northern harrier is a SSC when nesting (CDFW, 2016). Northern harrier has been observed throughout the Program Area (eBird, 2014). Truan et al. (2010) reports most sightings in the I-80 to Old Davis Road Reach and at UC Davis Picnic Grounds. Breeding also was documented in the I-80 to Old Davis Road Reach (Truan et al., 2010). However, it is unlikely this species nests within the Program Area because there is very limited ground-nesting habitat with preferred vegetation types available within the riparian corridor.

Western Yellow-Billed Cuckoo (*Coccyzus americanus occidentalis*)

Western yellow-billed cuckoo is federally threatened, and is state-listed as endangered (CDFW, 2016). On August 15, 2014, USFWS proposed to designate critical habitat in California, which does not include areas along Putah Creek (Stillwater Sciences, 2015). The western yellow-billed cuckoo is presently a rare migrant in Yolo County. Because individual western yellow-billed cuckoos have been documented within the Program Area, which overlaps with their historical range, this species has potential to occur, but is not expected to nest, within the Program Area.

Invertebrates

Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus)*

The VELB is found throughout the Program Area. This species is primarily hosted in elderberry (*Sambucus* spp.) plants. Identification of VELB typically is performed through an examination of boreholes on elderberry plants. This species has a high occurrence potential within the Program Area, especially in the upstream reaches west of I-80 (Stillwater Sciences, 2015). This species is federally listed as “threatened” (CDFW, 2016).

Vernal Pool Fairy Shrimp (Branchinecta lynchi)

The vernal pool fairy shrimp is federally threatened (CDFW, 2016). They are found in vernal pools and sandstone rock outcrop pools. The vernal pool fairy shrimp does not

occur in areas subject to flooding from rivers or other waterways. There is no suitable habitat present within the Program Area for this species.

Reptiles

Western Pond Turtle (*Emys marmorata*)

Western pond turtle lives in a variety of habitats, including streams, rivers, estuaries, ponds, marshes, and lakes, and exhibits plasticity in habitat use (Cook and Martini-Lamb 2004). Despite being a habitat generalist, western pond turtle numbers have declined throughout its range, primarily due to loss of habitat via urbanization and conversion to agriculture (Spinks et al. 2003). Essential habitat features for western pond turtle include areas with slow moving water and basking sites including exposed logs, rocks, and emergent vegetation (Cook and Martini-Lamb 2004). Additionally, the species requires underwater cover to protect itself from predators (Stillwater Sciences, 2015). This species has a status of SSC under CDFW (CDFW, 2016). This species has been documented throughout much of the Program Area and therefore has potential to be present.

Giant Garter Snake (*Thamnophis gigas*)

The giant garter snake prefers sloughs, canals, and low gradient streams for habitat. This species is also found in ditches surrounding agricultural fields. This species is both federally and state "threatened" (CDFW, 2016). The species has designated critical habitat approximately 12 miles to the northeast of the Program Area. It is unlikely this species will be present in the Program Area due to the lack of recent observations and poor habitat quality where potentially suitable habitat occurs.

California Red-legged Frog (*Rana draytonii*)

The California red-legged frog is largely restricted to coastal drainages on the Central Coast of California and in the Sierra foothills. They prefer still or slow moving water with emergent and overhanging vegetation. The Program Area does not provide suitable habitat due to incised channels and lack of significant adjacent wetlands. The Program Area is outside of the range of the California red-legged frog and the nearest critical habitat is more than 8 miles from the Program Area.

Fish

Chinook salmon require water temperatures between 42.5 and 57.5°F for successful spawning, egg incubation, and fry development, while optimal immigration and holding temperatures range from 46 to 52°F (NOAA, 2014). The preferred water temperature range for steelhead spawning is reported to be 30°F to 52°F (CDFW, 2000, as referenced

in NOAA, 2014). As described in Section 3.2, *Water Quality*, low flow levels and large pools in Putah Creek lead to solar heating of stream flows and result in typical summer stream temperatures that exceed 68°F at Highway 505, are near or above 77°F at I-80, and continue to warm downstream (EDAW, 2005, pp. 5-11). In addition, high water temperatures limit the amount of dissolved oxygen (DO) that the stream can carry. Therefore, DO also typically decreases as water flows downstream through the Program Area.

Fish migration into the Program Area from upstream is impeded by Monticello Dam and Putah Diversion Dam (PDD). Within the Program Area, there is a fish passage barrier downstream at Road 106A that may limit the ability for migratory fish to travel upstream. Fish migration in the Program Area also is affected by seasonal obstructions caused by seasonal operation of the Los Rios Check Dam. The flashboards at this dam are removed typically on December 1st and installed on April 1st (Stillwater Sciences 2015, p. 13). Regulated, attraction pulse flows are timed to facilitate upstream migrations after the barrier is removed.

Steelhead – California Central Valley DPS (*Oncorhynchus mykiss*)

Central Valley steelhead, is a federally listed threatened species. Central Valley steelhead seasonally migrate from tributaries like Putah Creek, to the Sacramento River and out to the Pacific Ocean. Central Valley steelhead typically enter fresh water from August through April to spawn. The juvenile steelhead migrate to the ocean in the spring and early summer (NOAA 2014, p. 49). This species could be within the Program Area only for a very limited timeframe, specifically from December 1st, and will typically have exited the Program Area prior to the installation of the flashboards at the Los Rios Check Dam on April 1st. Although steelhead have been observed on the Yolo Bypass during flooding events, there has been no confirmed documentation of steelhead in Putah Creek since 1959, when the Monticello Dam was constructed. The species is unlikely to be present within the Program Area during Program activities.

Central Valley Fall-run Chinook salmon (*Oncorhynchus tshawytscha*)

Central Valley fall-run Chinook salmon are anadromous fish that migrate upstream as adults to spawn in freshwater streams, and migrate downstream as juveniles to physically develop in the ocean. This species is classified as SSC (CDFW, 2016). This species, while not abundant, are commonly found within the Program Area. Spawning, rearing, and migratory habitat is present within the Program Area and fall-run Chinook salmon occur in Putah Creek from fall through spring.

Pacific Lamprey (*Entosphenus tridentatus*)

The Pacific lamprey rears in freshwater before migrating to the ocean, where it grows to full size prior to returning to natal streams to spawn. This species is classified as an SSC (CDFW, 2016). Pacific lampreys have been reported to maintain small runs in Putah Creek (Moyle, 2002). Adults are expected to migrate upstream into the Program Area between December and early April, when the Los Rios Check Dam is open, and continue to migrate upstream to spawn between March and July. The larval stage (ammocoetes) and juveniles are expected to occur throughout the Upper Reach upstream of the Highway 505 bridge year-round, and may occur downstream of Highway 505 when water temperatures are suitable. Because Pacific lamprey have been documented within Putah Creek, and may occur year-round, this species has a high occurrence potential within the Program Area.

Mammals

Western Red Bat (*Lasiurus blossevillii*)

The western red bat is a wide-ranging migratory bat species, common throughout western North America through Central America and into the northern regions of South America. The Central Valley is known to be an area of primary importance for breeding populations of western red bat. Western red bat has been detected at five locations within riparian forest habitat in the Program Area (M. Truan, Pers. Comm.). This species has a status of SSC under CDFW (CDFW, 2016). The western red bat has the potential to occur within the riparian forest habitat found within the Program Area.

Pallid Bat (*Antrozous pallidus*)

The Pallid Bat is found throughout Western North America, occupying a range of habitat including coniferous forests, rocky canyons, old farmland, and desert. In Northern California, Pallid bats are primarily found in oak woodland habitat (Bolster, 1998). This species has a status of SSC under CDFW (CDFW, 2016). The Pallid Bat may use riparian tree hollows as roosting habitat, and as such, has the potential to be present within the Program Area throughout all reaches.

Plants

Baker's Naverretia (*Navarretia leucocephala* ssp. *bakeri*)

Baker's navarretia is found in cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, and vernal pools. This species is classified as "1B-rare, threatened, or endangered in California or elsewhere" by California

Native Plant Society. The Program Area has suitable habitat for this species. However, during numerous surveys of the Program Area, this species has not been identified. This species is unlikely to be present within the Program Area.

Non-Special Status Species of Interest within the Program Area

Fish

As a result of temperature and dissolved oxygen patterns in Putah Creek, the fish community in the Program Area downstream of Pedrick Road (Olmo-Hammond-UC Davis Reach) is dominated by warm-water exotic species (TRPA 2010 as referenced in Stillwater Sciences, 2015, p. 16). Upstream of Pedrick Road, in the cooler reaches of the Program Area, the fish community is dominated by native species (TRPA, 2010, as referenced in Stillwater Sciences, 2015, p. 16). Below are descriptions of a few native fish species of special interest found within the Program Area:

Sacramento Sucker (*Catostomus occidentalis*)

The Sacramento sucker is a native species that is found within the Program Area, primarily in the cooler water western reaches, west of I-80. Suitable habitat consists of streams, lakes, and mild estuarine environments that have cool temperatures and moderate elevations. The species is found in pools, runs, and riffles with vegetation or rocks to provide cover from predators (UCDANR, 2015). This is not a special-status species.

Tule Perch (*Hysterocarpus traskii*)

The tule is a native species that is found within the Program Area, primarily in the cooler water western reaches, west of I-80. Like many native California fish species, tule perch prefer cool, turbid water (Moyle 2002). They can be found along the Central Valley floor in lakes, sloughs, streams, and rivers lined with aquatic vegetation and overhanging riparian vegetation (UCDANR, 2015). A unique species as the only freshwater surfperch, tule perch give birth to live young. This is not a special-status species.

Rainbow trout (*Oncorhynchus mykiss*)

The rainbow trout is a native species that is found within the Program Area, primarily in the western most reaches, west of Stevenson Bridge. Rainbow trout are a cool water species that can be found within streams, rivers, and lakes throughout California where suitable cold-water habitats occur (Moyle 2002). The species is a generalist species that eats a wide variety of forage. They are a highly sought-after game species for recreational fishing. This is not a special-status species.

Mammals

North American Beaver (*Castor canadensis)*

Beavers are common and widespread throughout the Program Area (M. Truan, Pers. Comm.). This species is semi-aquatic and prefers riparian areas with flowing water. North American beaver is not a special-status species.

North American River Otter (*Lontra canadensis)*

The North American river otter is a semiaquatic species found throughout North America. The species prefers habitat near water's edge such as rivers, lakes, swamps, coastal shoreline, tidal flats, or estuaries. River otters are common and widespread throughout the Program Area. Their populations appear to be increasing in recent years, likely due to establishment of permanent flows in Putah Creek (M. Truan, Pers. Comm.). This species has the potential to be present within the Program Area. North American river otter is not a special-status species.

American mink (*Neovison vison*)

The American mink is a semiaquatic species found throughout North America and is not a special-status species. Mink live along lakes, rivers, streams, and densely vegetated areas in marshes. Populations of this species, like the North American river otter, appear to be increasing in recent years, likely due to establishment of permanent flows in Putah Creek (M. Truan, Pers. Comm.).

Critical Habitat

The USFWS Critical Habitat Mapper does not identify any critical habitat for special-status species within or near the Program Area (USFWS, 2014). The nearest critical habitat for any species is approximately 1.45 miles south of the Mace Road to Road 106A Reach. This area contains Colusa grass, Solano grass, and vernal pool tadpole shrimp critical habitat. Critical habitat for California red-legged frog is designated approximately 8.1 air miles to the southwest of the Program Area, approximately 10 miles upstream of Monticello Dam (USFWS, 2014). Vernal pool tadpole and fairy shrimp critical habitat has been designated approximately 15 miles south of the Program Area, in a vernal pool complex separated from the Program Area by I-80 and developed agriculture lands.

Wildlife Corridors

Wildlife corridors refer to established migration routes commonly used by resident and migratory species for passage from one geographic location to another. Corridors are

present in a variety of habitats and link undisturbed areas that would otherwise be fragmented. Maintaining the continuity of established wildlife corridors is important to sustain species with specific foraging requirements, preserve to species distribution potential, and retain diversity among wildlife populations. Therefore, wildlife corridors are considered a sensitive resource. The Program Area is an established wildlife corridor.

Biological Resources by Reach

General biological conditions for each project reach are described below. Habitat types generally observed within the Program Area occur parallel to the channel and include aquatic, riparian, and terrestrial habitats. There are spatial variations in how much of each habitat type occurs in each reach, as described below. **Table 3.4-2** below lists the project reaches in or near which the species listed above, and other notable species, such as giant garter snake, least Bells's vireo, and Baker's navarretia have been observed at some point in time and documented in the CNDDB database.

Table 3.4-2 Species Observed by Project Reach

Reach	Baker's Navarretia	Valley Elderberry Longhorn Beetle	Western Pond Turtle	Giant Garter Snake	Least Bell's Vireo	Swainson's Hawk	White-Tailed Kite	Western Red Bat
NAWCA/Mariani		✓+/-			✓	✓	✓	
Duncan – Giovannoni		✓	✓			✓	✓	
Winters Putah Creek Nature Park		✓	✓			✓	✓	✓
East of 505	✓+/-					✓		✓
Warren						✓	✓	✓
Upper McNamara			✓			✓	✓	
Lower McNamara			✓			✓	✓	
MacQuiddy (Lester)						✓		
Russell Ranch			✓			✓	✓	✓
Stevenson Bridge						✓	✓	
Glide Ranch					✓	✓	✓	
Nishikawa						✓	✓	
Olmo-Hammond-UCD		✓	✓			✓	✓	✓
I-80 to Old Davis Road				✓	✓	✓	✓	
Old Davis Road to Mace				✓		✓	✓	

Reach	Baker's Navarretia	Valley Elderberry Longhorn Beetle	Western Pond Turtle	Giant Garter Snake	Least Bell's Vireo	Swainson's Hawk	White-Tailed Kite	Western Red Bat
Mace to Road 106A						✓	✓	
Road 106A to YBWA					✓+/-	✓		

Note: +/- Observed near Program Area.
Source: CDFW, 2015a; M. Truan, Pers. Comm.

NAWCA/Mariani

The NAWCA/Mariani reach begins immediately downstream of the Putah Diversion Dam (PDD). Tributaries to Putah Creek in this reach include McCune/Pleasant Creek, which enters the Program Area in the upstream third of the reach. These tributaries provide nutrients that benefit aquatic and riparian species within this reach and downstream. A broad floodplain has formed in the upstream-most section of the reach; following downstream, the channel narrows and becomes incised with increased riverine habitat. The reach has lateral biological connectivity that allows species and nutrient movement and increased riparian habitat values. The reach does not have any large pools. Because of its location at the base of the PDD, water temperatures are generally lower in this reach than in downstream reaches, providing suitable habitat for native fish species. Native species, Pacific lamprey, and rainbow trout. No CNDDB special-status species observations have been recorded within this reach. However, least Bell's vireo, Swainson's hawk, and white-tailed kite have been observed in this reach by UC Davis Museum of Wildlife and Fish Biology (MWFB) (Dybala et al. 2015). Valley elderberry longhorn beetles (VELB) were also observed directly adjacent to this reach along the PDD (CDFW 2015a). The VELB host plant, the blue elderberry, is found within this reach (Table 3.4-2), therefore, the beetle may occur in this reach.

Duncan-Giovannoni

Dry Creek is a major tributary that enters this reach near the southwest corner of the City of Winters. A prior restoration on Dry Creek has stabilized its down-cutting and this channel is now one of the leading contributors of sediment to naturally rebuild the floodplains (EDAW, 2005, pp. 4-24, Exhibit 4-4). This tributary delivers nutrients and provides habitat diversity, improving habitat for riparian and aquatic species in this reach and downstream reaches. This reach has approximately 5 acres of in-channel pools, 7 acres of mapped invasive weeds, and contains an adjacent wetland. The pools in the downstream areas of this reach elevated water temperatures of around 68°F in summer months, creating habitat conditions favorable for non-native fish species. These pools support smallmouth bass (*Micropterus dolomieu*) which prefers cooler water than

largemouth bass, over native fish species such as rainbow trout which depend on cooler water habitat.

Western pond turtle~~s~~, valley elderberry longhorn beetle~~s~~, Swainson's hawk, and white-tailed kite have been observed in this reach (CDFW, 2015a; M. Truan, Pers. Comm.). This reach supports some habitat for all of these species (see Table 3.4-2). Western pond turtles inhabit fresh or brackish water characterized by areas of deep water, low flow velocities, moderate amounts of riparian vegetation, and underwater cover elements (Stillwater Sciences, 2015, pp. 36) (see Table 3.4-1). Pacific lamprey and rainbow trout also have potential to be present within the upstream sections of this reach because it contains cold-water habitat with predominantly runs and riffles.

Winters Putah Creek Nature Park

Along a portion of this reach, a restoration project was undertaken to fill large pools and reconfigure the channel to improve habitat and flow conditions. The Park has been revegetated with native plants (City of Winters, 2008, p.14).

CNDDB documents observations of the western pond turtle and the Swainson's hawk within this reach (CDFW, 2015a). UC Davis Museum of Wildlife and Fish Biology (MWFB) also documented western pond turtle, white-tailed kite, and western red bat within this reach (M. Truan, Pers. Comm.). This reach supports the habitat necessary for all of these species (Table 3.4-2). The Swainson's hawk requires large, sparsely vegetated flatlands characterized by valleys, plateaus, broad floodplains, and large open expanses (Bloom, 1980; Estep, 1989, as referenced in Stillwater Sciences, 2015, p. 37). Native fish species, such as Pacific lamprey, Sacramento sucker, tule perch, and rainbow trout also have the potential to be present within this reach.

East of 505

The East of 505 reach has no large pools. Approximately 2 acres of invasive weeds occur in this reach. Sacramento sucker, tule perch, and rainbow trout have the potential to be present within this reach. Baker's navarretia was observed south of this reach though outside of the Program Area (CDFW, 2015a). Baker's navarretia typically occurs in valley grasslands habitat, which does not exist in this reach within the Program Area (Stillwater Sciences, 2015, p. 19). Swainson's hawk and western red bat have also been observed in this reach (M. Truan, Pers. Comm.).

Warren, Upper McNamara, Lower McNamara

The Upper McNamara reach has approximately 5 acres of pool habitat and approximately 4 acres of mapped invasive weeds. Lower McNamara has approximately 7 acres of pools and approximately 0.5 acres of mapped invasive weeds. The Warren reach does not have any mapped pools. Native fish species, such as Sacramento sucker, tule perch, and rainbow trout, have the potential to be present within these reaches. The Warren reach contains one CNDDB Swainson's hawk observation (CDFW, 2015a). Other species observations within these reaches include western pond turtle, white-tailed kite, and western red bat (M. Truan, Pers. Comm.). Portions of these project reaches contain suitable habitat for these four species (Table 3.4-2).

MacQuiddy (Lester)

This reach does not have any mapped pool habitat. No CNDDB-listed observations have been documented within this reach. Swainson's hawk has been observed in the reach by MWFB, and the reach contains suitable habitat for this species (M. Truan, Pers. Comm.). The absence of pools allows for lower water temperatures and provides suitable habitat for native fish species such as Sacramento sucker, tule perch, and rainbow trout.

Russell Ranch

Russell Ranch reach has approximately 7 acres of pools and approximately 2.8 acres of invasive weeds. Elevated water temperatures in this reach favor non-native fish species, such as largemouth bass, common carp (also known as Eurasian carp [*Cyprinus carpiol*]), and sunfish (i.e., blue gill [*Lepomis macrochirus*], redear sunfish [*Lepomis microlophus*], and green sunfish [*Lepomis cyanellus*]). Observations of Swainson's hawk, western pond turtle, white-tailed kite, and western red bat have occurred in this reach (CDFW, 2015a; M. Truan, Pers. Comm.). This reach contains suitable habitat suitable for these fish species (Table 3.4-2).

Stevenson Bridge

There are some minor floodplain terraces on the southern edge of the Stevenson Bridge reach. This reach has approximately 1.5 acres of pools and approximately 0.5 acres of mapped invasive weeds. The pools have elevated water temperatures of between 68° to 77°F in summer months and such conditions likely favor predominately non-native fish species, such as largemouth bass, common carp, and sunfish. Multiple Swainson's hawk occurrences have been documented in this reach (CDFW, 2015a), which contains the habitat suitable for this species (Table 3.4-2). Observations of white-tailed kite

occurrences have also been documented in this reach, and the reach contains suitable habitat for this species.

Glide Ranch, Nishikawa

The Glide Ranch reach has approximately 15 acres of pools and approximately 8 acres of mapped invasive weeds. The pools likely have elevated water temperatures of between 68° to 77°F in summer months that favor non-native fish species. The Nishikawa Reach does not have any mapped pools. Multiple Swainson's hawk occurrences have been documented in these reaches (CDFW, 2015a). White-tailed kite has been observed in these reaches, while least Bell's vireo has been observed in the Glide Ranch reach (M. Truan, Pers. Comm.). Portions of these reaches contain habitat suitable for these three species (Table 3.4-2).

Olmo-Hammond-UCD

In the upstream half of this reach, the creek is in an incised channel. On the north bank, somewhat east of the middle of the reach, a smaller side branch of the creek splits off along the north bank of the creek. This northern side branch, which runs through the southern edge of the campus of the University of California, Davis and then through the City of Davis, is part of the historic channel of Putah Creek and, although not part of the Program Area, provides habitat for aquatic and riparian species near the Program Area. From this divergence point eastward, the main branch of the creek, including the Program Area, enters an engineered, leveed channel. The levees eliminate lateral connectivity, disconnecting the creek from a natural floodplain, which reduces nutrient movement, riparian width, and species diversity. The Olmo-Hammond-UC Davis Reach has approximately 17 acres of pools and approximately 2.5 acres of mapped invasive weeds. The pools in this reach have elevated water temperatures of around and likely greater than 77°F in summer months and favor non-native fish species, such as largemouth bass, common carp, and sunfish.

Multiple Swainson's hawk occurrences, one white-tailed kite occurrence, and one valley elderberry longhorn beetle occurrence have been documented in this reach (CDFW, 2015a). Western pond turtle and western red bat have also been observed within this reach (M. Truan, Pers. Comm.). The white-tailed kite prefers habitats within riparian corridors during both the breeding and non-breeding seasons (Erichsen, 1995, as referenced in Stillwater Sciences, 2015, p. 36). This reach contains habitat suitable for these species (nesting and foraging for Swainson's hawk, foraging for white-tailed kite) (see Tables 3.4-1 and 3.4-2).

I-80 to Old Davis Road, Old Davis Road to Mace

These reaches are located within the engineered, leveed channel, which ends at Mace Boulevard/Road 104. The levees eliminate lateral connectivity, disconnecting the creek from the natural floodplain. This disconnect reduces species and nutrient movement and riparian width, thus reducing riparian habitat. There are no significant tributaries in these reaches. Both of these reaches are located in an area of flatter topography in which the channel is less incised than in the upstream reaches. The University of California, Davis, National Priority Listing (Superfund) site is northeast of the eastern edge of the I-80 to Old Davis Road Reach and directly north of the western end of the Old Davis Road to Mace Reach.

The I-80 to Old Davis Road Reach and the Old Davis Road to Mace Reach do not have mapped pools; however, due to their location at the lower end of the watershed following a number of large pools, and the lack of shading riparian canopy in most locations, these reaches have elevated water temperatures likely greater than 77°F in summer months and are therefore likely to support mainly non-native fish species.

Multiple Swainson's hawk occurrences have been documented in these reaches (CDFW, 2015a). A giant garter snake was also observed at the border of these reaches in 1976 by an undocumented source. Giant garter snake habitat consists of sloughs, canals, low-gradient streams, and freshwater marshes (Stillwater Sciences, 2015, p. C-6). White-tailed kite have also been observed within both reaches and least Bell's vireo has been observed within the I-80 to Old Davis Road reach (M. Truan Pers. Comm.). These reaches contain suitable habitat for these species (see Tables 3.4-1 and 3.4-2).

Mace to Road 106A

At Road 106A, at the far eastern edge of the reach, an earthen push-up dam is constructed across the stream channel to impound water during the agricultural irrigation season every year. This limits species migration and creates a pool in the reach. The Mace to 106A reach has approximately 17 acres of pools and approximately 12.8 acres of mapped invasive weeds. The pools within the reach result in elevated water temperatures likely greater than 77°F in summer months that favor non-native fish species, such as largemouth bass, common carp, and sunfish.

Multiple Swainson's hawk occurrences have been documented in this reach (CDFW, 2015a). White-tailed kite has also been observed in this reach (M. Truan, Pers. Comm.). This reach contains nesting and foraging habitat suitable for Swainson's hawk (Table 3.4-2).

Road 106A to Yolo Bypass Wildlife Area

The earthen push-up dam at Road 106A on the far western edge of the reach (the dividing line between this reach and the Mace to Road 106A reach) controls flows into this reach in the summer months. The channel has very stable water levels due to the impoundments caused by the barriers at each end (the Los Rios check dam also backs up water into this reach). These barriers block species migration and creates large pools. The Road 106A to YBWA reach has approximately 11 acres of pools and approximately 8 acres of mapped invasive weeds. The pools within the reach and upstream create elevated water temperatures likely greater than 77°F in summer months that favor non-native fish species, such as largemouth bass, common carp, and sunfish. Shallow overbank flooding occurs in this area about one out of every three years. These flooding events alter habitat characteristics for brief periods, temporarily changing habitats from mixed riparian and ruderal grassland to open water.

Multiple Swainson's hawk occurrences have been documented in this reach (CDFW, 2015a). Least Bell's vireo was also observed just downstream of the reach on the Yolo Bypass Wildlife Area. This reach contains nesting and foraging habitat suitable for these species (see Tables 3.4-1 and 3.4-2).

Regulatory Setting

This section lists specific environmental review and consultation requirements and identifies permits and approvals that must be obtained from local, state, and federal agencies before implementation of the proposed Program.

Federal Regulations

The Program may be subject to a number of federal agency permits regarding biological resources. Regulations related to drainage, dredge and fill activities, stream flow, and other hydrological topics appear in Section 3.1, *Hydrology*. Regulations affecting fill of wetlands and other "Waters of the US" are addressed in Section 3.2, *Water Quality*. Other federal biological regulatory permits are summarized below.

Federal Endangered Species Act

The Federal Endangered Species Act (ESA) (16 USC Section 1531), protects and facilitates recovery of federally listed threatened and endangered animal and plant species and their habitats from unlawful take. "Take" under ESA includes activities such as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." The USFWS regulations define "harm" to include some types of "significant habitat modification or degradation." "Harm" may include habitat

modification "where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering." (*Babbit v. Sweet Home Chapter of Communities for a Great Oregon* (1995) 515 U.S. 687, 691.) Section 7 of the ESA requires that federal agencies, in consultation with USFWS or the National Oceanic and Atmospheric Administration (NOAA) Fisheries, use their authorities to further the purpose of ESA and to ensure that their actions are not likely to jeopardize the continued existence of listed species or result in destruction or adverse modification of critical habitat. Section 10(a)(1)(B) allows non-federal entities to obtain permits for incidental taking of threatened or endangered species through consultation with USFWS or NOAA Fisheries.

Migratory Bird Treaty Act

Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) of 1918 (16 USC Sections 703-711). The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 Code of Federal Regulations (CFR) Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR Section 21). If nests are found, they must remain protected during construction activities until the young birds have fledged, unless otherwise authorized by CDFW and/or USFWS.

Clean Water Act Sections 404 and 401

The objective of the Clean Water Act (33 U.S.C. Section 1251 et seq.) is to restore and maintain the chemical, physical, and biological integrity of the nation's waters.

Section 404 of the Clean Water Act regulates activities that involve a discharge of dredge or fill material into waters of the United States. The Corps is responsible for issuing permits for discharges covered by Section 404, including most notably the filling of wetlands. The Corps emphasizes avoiding and minimizing impacts on wetlands where feasible. When impacts on wetlands cannot be avoided, compensatory mitigation is generally required as part of the Section 404 permit process to ensure that there is no net loss of wetlands values and functions.

Section 401 of the Clean Water Act is administered by the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards. Under Section 401, an applicant for a federal permit, such as a Section 404 permit to discharge dredge or fill material into waters of the United States, must obtain a "water quality certification" from the appropriate state agency stating that the permitted activity is consistent with the

state's water quality standards. The Central Valley Regional Water Quality Control Board (RWQCB) is the appointed authority for Section 401 compliance in the Central Valley.

State Regulations

California Endangered Species Act

Under the CESA, CDFW has the responsibility to maintain a list of endangered and threatened species (CDFGC Section 2070). CDFW also maintains a list of "candidate species," which are species that CDFW formally notices as being under review for addition to the list of endangered or threatened species. CDFW holds regulatory authority over projects that could result in the "take" of any threatened, endangered or candidate species (CDFW, 2015b, p. 3). Pursuant to the CESA and CEQA, a lead agency reviewing any project within the state must determine whether state-listed endangered or threatened species may be present in the Program Area and determine whether the proposed Program may have a potentially significant impact on such species.

California Department of Fish and Wildlife

Streambed Alteration Agreement (Sections 1600-1607 of the CDFGC)

State, local public agencies and private entities are subject to Section 1600 *et seq* of the CDFGC, which governs any activity that may substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated by the CDFW. Under section 1602, a discretionary Stream Alteration Agreement must be issued by the CDFW to the project applicant prior to the initiation of construction activities within a streambed.

Section 1602 of the California Fish and Game Code requires that any person, governmental agency, or public utility (e.g., an entity) may not substantially divert or obstruct the natural flow of, or substantially change or use any material from, the bed, channel, or bank of any river, stream, or lake, or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake unless the CDFW receives a complete written notification and other agreement issuance criteria are met. Based on information contained in the notification form and a possible field inspection, the CDFW may propose reasonable modifications to the proposed activity in order to protect fish and wildlife resources. The notification requirement applies to any work undertaken within the bed, bank, and/or riparian zone, including any hydrologically connected wetlands, of a creek, stream, or lake.

Native Plant Protection Act

The Native Plant Protection Act (CDFGC Section 1900-1913) prohibits the taking, possessing, or sale within the state of any plants with a State designation of rare, threatened, or endangered (as defined by CDFW). An exception to this prohibition in the Act allows landowners, under specified circumstances, to take listed plant species, provided that the owners first notify CDFW and give the agency at least 10 days to salvage the plants before they are destroyed.

Birds of Prey

Under Section 3503.5 of the CDFGC, it is "unlawful to take, possess, or destroy any birds in the orders of *Falconiformes* or *Strigiformes* (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." CDFW holds jurisdiction over such actions and requires projects to plan avoidance and minimization measures for these types of impacts (CDFW, 2015b, p. 3).

"Fully Protected" Species

California statutes also accord "fully protected" status to a number of specifically identified birds, mammals, reptiles, and amphibians. Section 3505 of the CDFGC makes it unlawful to "take" "any aigrette or egret, osprey, bird of paradise, goura, numidi, or any part of such a bird." Section 3511 protects from "take" the following "fully protected bird" that was observed foraging at the proposed Program Area: white-tailed kite.

"Special Concern" Species

According to Section 15380 of the CEQA Guidelines, species of special concern should be included in an analysis of project impacts. Project-level impacts to listed species (rare, threatened, or endangered) are generally considered significant, thus requiring lead agencies to prepare an Environmental Impact Report to fully analyze and evaluate the impacts. In assigning "impact significance" to populations of *non-listed* species, an analysis may consider factors such as population-level effects, proportion of the taxon's range affected by a project, regional effects, and impacts to habitat features.

Water Pollution Affecting Species

According to CDFGC Section 5650, "it is unlawful to deposit in, permit to pass into, or place where it can pass into the waters of the state" any substance or material deleterious to fish, plant life, or bird life, including non-native species. This provision includes application of herbicides that could result in pollution of "Waters or the State" impacting fish and wildlife resources (CDFW, 2015, p. 3).

Local Regulations

Solano County General Plan

The Solano County General Plan contains policies to protect and improve water quality, preserve wetlands, protect watersheds and aquifer recharge areas, and conserve riparian vegetation (County of Solano, 2008a, pp. RS-2 to RS-3). The General Plan also discusses special-status species within the County (County of Solano, 2008a, pp. RS-9 to RS-3).

The following goals and policies from the Resources Element of the Solano County General Plan are relevant to biological impacts:

> Policy RS.P-1: Protect and enhance the county's natural habitats and diverse plant and animal communities, particularly occurrences of special-status species, wetlands, sensitive natural communities, and habitat connections.
>
> Policy RS.P-2: Manage the habitat found in natural areas and ensure its ecological health and ability to sustain diverse flora and fauna.
>
> Policy RS.P-3: Focus conservation and protection efforts on high-priority habitat areas depicted in Figure RS-1.
>
> Policy RS.P-4: Together with property owners and federal and state agencies, identify feasible and economically viable methods of protecting and enhancing natural habitats and biological resources.
>
> Policy RS.P-5: Protect and enhance wildlife movement corridors to ensure the health and long-term survival of local animal and plant populations. Preserve contiguous habitat areas to increase habitat value and to lower land management costs.
>
> Policy RS.P-6: Protect oak woodlands and heritage trees and encourage the planting of native tree species in new developments and along road rights-of-way.
> (County of Solano 2008a, pp. pp. RS-11 and RS-12)

Solano County General Plan Priority Habitat Areas

Solano County Priority Habitat Areas map lists the western end of Putah Creek (approximately 8.1 miles upstream of the Program Area) as California Red-legged Frog Core Recovery Area. This recovery area is in the extreme northwestern corner of the county (County of Solano, 2008a, p. RS-9). Approximately 4.96 miles of the Program Area (between the fork of Putah Creek near Davis, California and Mace Boulevard) is defined as Giant Garter Snake Priority Conservation Area. These snakes use dense aquatic vegetation in freshwater marshes, oxbows, and backwaters of creeks as their primary habitat, though they can also be found in and adjacent to irrigation canals that support

cattails and bulrushes (County of Solano, 2008a, p. RS-10). High Value Vernal Pool Conservation Areas are located approximately 18 miles south of the Program Area between the English Hills and I-505 (County of Solano, 2008a, p. RS-10).

These habitat areas are mapped in Figure RS-1 of the Solano County General Plan. The priority habitat areas were used to create the Resource Conservation Overlay shown in Figure RS-2 of the Solano County General Plan and discussed in the Land Use chapter of the General Plan. The overlay indicates general locations of priority habitat and provides both opportunities and restrictions regarding the use of the underlying properties (County of Solano, 2008b, p. RS-11).

Yolo County General Plan

The Yolo County General Plan contains policies to protect enhance biological resources through the conservation, maintenance, and restoration of key habitat areas and corresponding connections that represent the diverse geography, topography, biological communities, and ecological integrity of the landscape (County of Yolo, 2009, p. CO-34).

The following goals and policies from the Resources Element of the Yolo County General Plan are relevant to biological impacts:

Policy CO-2.1: Consider and maintain the ecological function of landscapes, connecting features, watersheds, and wildlife movement corridors.

Policy CO-2.2: Focus conservation efforts on high priority conservation areas (core reserves) that consider and promote the protection and enhancement of species diversity and habitat values, and that contribute to sustainable landscapes connected to each other and to regional resources.

Policy CO-2.3: Preserve and enhance those biological communities that contribute to the county's rich biodiversity including blue oak and mixed oak woodlands, native grassland prairies, wetlands, riparian areas, aquatic habitat, agricultural lands, heritage Valley oak trees, remnant Valley oak groves, and roadside tree rows.

Policy CO-2.4: Coordinate with other regional efforts (e.g., Yolo County HCP/NCCP) to sustain or recover special-status species populations by preserving and enhancing habitats for special-status species.

Policy CO-2.5: Protect, restore and enhance habitat for sensitive fish species, so long as it does not result in the large-scale conversion of existing agricultural resources.

Policy CO-2.6: Cooperate with the Department of Fish and Wildlife in inventorying streams with spawning and rearing habitat, evaluating those streams' existing and potential habitat value, and determining current and potential fish population levels.

Policy CO-2.7: Encourage streamside property owners and appropriate public agencies to participate in fishery enhancement projects.

Policy CO-2.8: Encourage all public land management agencies to protect, restore, and enhance the fish habitat within their jurisdiction.

Policy CO-2.9: Protect riparian areas to maintain and balance wildlife values.

Policy CO-2.10: Encourage the restoration of native habitat.

Policy CO-2.11: Ensure that open space buffers are provided between sensitive habitat and planned development.

Policy CO-2.14: Ensure no net loss of oak woodlands, alkali sinks, rare soils, vernal pools or geological substrates that support rare endemic species, with the following exception. The limited loss of blue oak woodland and grasslands may be acceptable, where the fragmentation of large forests exceeding 10 acres is avoided, and where losses are mitigated.

Policy CO-2.23: Support efforts to coordinate the removal of non-native, invasive vegetation within watersheds and replacement with native plants.

Policy CO-2.24: Promote floodplain management techniques that increase the area of naturally inundated floodplains and the frequency of inundated floodplain habitat, restore some natural flooding processes,

Policy CO-2.25: Support efforts to reduce water temperatures in streams for fish via habitat restoration (e.g., increase shading vegetation) and water management (e.g., control of flows) that are compatible with the Integrated Regional Water Management Plan.

Policy CO-2.26: Coordinate with local watershed stewardship groups to identify opportunities for restoring or enhancing watershed, instream, and riparian biodiversity.

Policy CO-2.28: Balance the needs of aquatic and riparian ecosystem enhancement efforts with flood management objectives.

Policy CO-2.30: Protect and enhance streams, channels, seasonal and permanent marshland, wetlands, sloughs, riparian habitat and vernal pools in land planning and community design.

Policy CO-2.31: Protect wetland ecosystems by minimizing erosion and pollution from grading, especially during grading and construction projects.

Policy CO-2.34: Recognize, protect and enhance the habitat value and role of wildlife migration corridors for the Sacramento River, Putah Creek, Willow Slough, the Blue Ridge, the Capay Hills, the Dunnigan Hills and Cache Creek.

Policy CO-2.35: Consider potential effects of climate change on the locations and connections between wildlife migration routes.

Policy CO-2.37: Where applicable in riparian areas, ensure that required state and federal permits/approvals are secured prior to development of approved projects.

Policy CO-2.38: Avoid adverse impacts to wildlife movement corridors and nursery sites (e.g., nest sites, dens, spawning areas, breeding ponds). Preserve the functional value of movement corridors to ensure that essential habitat areas do not become isolated from one another due to the placement of either temporary or permanent barriers within the corridors. Encourage avoidance of nursery sites (e.g., nest sites, dens, spawning areas, breeding ponds) during periods when the sites are actively used and that nursery sites which are used repeatedly over time are preserved to the greatest feasible extent or fully mitigated if they cannot be avoided.

Policy CO-2.41: Require that impacts to species listed under the State or federal Endangered Species Acts, or species identified as special-status by the resource agencies, be avoided to the greatest feasible extent. If avoidance is not possible, fully mitigate impacts consistent with applicable local, State, and Federal requirements.

Policy CO-2.42: Projects that would impact Swainson's hawk foraging habitat shall participate in the Agreement Regarding Mitigation for Impacts to Swainson's Hawk Foraging Habitat in Yolo County entered into by the CDFG and the Yolo County HIP/NCCP Joint Powers Agency, or satisfy other subsequent adopted mitigation requirements consistent with applicable local, State, and federal requirements. (County of Yolo, 2009, p. CO-34 to CO-40)

Yolo County General Plan Priority Habitat Area Goals and Policies

GOAL CO-2: Biological Resources. Protect and enhance biological resources through the conservation, maintenance, and restoration of key habitat areas and corresponding connections that represent the diverse geography, topography, biological communities, and ecological integrity of the landscape.

Policy CO-2.2: Focus conservation efforts on high priority conservation areas (core reserves) that consider and promote the protection and enhancement of species diversity and habitat values, and that contribute to sustainable landscapes connected to each other and to regional resources. (County of Yolo, 2009, p. C-34 to CO-35.)

3.4.2 Significance Criteria

The following thresholds for measuring a project's environmental impacts are based on CEQA Guidelines Appendix G (OPR, 2013). For the purposes of this PEIR, impacts are considered significant if implementation of the proposed Program may result in any of the following:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS.

- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFW or USFWS.
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
- Conflict with any local polices or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

An evaluation of the significance of potential impacts on biological resources must consider both direct effects to the resource, as well as indirect effects in a local or regional context. The loss of a biological resource or an obvious conflict with local, state, or federal agency conservation plans, goals, policies, or regulations would generally be considered potentially significant impacts.

3.4.3 Impacts and Mitigation Measures

Impacts and mitigation measures are described below both generally and by reach. Applicable impacts and mitigation measures for each reach are summarized in Table 3.4-3, at the end of this section.

General Impacts and Mitigation Measures

Impact 3.4-1: General Impacts on Special-Status Species and Habitats.

The Program would reduce invasive plants and promote the growth of native wetland and riparian plants that would provide improved habitat for native plants and wildlife within the Program Area. However, construction of individual projects could create general short-term adverse impacts to special-status species and habitats by directly disturbing special-status species or by temporarily removing habitat during restoration activities within the Program Area. Mitigation Measure 3.4-1, along with the other mitigation measures listed below, would reduce this impact to **less than significant.**

Mitigation Measure 3.4-1: Worker Environmental Awareness Program (WEAP).

During construction of individual projects under the Program, before any work occurs on the project site, including grading, vegetation removal and equipment staging, all construction personnel shall participate in an environmental awareness training regarding special-status species and sensitive habitats present on the project site. Any additional construction personnel that are employed following the initial start of construction shall receive the mandatory training before starting work. As part of the training, an environmental awareness handout shall be provided to all personnel that describes and illustrates sensitive resources (i.e., special-status species and habitat, nesting birds/raptors) to be avoided during construction and lists measures to be followed by personal for the protection of biological resources. Such measures shall include, but are not limited to:

- Procedures to follow if a special-status species is found within the work area.
- Checking under equipment and staging areas for wildlife species each morning prior to work.
- Staying within designated work areas.
- Maintaining exclusion/silt fencing.
- Reduced project site speed limits.
- No pets or firearms on-site.
- Contain trash/food waste and remove daily to avoid encouraging predators onto the project site.
- Following project Best Management Practices (BMPs).

Impact 3.4-2: Impacts on Western Pond Turtle.

The Program would benefit the western pond turtle by reducing invasive plants and promoting the growth of vegetated banks with log or rock basking sites that would provide increased and improved turtle habitat in the Program Area. However, construction of restoration projects could create short-term adverse impacts to the western pond turtle by temporarily removing habitat, or accidentally crushing them or otherwise directly harming them during restoration activities. Implementation of Mitigation Measure 3.4-2 would reduce this impact to **less than significant.**

Mitigation Measure 3.4-2: Western Pond Turtle Avoidance.

The western pond turtle shall be protected from restoration project staging and operations areas through monitoring by a qualified biologist. For individual restoration projects, the project work area shall be inspected daily for the presence of turtles. If necessary, with consultation with CDFW, barriers shall be used when needed to direct the turtles and move them to an area of suitable habitat outside of the construction activity.

Impact 3.4-3: Impacts on Giant Garter Snake.

Program implementation may result in long-term benefits to potential Giant Garter snake habitat by improving habitat quality through the restoration of degraded stream reaches and widening of the associated floodplain within the lower reaches of the Program Area. However, short-term direct (crushing) and indirect (temporary habitat loss) impacts from construction may occur to Giant Garter Snake in areas where there is potential habitat for this species. Mitigation Measure 3.4-3 would reduce potential construction-related impacts to **less than significant**.

Mitigation Measure 3.4-3: Giant Garter Snake Avoidance.

In areas that provide suitable habitat for giant garter snake, construction shall only occur during the active period for the snake, between May 1 and October 1. During the active period for giant garter snake direct mortality is lessened because snakes are expected to actively move and avoid danger. Preconstruction surveys for the giant garter snake shall occur within 24 hours prior to ground disturbing activities. A survey of the project work area shall be repeated if a lapse in construction activity of two weeks or greater has occurred.

If a snake is encountered during construction, work shall stop within the vicinity of the snake and the USFWS will be contacted immediately. Only following receipt of USFWS approval shall giant garter snake be collected and transferred to the nearest suitable habitat outside the work area. Work shall not re-commence until a qualified biologist has either removed the snake from the construction area or, after thorough inspection, determined that the snake has vacated the construction area.

Any dewatering or vegetation clearing within 200 feet of potential aquatic habitat for giant garter snake shall be limited to the minimum amount necessary.

Impact 3.4-4: Impacts on Valley Elderberry Longhorn Beetle.

Project construction activities could adversely impact the Valley Elderberry Longhorn Beetle (VELB) by inadvertently harming or killing the VELB's host plant, blue elderberry (*Sambucus nigra* ssp. *caerulea*) (BSK, 2015, p. 20). Project designs would avoid disruptive activities areas where elderberry shrubs naturally occur, and these shrubs would be protected during project construction (BSK, 2015, p. 20). Biological clearances for project activities would adhere to the applicable USFWS VELB guidance (USFWS, 1999). To provide additional protection for VELB habitat, Mitigation Measure 3.4-4 would require projects to adhere to USFWS VELB guidance, thereby reducing the potential impacts to **less than significant**.

Mitigation Measure 3.4-4: Valley Elderberry Longhorn Beetle (VELB) Avoidance.

Blue elderberry plants (with stems greater than 1-inch diameter at ground level) occurring within the Program Area shall be avoided and, if avoidance is not possible, relocated to a designated location. Where impacts to elderberry shrubs cannot be avoided, or where shrubs are located within 30.5 meters (100 feet) of project specific restoration activities, activities shall be conducted according to USFWS Conservation Guidelines for VELB (1999), or other VELB guidance as updated by the USFWS.

VELB habitat shall be considered directly affected if project construction requires the removal of elderberry shrubs or if ground-disturbing activities would occur within 6.1 meters (20 feet) of the dripline of an elderberry shrub. The species would be considered indirectly affected if project construction would disturb the ground between 6.1 and 30.5 meters (20 and 100 feet) from the dripline of the shrub (USFWS, 1999). Transplantation or temporary removal of the affected shrubs may be necessary as prescribed by the guidelines, but plants that are extremely difficult to remove may be exempted. Planting of additional seedlings or cuttings may be required under the project or Program USFWS Biological Opinion, depending on the number of elderberry shrubs with emergence holes present in the project area.

A monitoring plan of any mitigation measures in the Program Area shall be implemented as required under the Biological Opinion, including monitoring the general condition of individual project sites and/or the entire Program Area and the condition of the elderberry plantings for up to ten consecutive years. The plan shall describe monitoring responsibilities, intervals, intensity, and success rates. The monitoring plan shall further include requirements for reporting observations and findings to the applicable agency, for example, for VELB observations, to USFWS.

Impact 3.4-5: Impacts on Swainson's Hawk.

The Program would support a transition from habitat that favors invasive plant species to one that favors native species and self-maintaining habitat. This would reduce invasive plants and promote the growth of native and shelterbelt vegetation that could provide habitat for Swainson's hawk. However, the Program could adversely impact Swainson's hawk if restoration activities occurred during the breeding and nesting seasons, both directly (by physically disrupting breeding and nesting), and indirectly (if the noise and activity of construction discourages birds from utilizing otherwise suitable breeding and nesting habitat). Mitigation Measure 3.4-4 would reduce this impact to **less than significant.**

Mitigation Measure 3.4-5: Swainson's Hawk Avoidance.

For any construction activities initiated between March 15 and September 1, surveys for nesting Swainson's hawk shall be conducted within 0.5-mile of areas of disturbance for this species as described in the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in the California's Central Valley* (Swainson's Hawk Technical Advisory Committee, 2000). The recommended minimum survey protocol is completion of surveys for at least the two survey periods immediately prior to a project's initiation. Survey periods correspond to typical migration, courtship, and nesting behavior and are defined as follows:

Survey Period		Survey Dates	Survey Time	Number of Surveys
1	Recommend optional	January 1 to March 20	All day	1
2		March 20 to April 5	Sunrise to 1000 or 1600 to sunset	3
3		April 5 to April 20	Sunrise to 1200 or 1630 to sunset	3
4	Initiating surveys is not recommended	April 21 to June 10	All day; Monitoring known nests only	Ongoing
5		June 10 to July 30	Sunrise to 1200 or 1630 to sunset	3

If surveys determine that the species is present and nesting within a restoration project site, a buffer zone of 0.5-mile shall be established and coordination with CDFW shall be required prior to any work in this buffer zone during the nesting season. Work within 0.5-mile may be permitted with CDFW approval if a qualified biologist monitors the nest when project disturbance activities occur within 0.5-mile of the nest. If the monitor determines that construction may result in abandonment of the nest, all construction activities within

0.5-mile shall be halted until the nest is abandoned or all young have fledged. The monitor shall continue monitoring the nest until construction within 0.5-mile of the nest is completed, or until all chicks have completely fledged and are no longer dependent on the nest.

Impact 3.4-6: Impacts on Nesting Bird Species.

The Program would support an overall transition from habitat that favors invasive plant species to one that favors native species and self-maintaining habitat. This would reduce invasive plants and promote the growth of native and overhanging vegetation that could provide improved cover, foraging and nesting habitat for the song sparrow (Modesto population), western yellow-billed cuckoo, tricolored blackbird, white-tailed kite, and other migratory bird species. However, the Program could adversely impact bird species if construction activities occurred during the breeding season, both directly by physically disrupting breeding and nesting, and indirectly if the noise and activity of construction discourages birds from utilizing otherwise suitable breeding and nesting habitat. Mitigation Measure 3.4-6 would reduce this impact to **less than significant.**

Mitigation Measure 3.4-6: Nesting Bird Avoidance.

A pre-construction survey by a qualified biologist for nesting birds shall be required for individual projects if construction activities are scheduled to occur during the breeding season (February 1 to August 31) for raptors and other migratory birds, including special-status bird species. The survey shall be conducted 15 days prior to ground disturbing activities and shall cover 500-foot radius surrounding the construction zone.

If active nests are found, actions typically would include, but are not limited to, monitoring by agency-approved biologists, establishment or refinement of species-specific buffers, reduction or elimination of the use of loud equipment, reducing foot traffic and remaining in vehicles, and the maintenance of visual screens. Migratory birds shall be protected from staging and construction operations through the use of a buffer established based on the birds' sensitivity and response to the potential activities. Baseline behavior of the bird should be established to inform the buffer size. The qualified biologist may start with a 100-foot nest buffer, or a 250-foot nest buffer for raptors, but may adjust the buffer size based of the reaction of the bird(s) to the construction activity. If there is a potential for nest abandonment due to intrusion into the buffer zone, as established by the qualified biologist, then CDFW and the USFWS shall be consulted. If a lapse in project-related work of 15 days or longer occurs, another focused survey, and if

required, consultation with CDFW and the USFWS, shall be performed before project work can resume.

Impact 3.4-7: Impacts on Special-Status Bats.

The Program has potential to impact special-status bat species through the removal of large trees or snags that may be used as roosting habitat. Additionally, project construction ~~or demolition~~ has the potential to disturb roosting individuals in the vicinity of the Program Area. Mitigation Measure 3.4-7 would reduce this impact to **less than significant**.

Mitigation Measure 3.4-7: Avoid and Minimize Impacts to Special-Status Bats.

In areas where suitable habitat occurs and there is potential for special-status bat species to be present, specific mitigation measure(s) will be developed in consultation with CDFW. Specific measures may vary depending on the project reach and project activities, and may include the following:

A pre-construction bat survey shall be conducted by a qualified biologist to establish the presence or absence of roosting bats prior to May 1st in order to put exclusionary measures into place before the active season of this species (no exclusionary efforts should be conducted during May 1 to August 31 of the construction year). If no roosting bats are found, no further mitigation shall be necessary; however, it is recommended that exclusionary measures be conducted prior to May 1st of each construction year to prevent bats from utilizing the riparian corridor.

If pallid bats, western red bats, or other bat species are detected within a roost at the time of the survey, excluding any bats from roosts, if possible, will be accomplished by a qualified biologist prior to the removal of roost trees. The timing and other methods of exclusionary activities will be developed by the qualified biologist in consultation with CDFW in order to reduce the stress on the bats to the extent feasible. Exclusionary devices, such as plastic sheeting, plastic or wire mesh, may be used to allow for bats to exit but not re-enter any occupied roosts, if applicable. A qualified biologist will also be notified and present during any tree removal or tree trimming.

Impact 3.4-8: Impacts on Rare Plants.

The quality and extent of native riparian vegetation would increase through Program implementation. However, construction activities would involve large amounts of ground clearing and vegetation removal. In the long-term this would provide the benefit of

increased habitat availability for rare and other native plant species which would be planted on cleared sites, but could potential impact current populations. Mitigation Measure 3.4-8 would reduce these impacts to **less than significant**.

Mitigation Measure 3.4-8: Avoid and Minimize Impacts to Rare Plants.

Before the initiation of any vegetation removal or ground-disturbing activities in areas that provide suitable habitat for special-status plants, the following measures shall be implemented:

- A qualified botanist shall conduct appropriately timed surveys for special-status plant species in all suitable habitats that would be potentially disturbed by the project.
- Surveys shall be conducted following CDFW- or other approved protocol.
- If no special-status plants are found during focused surveys, the botanist shall document the findings in a letter to the lead agency, and other appropriate agencies as needed, and no further mitigation will be required.
- If special-status plants are found during focused surveys, the following measures shall be implemented:
  - Information regarding the special-status plant population shall be reported to the CNDDB.
  - If the populations can be avoided during project implementation, they shall be clearly marked in the field by a qualified botanist and avoided during construction activities. Before ground clearing or ground disturbance, all on-site construction personnel shall be instructed as to the species' presence and the importance of avoiding impacts to this species and its habitat.
  - If special-status plant populations cannot be avoided, consultations with CDFW and/or USFWS would be required. If allowed under the appropriate regulations, the plants shall be mapped, photographed, and then transplanted to a suitable location by a qualified botanist. If required by the relevant agency, a plan to compensate for the loss of special-status plant species, detailing appropriate replacement ratios, methods for implementation, success criteria, monitoring and reporting protocols, and contingency measures that would be implemented if the initial mitigation fails; the plan would be developed in consultation with the appropriate agencies prior to the start of construction activities.
  - If mitigation is required, the project proponent shall maintain and monitor the mitigation area for 5 years following the completion of construction and restoration activities. Monitoring reports shall be submitted to the resource

agencies at the completion of restoration and for 5 years following restoration implementation. Monitoring reports shall include photo-documentation, planting specifications, a site layout map, descriptions of materials used, and justification for any deviations from the mitigation plan. Additional mitigation, monitoring may be required or modified by the administering agency, and those requirements would supersede this section.

Impact 3.4-9: Impacts on Riparian Habitat.

Program activities would, in the long-term, improve the quality and extent of riparian habitat and wildlife access to habitat by removing invasive vegetation and substantially increasing the total riparian area.

Since the primary habitat within the proposed Program Area is riparian habitat, and equipment would be operated within the riparian zone, short-term adverse impacts to riparian habitat would occur. These short-term impacts include removing, moving, or altering vegetation and the Putah Creek channel. The impacts to habitat from the restoration would be temporary, until new native vegetation establishes itself. Temporary loss of riparian habitat would typically last 1 to 3 years for reestablishment of riparian scrub/understory habitat; and 5 to 10 years for re-establishment of large canopy trees and shrubs.

The Program has incorporated annual limits on construction extents and spatial staggering of implementation of individual restoration projects in order to minimize cumulative short-term riparian habitat impacts. In the long term, the Program would serve to enhance riparian habitat, resulting in a beneficial impact. However, as stated above, impacts due to removal of vegetation during construction could result in a temporary loss of functions and values of riparian habitat. Mitigation Measure 3.4-9 would reduce these impacts to **less than significant**.

Mitigation Measure 3.4-9: Monitor Riparian Habitat.
In advance of construction of each individual project under the Program, a Riparian Revegetation and Monitoring Plan shall be prepared. Each plan will describe thresholds of revegetation success, monitoring and reporting requirements, and a description of the site-specific planting plan. The Plan will be submitted to the appropriate regulatory agencies for review and approval.

Monitoring Plans shall include the following, subject to modification based upon regulatory agencies review and approval.

Monitoring shall commence immediately following construction of each project implemented under the Program. Monitoring shall be performed for a period of at least five years and may be extended if contingency measures were required beyond the third year, and/or if the final success criteria are not met at the end of five years. In this event, monitoring shall continue until such time as all disturbed areas and restoration plantings are established and the long-term viability of the target replacement habitat is assured, as determined in consultation with the permitting agencies.

Monitoring Methods

Monitoring shall be performed by a qualified biologist, horticulturist, or ecologist with appropriate credentials and demonstrated experience in native habitat restoration. The project monitor shall provide oversight of maintenance operations to ensure high quality project maintenance, which conforms to standards established in the restoration plan for each individual project, and to immediately address any unanticipated problems. The monitor shall be in direct contact with SCWA/LPCCC, via regular telephone reports of maintenance activities and periodic site visits.

Recording of As-Built Conditions

Accurate plans shall be prepared depicting the finished grades, locations of any grade control or hydraulic structures, erosion control measures, and species, quantities and locations of all planted materials. Methods of construction and planting, as well as any significant problems or unexpected conditions encountered, shall also be recorded. As-built plans shall include surveyed cross-sections of the restored creek channel. Cross-section locations shall be permanently marked in the field. Permanent photo stations shall be established and depicted on the as-built plans. Baseline information shall be incorporated into a written report describing the as-built status of the restoration project, and submitted with the as-built drawings to the permitting agencies within 6 weeks of completion of construction activities.

Monitoring Schedule

Monitoring visits shall be conducted monthly for the first year and at least quarterly thereafter, as determined necessary by the relative success of the project plantings in the first year.

Monitoring Protocol

During the monitoring visits, detailed records shall be made of the conditions existing at the restoration site. In order to maintain continuity and ensure comparable assessments,

standardized data sheets shall be used to record monitoring data. A copy of the as-built planting plan shall be attached to the data sheets for each monitoring visit, so that monitoring data and observations may be tied to exact locations on the restoration site. Sample channel cross-sections, quadrats, and permanent photo stations shall be permanently marked in the field using rebar stakes.

Channel cross-sections shall be surveyed in the field to record the condition of the channel and banks, and any changes occurring as a result of natural geomorphic adjustment or other causes (e.g. possible vandalism, or human activity in the channel, wildlife trails/laydown areas, etc.).

Quadrat sampling methods shall be used to record data for selected areas of the restoration site. Required monitoring data would include:

- Percent survival and average height of all trees planted (with the exception of willows and cottonwoods, which shall be evaluated based upon aerial cover);

- Overall cover, percent cover by species (dominant as well as incidental species present shall be recorded), and natural recruitment of native and invasive species;

- Mortality and other problems such as insect damage, erosion, or other soil problems shall be noted and documented with photographs; and

- General health and vigor of restoration plantings.

Photographs showing overall views of the restoration site shall be taken at established photo points during each visit.

The following is a description of specific monitoring data to be collected for the restoration site.

Vegetation:

Riparian vegetation

Riparian vegetation planted on the restoration site shall consist of liner and one- to two-gallon materials. As-built planting plans shall identify the locations and species of each planting. During monitoring visits, the percent cover, species

diversity and natural recruitment (both by native and invasive species) within these areas shall be assessed.

Existing riparian trees retained within the project site

The general conditions and health of these trees and seedlings shall be documented during monitoring visits. Any natural recruitment of native tree and shrub species in these areas shall be noted.

Success Criteria

The restoration prescribed for individual restoration projects under the Program shall be considered successful if, at the end of the 5-year monitoring period, restoration objectives are achieved, the channel morphology is stable, planted areas are self-sustaining, and plant survivorship and vigor are adequate to assure a viable, high-quality wildlife habitat.

The section below provides proposed minimum success criteria for the different vegetation types within the individual project sites. Success criteria presented below may be modified based upon site specific conditions and subject to review and approval of regulatory stakeholders and permitting agencies.

Plantings in each restoration site shall be considered successful if, at the end of the 5-year monitoring period, the following criteria have been met. Non-native cover includes plant species that are non-native, but not considered invasive. To measure this success criteria, Invasive plants are defined as having a moderate or high rating by the California Invasive Plant Council (Cal-IPC). Maintenance and/or replanting shall be performed as necessary to achieve these standards. If significant numbers of replacement plantings are required after the third year, the applicant shall consult with the permitting agencies to determine whether the monitoring period should be extended.
Vegetation Success Criteria:

Plantings in the restoration site shall be considered successful if, at the end of the 5-year monitoring period, the following criteria have been met:

Riparian trees and shrubs

- 80 percent cover of the planted area, as indicated on as-built plans submitted to the regulatory agencies.

All revegetated areas within the restoration site

- Percent cover by invasive plants not to exceed 5 %

Maintenance and/or replanting necessary to achieve these standards shall be performed as required. If significant numbers of replacement plantings are required after the third year, the applicant shall consult with the CDFW and other regulatory agencies, as appropriate, to determine whether the monitoring period should be extended.

Annual Reports

Annual monitoring reports shall be submitted by LPCCC/SCWA to the Corps, CDFW and other appropriate agencies and stakeholders. The first annual report for each project shall be delivered by December 31 of the year following the first growing season after planting, and by December 31 of each year thereafter.

The reports shall include analyses of all quantitative monitoring data, prints of monitoring photographs, and maps identifying monitoring transects and/or quadrats, monitoring photo points, and restoration plantings by vegetation type and height class, and provide discussion of the implications of monitoring data for site evolution, and comparison to the success criteria. The reports shall discuss problems and successes encountered, any replacement planting or other remedial measures taken, and shall recommend steps to ensure continued success (or remediation of problems encountered) of the restoration project.

Impact 3.4-10: Impacts on Fish.

Construction of restoration projects under the Program would temporarily increase erosion and sedimentation as described in Impact 3.1-1, in the Section 3.1, *Hydrology*, of this report. This could have adverse impacts to fish habitat, however these impacts would be mitigated to a less-than-significant level by implementation of Stormwater Pollution Prevention Plans (SWPPPs) and, where SWPPPs are not required, implementation of Mitigation Measure 3.1-1 in Section 3.1, *Hydrology*. In the long-term, the Program would likely decrease sediment levels in the creek by stabilizing unstable, sloughing banks. Improved sediment transport is one of the goals of the Program.

The Program is not expected to increase any current effects from existing mercury or boron on fish habitat. The Program is unlikely to have any effect on the concentration of boron, because the Program would not influence the creek's boron dynamics. The proposed Program actions are not expected to increase exposure of mercury to fish through grading or soil manipulation.

In the long term, the Program would improve habitat for native fish through the conversion of large reaches of wide, shallow water with limited to no connection to floodplain habitat to a more confined low flow channel with pools and riffles and connection to active floodplain riparian and wetland habitat. This conversion would decrease water temperatures and increase dissolved oxygen, thus providing better habitat for native fish species. The proposed Project also would improve salmonid habitat through planting of native trees, which would provide shade, decreasing water temperatures, and contribute small and large organic debris which provide an important energy source to hyporheic and stream waters, and terrestrial invertebrates, which contribute to the food web of aquatic systems. The cooler water temperatures and increased dissolved oxygen levels would improve habitat conditions for salmonids and somewhat diminish conditions favoring invasive species such as largemouth bass, common carp, and sunfish.

Additionally, the Program could remove the seasonal earthen barrier between the Mace to Road 106A project reach and the Road 106A to Yolo Bypass Wildlife Area project reach and replace it with a non-sediment-based barrier, such as operable gates and a bridge. This would improve fish passage from the Yolo Bypass through the Program Area. In the long term, the Program would result in improved aquatic habitat for special-status and other native fish species. Aquatic habitat would be temporarily impacted by Program activities, which could increase sedimentation and remove segments of habitat from availability to aquatic species, including special-status fish species, during construction periods (e.g., when channel is dewatered or bypassed). Construction impacts to salmonids would be avoided by limitation of in-channel activities to the summer work window, when water temperatures are typically too high for them to be present. Implementation of Measure 3.4-10 would reduce construction impacts on aquatic habitat to a **less-than-significant** level.

Mitigation Measure 3.4-10: Implement Aquatic Habitat Protection.

Aquatic habitat shall be protected during Program ~~A~~ctivities by limiting the amount of in-channel work and implementing aquatic habitat protection measures. Silt fencing and other BMPs shall be installed to prevent the unintended discharge of excavated material and/or turbid water. Protective fencing and other measures shall be checked regularly and maintained until construction is complete. If portions of the channel are isolated, dewatered or bypassed, fish salvage shall be performed under the direct supervision of an approved biologist to avoid incidental take. Following installation of any water diversion structures, and prior to placement of any fill, the approved biologist shall perform surveys for any fish in the project area, collect, and transfer native fish, including

Pacific lamprey, to the nearest suitable habitat. During holding and transportation, fish would be held in stream water collected from the project reach.

- Before removal and relocation begins, the approved biologist, in consultation with the appropriate agencies, shall identify the most appropriate release location(s). Release locations should offer ample habitat for Pacific lamprey and other native fish and should be selected to minimize the likelihood of fish reentering the work area.
- Relocation activities shall be performed during the morning when temperatures are coolest. Air and water temperatures would be periodically measured during dewatering activities to ensure native fish that may be present are protected.
- If native fish are relocated, the following procedure shall be used:
    1. Handling of fish would be minimized. However, when handling is necessary, hands and nets would be wetted prior to handling.
    2. Any handled fish would be immediately placed in an aerated container with a lid in cool, shaded water. Aeration would be provided with a battery powered external bubbler. Fish would not be held more than 30 minutes.
    3. All handled fish would be moved directly to the nearest suitable habitat in the creek, as identified above.

Impact 3.4-11: Impacts on Wetland Habitats.

A wetland delineation report was prepared to determine the wetland boundaries within the Program Area (BSK, 2015a). Program construction activities would have direct and indirect impacts to wetlands, including potential disturbance to existing vegetation and soils.

Over the long term, impacts to wetlands would be mitigated through the conversion of low-quality and function wetlands to high-quality and function wetlands. In other words, although there would be a loss in Program Area total acres of low-value wetland, consisting primarily of small wetland features within the channel, the Program would increase the acreage of high-value wetlands. Low-value wetlands that are now overrun with invasive non-native plant species such as arundo and Himalayan blackberry would be converted to high- value wetlands occupied by primarily native wetland plant species. Therefore, the Program would have a **less-than-significant** impact on wetland habitats and no mitigation is required.

Impact 3.4-12: Impacts on Wildlife Corridors and Movement in the Program Area.

The proposed Program would restore and enhance habitat for native or migratory corridor species. Project construction could result in short-term disturbance and habitat removal. Resident and migratory species such as North American beaver and North American river otter may be present within the Program Area. These species are protected under the CDFGC (CDFW, 2014). Beaver can only be taken under license (CDFGC, Section 463), all take is prohibited for river otter (CDFGC, Section 460).

The Program could temporarily disturb and reduce wildlife migration and movement. However, the impact to these species would be temporary and reduced to **less than significant** with the implementation of Mitigation Measures 3.4-1 through 3.4-11.

Mitigation Measure 3.4-12~~1~~: Native or Migratory Fish or Wildlife Species Avoidance.

Native or migratory fish and wildlife species, such as North American beaver, North American otter, and other wildlife species shall be protected from construction staging and operations impacts through monitoring by a qualified biologist. Prior to construction, the construction work area shall be inspected for the presence of these species. If necessary, with consultation with CDFW, appropriate measures shall be taken to avoid and minimize impacts to these species. Additional specific measures to protect native or migratory wildlife species, may be required by CDFW under the 1600 series permit for the each project and shall be adhered to by the project proponent.

Impact 3.4-13: Impacts on Biological Resources from Herbicide Use.

As described in Chapter 2, *Project Description*, herbicides approved by the California Department of Pesticide Regulation may be used in accordance with their labels as part of Program activities to reduce invasive weed species. As described in Section 3.2, *Water Quality*, herbicides that may be used include glyphosate, triclopyr, imazapyr, aminopyralid, chlorsulfuron, dithiopyr, and isoxaben. Some form of chemical weed control would be used in every project reach for maintenance (see Chapter 2, *Project Description,* Table 2-1, Invasive Weed Control).

Following the recommendations of the CDFW, this section includes a discussion of environmental chemistry of herbicides that may be used as part of Program activities and their potential effects (CDFW, 2015, p. 3). Potential Program herbicide impacts specifically related to water quality are discussed in Section 3.2, *Water Quality*.

Glyphosate

This herbicide is among the most widely used in the U.S. and is of relatively low oral and dermal acute toxicity and has not been found to cause mutations (NPIC, 2015). Glyphosate residue in plants and animals has been well studied, and studies indicate that plant uptake of glyphosate from soil is limited (NPIC, 2015).

Environmental Fate and Ecological Risks

Glyphosate is not expected to move vertically below the 6-inch soil layer and residues are expected to be immobile in soil. Glyphosate accidentally over-sprayed on the water may contaminate surface waters because it would not be broken down readily by water or sunlight. US EPA has determined that the effects of glyphosate on birds, mammals, fish and invertebrates are minimal, but glyphosate may cause adverse effects to non-target terrestrial plants (US EPA, 1993, p. 4.). Thus, Program use of glyphosate would not be expected to significantly affect birds, mammals, fish, and invertebrates in the Program Area, but would be expected to harm any plants sprayed, including those sprayed inadvertently. Consequently, Program use of glyphosate could adversely impact elderberry plants.

For Program purposes, target plants would include arundo, eucalyptus, fennel (*Foeniculum vulgare*), Himalayan blackberry, pampas grass (*Cortaderia* spp.), milk thistle, perennial pepperweed, tree-of-heaven, tree tobacco (*Nicotiana glauca*), vinca (*Vinca major*), Virginia creeper *(Parthinocissus quincifolia*), and yellow starthistle. Glyphosate would also be used in Program activities as a pre-emergent control for winter annual weeds (see Chapter 2, *Project Description*, Table 2-1, Invasive Weed Control).

Mitigation Measure 3.4-12, below, would require all Program use of glyphosate to be applied only to target plants by a licensed applicator in accordance with label directions and US EPA recommendations (US EPA, 1993). Licensed applicators are required by law to avoid applying herbicides to non-target organisms. Additionally, Mitigation Measure 3.4-11 forbids herbicide use within 100 feet of blue elderberry plants and specifies that herbicides shall be applied only to target plants.

No mitigation is needed for organisms other than plants given that glyphosate's toxicity to birds, mammals, fish and invertebrates is minimal (US EPA, 1993, p. 4). Therefore, after mitigation, potential Program impacts related to use of glyphosate would be reduced to **less than significant**.

Triclopyr

Triclopyr is used as a selective herbicide to control broad leaf weeds on a variety of sites (US EPA, 1998, p. 1). Environmental risks are discussed below.

Environmental Fate and Ecological Risks

Triclopyr is somewhat persistent and is mobile in the environment. In water, triclopyr primarily breaks down through exposure to light (photodegradation). In soil, triclopyr primarily breaks down through microbial processes. Triclopyr is practically non-toxic to mammals and insects. Different triclopyr products have varying levels of toxicity to bird and fish species. Triclopyr TEA is practically non-toxic to slightly toxic to birds and estuarine/marine invertebrates and practically non-toxic to freshwater fish, freshwater invertebrates, and estuarine/marine fish. Testing of triclopyr BEE indicates it is slightly toxic to birds, moderately toxic to highly toxic to freshwater fish and estuarine/marine invertebrates, slightly to moderately toxic to freshwater invertebrates, and highly toxic to estuarine/marine fish. US EPA notes that flowing water systems would result in rapid dissipation of triclopyr (US EPA, 1998, pp. 4-5.) Thus, Program use of triclopyr would be expected to not significantly affect birds and mammals, and invertebrates in the Program Area, but would be expected to harm any plants or freshwater fish sprayed, including those sprayed accidentally. Consequently, Program use of triclopyr could adversely impact elderberry plants and freshwater fish.

For Program purposes, target plants would include almond (*Prunus dulcis*), black locust (*Robinia pseudoacacia*), catalpa (*Catalpa bignoniodes*), edible fig (*Ficus carica*), English ivy (*Hedera helix*), pepper tree (*Shinus molle*), tamarisk, tree-of-heaven, and tree tobacco (*Nicotiana glauca*) (see Chapter 2, *Project Description*, Table 2-1, Invasive Weed Control).

Mitigation Measure 3.4-12, below, would require all Program use of triclopyr to be applied only to target plants by a licensed applicator in accordance with label directions and US EPA recommendations to avoid spray drift to prevent toxicity to non-target organisms (US EPA, 1998). Licensed applicators are required by law to avoid applying herbicides to non-target organisms. Additionally, Mitigation Measure 3.4-12 forbids herbicide use within 100 feet of blue elderberry plants and specifies that herbicides shall be applied only to target plants. The measure also forbids use of triclopyr in open water and wetland areas.

Because on triclopyr's low toxicity to mammals, birds, and insects, no mitigation is needed for these organisms. Therefore, after mitigation, potential Program impacts related to use of triclopyr would be reduced to **less than significant**.

Imazapyr

Environmental Fate and Ecological Risks

Imazapyr is non-volatile, persistent, mobile in soil, and can move via runoff to surface water and to leach to groundwater. Imazapyr breaks down in the environment only through photolysis (breakdown by photons, including visible light, ultraviolet light, x-rays and gamma rays). Imazapyr is not expected to bioaccumulate in aquatic organisms (US EPA, 2006, p. 17).

US EPA does not consider imazapyr a risk to terrestrial birds, mammals, bees, fish, aquatic invertebrates, and aquatic non-vascular plants. US EPA is uncertain regarding imazapyr risks to estuarine/marine fish and invertebrates, due to an absence of toxicity data to observe long-term effects, but US EPA assumes that these organisms face no risk, similar to freshwater fish and invertebrates. However, US EPA does consider imazapyr a risk to non-target terrestrial plants and aquatic vascular plants, and a potential risk to federally listed threatened and endangered species, including aquatic vascular plants, terrestrial and semi-aquatic monocots and dicots (US EPA, 2006, pp. 1, 18).

Imazapyr is mainly used in aquatic and semi-aquatic weed control is to control nuisance and non-native weed species along shoreline areas of lakes, streams, or canals. Because imazapyr has no effect on submerged aquatic vegetation (SAV), it can be used in margin or shoreline areas to control weeds without the risk of damaging desirable SAV (US EPA, 2006, p. 33.) Thus, Program use of imazapyr would be expected to not significantly affect birds, mammals, bees, fish, aquatic invertebrates, and aquatic non-vascular plants in the Program Area, but would be expected to harm any terrestrial plants sprayed, including those sprayed accidentally. Consequently, Program use of imazapyr could adversely impact elderberry plants.

For Program purposes, target plants include almond, black locust, catalpa, English ivy, pepper tree, and tree-of-heaven (see Chapter 2, *Project Description*, Table 2-1, Invasive Weed Control).

Mitigation Measure 3.4-12, below, requires all Program use of imazapyr to be applied only to target plants by a licensed applicator in accordance with label directions and US EPA recommended methods to minimize potential risk to non-target organisms (US EPA, 2006). Licensed applicators are required by law to avoid applying herbicides to non-target organisms. Additionally, Mitigation Measure 3.4-12 forbids herbicide use within 100 feet of blue elderberry plants.

Because of imazapyr's low toxicity to birds, mammals, bees, fish, aquatic invertebrates, and aquatic non-vascular plants, no mitigation is needed for these organisms. Therefore, after mitigation, potential Program impacts related to use of imazapyr would be reduced to **less-than-significant**.

Aminopyralid

This herbicide could be used for control of milk thistle and yellow starthistle (see Chapter 2, *Project Description*, Table 2-1, Invasive Weed Control). It is particularly effective for yellow starthistle control (US EPA, 2005a, p. 20).

Environmental Fate and Ecological Risks

The primary way aminopyralid breaks down is by photolysis. Aminopyralid photolyzes moderately slowly in soils and is likely to be non-persistent and relatively immobile in the field (US EPA, 2005a, p. 6). Aminopyralid has been shown to be practically non-toxic to birds, fish, honeybees, earthworms, and aquatic invertebrates, but is slightly toxic to eastern oyster, algae, and aquatic vascular plants. Aminopyralid is not expected to bioaccumulate in fish tissue. The herbicide poses no acute or chronic risks to non-target endangered or non-endangered fish, birds, wild mammals, terrestrial and aquatic invertebrates, algae, or aquatic plants (US EPA, 2005a, p. 7). US EPA notes that compared to alternative herbicides, aminopyralid is less likely to impact terrestrial and aquatic plants (US EPA, 2005a, p. 20). Thus, Program use of aminopyralid would be expected to not significantly affect fish, birds, mammals, honeybees, earthworms, and aquatic invertebrates in the Program Area. Program use of aminopyralid could adversely impact elderberry plants if they were inadvertently sprayed.

For Program purposes, target plants include milk thistle and yellow starthistle (see Chapter 2, *Project Description*, Table 2-1, Invasive Weed Control).

Mitigation Measure 3.4-12, below, requires all Program use of aminopyralid to be applied only to target plants by a licensed applicator in accordance with label directions and with US EPA recommendations to apply aminopyralid using hand-spray and spot treatments only (US EPA, 2005a, p. 19). Licensed applicators are required by law to avoid applying herbicides to non-target organisms. Additionally, Mitigation Measure 3.4-12 forbids herbicide use within 100 feet of blue elderberry plants.

Because of aminopyralid's low toxicity to fish, birds, mammals, honeybees, earthworms, and aquatic invertebrates, no mitigation is needed for these organisms. Therefore, after

mitigation, potential Program impacts related to use of aminopyralid would be reduced to **less-than-significant**.

Chlorsulfuron

This herbicide would be used for control target species, such as perennial pepperweed (see Chapter 2, *Project Description*, Table 2-1, Invasive Weed Control).

Environmental Fate and Ecological Risks

US EPA conducted a screening level ecological risk assessment to determine the potential impact of chlorsulfuron use on non-target terrestrial and aquatic organisms. The assessment concluded that ecological risks are below the level of concern, with the exception of non-target plants. To minimize potential risk to non-target plants, US EPA requires that chlorsulfuron be applied to minimize spray drift. Adherence to the strict use restrictions on the labels for all chlorsulfuron products would substantially reduce, though not completely eliminate, risks to non-target plants (US EPA, 2005b, p. 5). Thus, Program use of chlorsulfuron would not be expected to significantly affect terrestrial and aquatic organisms in the Program Area, but would be expected to harm any terrestrial plants sprayed, including those sprayed accidentally. Consequently, Program use of chlorsulfuron could adversely impact elderberry plants.

Mitigation Measure 3.4-12, below, requires all Program use of chlorsulfuron to be applied only to target plants by a licensed applicator in accordance with label directions and to minimize spray drift. Licensed applicators are required by law to avoid applying herbicides to non-target organisms. Additionally, Mitigation Measure 3.4-12 forbids herbicide use within 100 feet of blue elderberry plants and specifies that herbicides shall be applied only to target plants.

Because of chlorsulfuron's low toxicity to terrestrial and aquatic organisms, no mitigation is needed for these organisms. Therefore, after mitigation, potential Program impacts related to use of chlorsulfuron would be reduced to **less-than-significant**.

Dithiopyr

This herbicide could be used as a pre-emergent control for winter annual weeds (see Chapter 2, *Project Description*, Table 2-1, Invasive Weed Control).

Environmental Fate and Ecological Risks

Toxicological data indicates that dithiopyr is of low acute toxicity to mammals and has little to no potential for groundwater contamination. It is non-mutagenic and does not

appear to be a developmental toxicant (US EPA, 1991, p. 2). In water, dithiopyr appears to break down through photodegradation, but dithiopyr does not photodegrade in soil (US EPA, 1991, p. 2). Dithiopyr is not very mobile in soil and residues do not persist beyond the growing season. Surface water contamination from soil containing the herbicide is to be expected. Dithiopyr has low toxicity to mammals and is practically non-toxic to birds, but is highly toxic to freshwater fish and aquatic invertebrates (US EPA, 1991, pp. 7-8). US EPA has concluded that use of dithiopyr according to its registered use pattern is unlikely to pose a hazard to endangered aquatic and avian species, but may pose a hazard to endangered plant species from runoff and movement from treated areas (US EPA, 1991, p. 8). Thus, Program use of dithiopyr would not be expected to significantly affect mammals, birds in the Program Area, but would be expected to harm any terrestrial plants sprayed, including those sprayed accidentally. Consequently, Program use of chlorsulfuron could adversely impact elderberry plants. If dithiopyr were allowed to runoff and migrate from treated areas, Program use of dithiopyr would also be expected to significantly affect freshwater fish and aquatic invertebrates in the Program Area.

Dithiopyr would be used in Program activities as a pre-emergent control for winter annual weeds (see Chapter 2, *Project Description*, Table 2-1, Invasive Weed Control). Mitigation Measure 3.4-12, below, requires all Program use of dithiopyr to be applied only to target plants by a licensed applicator in accordance with label directions and US EPA recommendations to minimize potential harm to non-target organisms (US EPA, 1991). Mitigation Measure 3.4-12 also forbids herbicide use within 100 feet of blue elderberry plants, and specifies that herbicides shall be applied only to target plants.

Mitigation Measure 3.4-12 also forbids use of dithiopyr in or near water due to its toxicity to fish. Additionally, licensed applicators are required by law to avoid applying herbicides to non-target organisms, therefore Mitigation Measure 3.4-12 would avoid herbicide application to non-target organisms during Program activities. Therefore, after mitigation, potential Program impacts related to use of dithiopyr would be reduced to **less-than-significant**.

Isoxaben

This herbicide is classified as low toxicity; it causes eye irritation and is harmful if inhaled (WSDOT, 2006, p. 1). It is considered practically non-toxic to mammals and birds, but its toxicity to fish and aquatic invertebrates has not been identified (WSDOT, 2006, p. 2).

Environmental Fate and Ecological Risks

Microbes and sunlight break down isoxaben, and the herbicide has a low potential to leach to groundwater. The herbicide is highly persistent in soil but breaks down quickly in water. Isoxaben does not bioconcentrate (build up) through the food chain (WSDOT, 2006, pp. 2-3).

Mammals and birds can be directly exposed to isoxaben herbicide residues through their skin or eyes or when they inhale vapors or particulates. They can be indirectly exposed by eating contaminated prey or vegetation. However, at typical application rates of 1.0 pound per acre per year as a broadcast treatment, isoxaben is considered to pose an insignificant risk to mammals. (WSDOT, 2006, pp. 1, 3.) Thus, Program use of isoxaben is not considered likely to result in significant impacts to mammals and birds in the Program Area, including to song sparrow, Swainson's hawk, white-tailed kite, and western pond turtle.

Fish and aquatic insect exposure to isoxaben occurs primarily through direct contact with contaminated surface waters and sediment, and extra precautions are taken when using isoxaben near open water, wetlands, and wellhead protection zones. Contamination could result from application drift, rainfall runoff, or residue leaching through the soil into groundwater. Because isoxaben breaks down quickly in water, it is expected that exposure to fish and aquatic invertebrates would be limited (WSDOT, 2006, pp. 3-4). Because isoxaben's toxicity to fish and aquatic invertebrates has not been identified, it could pose a risk of impacts to fish and aquatic invertebrates in the Program Area.

Isoxaben would be used in Program activities as a pre-emergent control for winter annual weeds (see Chapter 2, *Project Description*, Table 2-1, Invasive Weed Control). To minimize exposure to fish and aquatic invertebrates, Mitigation Measure 3.4-12 forbids application of isoxaben to water, to areas where surface water is present, to wetlands, or to intertidal areas below the mean high water mark. Additionally, licensed applicators are required by law to avoid applying herbicides to non-target organisms.

Mitigation Measure 3.4-12 below would require all Program use of isoxaben to be applied only by a licensed applicator in accordance with label directions and regulatory agency recommendations to control spray drift and minimize potential harm to non-target organisms (WSDOT, 2006). Mitigation Measure 3.4-12 forbids herbicide use within 100 feet of blue elderberry plants.

Because isoxaben is non-toxic to mammals and birds, no mitigation is needed for these organisms. Therefore, after mitigation, potential Program impacts related to use of isoxaben would be reduced to **less-than-significant**.

Mitigation Measure 3.4-12: Implement Herbicide Protective Actions.

During all Program activities, herbicides shall only be used by a licensed applicator and shall be applied only to target plants. Herbicides shall not be used within 100 feet of blue elderberry plants.

In order to avoid and minimize impacts related to herbicide use, use any herbicides during Program activities in accordance with all directions and protective actions listed on the product label of the herbicide being applied.

In addition, take the following actions to ensure protection of fish, plant, and bird life during use of the herbicides listed below:

Glyphosate:

a. Implement the following US EPA recommendations during Program activities (US EPA, 1993):
    i. For non-aquatic uses, do not apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high-water mark. Do not contaminate water when disposing of equipment washwaters and rinsate.
    ii. For aquatic uses, only end-use products that are registered for aquatic uses. Do not contaminate water when disposing of equipment washwaters and rinsate. Treatment of aquatic weeds can result in oxygen loss from decomposition for dead plants. This loss can cause fish kills.

Triclopyr:

a. As recommended by US EPA, avoid spray drift to prevent toxicity to non-target plants during Program activities (US EPA, 1998).
b. Do not apply to open water or wetland areas to prevent toxicity to freshwater fish.

Imazapyr:

a. Implement the following US EPA recommendations during Program activities (US EPA, 2006):

i. If groundborne application is performed, take the following precautions to minimize potential risk to non-target terrestrial plants, aquatic vascular plants, and threatened and endangered species (US EPA, 2006, p. 33):

- Use a nozzle height below 4 feet above the ground or plant canopy and coarse or coarser droplet size. (ASABE S572) or, if specifically using a spinning atomizer nozzle, use a volume mean diameter (VMD) of 385 microns or greater.
- Do not apply with wind speeds greater than 10 mph.
- Do not apply into temperature inversions.

b. To minimize potential risk to aquatic vascular plants, do not apply to bodies of water or portions of bodies of water where emergent and/or floating weeds do not exist (US EPA, 2006, p. 32-33).

Aminopyralid:

a. In addition to following all directions and protective actions listed on the product label, apply aminopyralid using hand-spray and spot treatments only (US EPA, 2005a, p. 19).

Chlorsulfuron:

a. To minimize potential harm to non-target plants, implement the following US EPA recommendations during Program activities (US EPA, 2005b, p. 6):

i. Employ measures to control spray drift.

ii. Restrict use to only one application per growing season.

Dithiopyr:

a. Do not apply dithiopyr in or near water due to its toxicity to fish.

b. To minimize potential harm to non-target plants, implement the following US EPA recommendations during Program activities (US EPA, 1991, p. 8):

i. Do not apply dithiopyr aerially.

Isoxaben:

a. To minimize exposure to fish and aquatic invertebrates, implement the following actions (WSDOT, 2006, p. 3):

i. Do not apply directly to water, to areas where surface water is present, to wetlands, or to intertidal areas below the mean high-water mark.

ii. Employ measures to control spray drift.

iii. Do not contaminate water when disposing of equipment washwaters and rinsate.

Project Area-Specific Impacts and Mitigation Measures

NAWCA/Mariani

Special-Status Species

As described in Impacts 3.4-1 through 3.4-13, implementation of the proposed Program activities in this reach would result in temporary disturbance of areas that could support special-status wildlife species, such as federal and California threatened or endangered species of special concern, including the valley elderberry longhorn beetle, Swainson's hawk, and the western pond turtle. Herbicide use during Program activities could impact elderberry plants that may be present within the project reach. Implementation of Mitigation Measures 3.4-1 through 3.4-12 would reduce this impact to a **less-than-significant** level.

Riparian Habitat

As described in Impact 3.4-9, in the long-term, riparian habitat within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could remove, move, or alte riparian habitat throughout the project reach. This impact would be reduced to a **less-than-significant** level by Mitigation Measure 3.4-9.

Fish

As described in Impact 3.4-10, in the long term the Program would improve aquatic habitat for native fish. Short-term construction activities could have direct and indirect impacts to aquatic habitat, through potential disturbance to existing vegetation, soils, and species. Short-term impacts would be **less than significant** with the implementation of Mitigation Measure 3.4-10.

Wetlands

As described in Impact 3.4-11, in the long-term, riverine wetlands within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could have direct and indirect impacts to wetlands, through potential disturbance to existing vegetation and soils. Over the long term, impacts to wetlands

would be self-mitigated through the conversion of low quality wetlands to high quality and high function wetlands. Therefore, there would be a **less-than-significant** impact to wetlands.

Species Movement

As described in Impact 3.4-12, implementation of Program activities may temporarily interfere with the movement of species within the project reach, including song sparrow (Modesto population), Swainson's hawk, valley elderberry longhorn beetle, western pond turtle, and white-tailed kite. Resident species such as the North American beaver, North American river otter, and native fish species movement may also be temporarily interfered with, due to Program activities. This temporary impact would only occur during construction activities. Mitigation Measure 3.4-11 would prevent any significant impacts on species movement during Project activities. This potentially significant impact would be reduced to a **less-than-significant** level with mitigation.

Herbicides

Herbicide use in the project reach could adversely impact freshwater fish and non-target plants, including elderberry. Implementation of Mitigation Measure 3.4-12 would reduce potentially significant impacts from herbicide use to a **less-than-significant** level.

Duncan-Giovannoni

Special-Status Species

As described in Impacts 3.4-1 through 3.4-13, implementation of the proposed Program activities would result in temporary disturbance of the project reaches that could support special-status wildlife species, such as federal and California threatened or endangered species of special concern, including the valley elderberry longhorn beetle, Swainson's hawk, and the western pond turtle. Herbicide use during Program activities could impact elderberry plants that may be present within this project reach. Implementation of Mitigation Measures 3.4-1 through 3.4-12 would reduce this impact to a **less-than-significant** level.

Riparian Habitat

As described in Impact 3.4-9, in the long-term, riparian habitat within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could remove, move, or alter riparian habitat throughout the project reach. This impact would be reduced to a **less-than-significant** level by Mitigation Measure 3.4-9.

Fish

As described in Impact 3.4-10, in the long term the Program would improve aquatic habitat for native fish. Short-term construction activities could have direct and indirect impacts to aquatic habitat, through potential disturbance to existing vegetation, soils, and species. Short-term impacts would be **less than significant** with the implementation of Mitigation Measure 3.4-10.

Wetlands

As described in Impact 3.4-11, in the long-term, riverine wetlands within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could have direct and indirect impacts to wetlands, through potential disturbance to existing vegetation and soils. Over the long term, impacts to wetlands would be self-mitigated through the conversion of low-quality wetlands to high quality and high function wetlands. Therefore, there would be a **less-than-significant** impact to wetlands.

Species Movement

As described in Impact 3.4-12, implementation of Program activities may temporarily interfere with the movement of species within the project reach, including song sparrow (Modesto population), Swainson's hawk, valley elderberry longhorn beetle, western pond turtle, and white-tailed kite. Resident species such as the North American beaver, North American river otter, and fish species movement may also be temporarily interfered with, due to Program activities. This temporary impact would only occur during construction activities. Mitigation Measure 3.4-11 would prevent any significant impacts on species movement during Project activities. This potentially significant impact would be reduced to a **less-than-significant** level with mitigation.

Herbicides

Herbicide use in the project reach could adversely impact freshwater fish and non-target plants, including elderberry. Implementation of Mitigation Measure 3.4-12 would reduce potentially significant impacts from herbicide use to a **less-than-significant** level.

Winters Putah Creek Nature Park

Special-Status Species

As described in Impacts 3.4-1 through 3.4-13, implementation of the proposed Program activities in this project reach would result in temporary disturbance that could support special-status wildlife species, such as federal and California threatened or endangered

species of special concern, including the valley elderberry longhorn beetle, Swainson's hawk, and the western pond turtle. Herbicide use during Program activities could impact elderberry plants that may be present within the project reach. Implementation of Mitigation Measures 3.4-1 through 3.4-12 would reduce this impact to a **less-than-significant** level.

Riparian Habitat

As described in Impact 3.4-9, in the long-term, riparian habitat within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could remov~~e~~, move, or alter~~ing~~ riparian habitat throughout the project reach. This impact would be reduced to a **less-than-significant** level by Mitigation Measure 3.4-9.

Fish

As described in Impact 3.4-10, in the long term the Program would improve aquatic habitat for native fish. Short-term construction activities could have direct and indirect impacts to aquatic habitat, through potential disturbance to existing vegetation, soils, and species. Short-term impacts would be **less than significant** with the implementation of Mitigation Measure 3.4-10.

Wetlands

As described in Impact 3.4-11, in the long-term, riverine wetlands within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could have direct and indirect impacts to wetlands, through potential disturbance to existing vegetation and soils. Over the long term, impacts to wetlands would be self-mitigated through the conversion of low-quality wetlands to high quality and high function wetlands. Therefore, there would be a **less-than-significant** impact to wetlands.

Species Movement

As described in Impact 3.4-12, implementation of Program activities may temporarily interfere with the movement of species within the project reach, including song sparrow (Modesto population), Swainson's hawk, valley elderberry longhorn beetle, western pond turtle, and white-tailed kite. Resident species such as the North American beaver, North American river otter, and fish species movement may also be temporarily interfered with, due to Program activities. This temporary impact would only occur during construction activities. Mitigation Measure 3.4-11 would prevent any significant impacts on species

movement during Project activities. This potentially significant impact would be reduced to a **less-than-significant** level with mitigation.

Herbicides

Herbicide use in the project reach could adversely impact freshwater fish and non-target plants, including elderberry. Implementation of Mitigation Measure 3.4-12 would reduce potentially significant impacts from herbicide use to a **less-than-significant** level.

East of 505

Special-Status Species

As described in Impacts 3.4-1 through 3.4-13, implementation of the proposed Program activities would result in temporary disturbance of the project reaches that could support special-status wildlife species, such as federal and California threatened or endangered species of special concern, including the valley elderberry longhorn beetle, Swainson's hawk, and the western pond turtle. Herbicide use during Program activities could impact elderberry plants that may be present within this project reach. Implementation of Mitigation Measures 3.4-1 through 3.4-12 would reduce this impact to a **less-than-significant** level.

Riparian Habitat

As described in Impact 3.4-9, in the long-term, riparian habitat within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could remove, move, or alter-riparian habitat throughout the project reach. This impact would be reduced to a **less-than-significant** level by Mitigation Measure 3.4-9.

Fish

As described in Impact 3.4-10, in the long term the Program would improve aquatic habitat for native fish. Short-term construction activities could have direct and indirect impacts to aquatic habitat, through potential disturbance to existing vegetation, soils, and species. Short-term impacts would be **less than significant** with the implementation of Mitigation Measure 3.4-10.

Wetlands

As described in Impact 3.4-11, in the long-term, riverine wetlands within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could have direct and indirect impacts to wetlands, through potential disturbance to existing vegetation and soils. Over the long term, impacts to wetlands

would be self-mitigated through the conversion of low-quality wetlands to high quality and high function wetlands. Therefore, there would be a **less-than-significant** impact to wetlands.

Species Movement

As described in Impact 3.4-12, implementation of Program activities may temporarily interfere with the movement of species within the project reach, including song sparrow (Modesto population), Swainson's hawk, valley elderberry longhorn beetle, western pond turtle, and white-tailed kite. Resident species such as the North American beaver, North American river otter, and fish species movement may also be temporarily interfered with, due to Program activities. This temporary impact would only occur during construction activities. Mitigation Measure 3.4-11 would prevent any significant impacts on species movement during Project activities. This potentially significant impact would be reduced to a **less-than-significant** level with mitigation.

Herbicides

Herbicide use in the project reach could adversely impact freshwater fish and non-target plants, including elderberry. Implementation of Mitigation Measure 3.4-12 would reduce potentially significant impacts from herbicide use to a **less-than-significant** level.

Warren, Upper McNamara, Lower McNamara

Special-Status Species

As described in Impacts 3.4-1 through 3.4-13, implementation of the proposed Program would result in temporary disturbance of the project reach that could support special-status wildlife species, such as federal and California threatened or endangered species of special concern, including the valley elderberry longhorn beetle, Swainson's hawk, and the western pond turtle. Herbicide use during Program activities could impact elderberry plants that may be present within the project reach. Implementation of Mitigation Measures 3.4-1 and 3.4-12 would reduce this impact to a **less-than-significant** level.

Riparian Habitat

As described in Impact 3.4-9, in the long-term, riparian habitat within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could remove, move, or alter-riparian habitat throughout the project reach. This impact would be reduced to a **less-than-significant** level by Mitigation Measure 3.4-9.

Fish

As described in Impact 3.4-10, in the long term the Program would improve aquatic habitat for native fish. Short-term construction activities could have direct and indirect impacts to aquatic habitat, through potential disturbance to existing vegetation, soils, and species. Short-term impacts would be **less than significant** with the implementation of Mitigation Measure 3.4-10.

Wetlands

As described in Impact 3.4-11, in the long-term, riverine wetlands within the project ~~Area~~ reach would be enhanced and restored as part of the Program. Short-term construction activities could have direct and indirect impacts to wetlands, through potential disturbance to existing vegetation and soils. Over the long term, impacts to wetlands would be self-mitigated through the conversion of low-quality wetlands to high quality and high function wetlands. Therefore, there would be a **less-than-significant** impact to wetlands.

Species Movement

As described in Impact 3.4-12, implementation of Program activities may temporarily interfere with the movement of species within the project reach, including song sparrow (Modesto population), Swainson's hawk, valley elderberry longhorn beetle, western pond turtle, and white-tailed kite. Resident species such as the North American beaver, North American river otter, and fish species movement may also be temporarily interfered with, due to Program activities. This temporary impact would only occur during construction activities. Mitigation Measure 3.4-11 would prevent any significant impacts on species movement during Project activities. This potentially significant impact would be reduced to a **less-than-significant** level with mitigation.

Herbicides

Herbicide use in the project reach could adversely impact freshwater fish and non-target plants, including elderberry. Implementation of Mitigation Measure 3.4-12 would reduce potentially significant impacts from herbicide use to a **less-than-significant** level.

MacQuiddy (Lester)

Special-Status Species

As described in Impacts 3.4-1 through 3.4-13, implementation of the proposed Program activities would result in temporary disturbance of the project reaches that could support special-status wildlife species, such as federal and California threatened or endangered

species of special concern, including the valley elderberry longhorn beetle, Swainson's hawk, and the western pond turtle. Herbicide use during Program activities could impact elderberry plants that may be present within this project reach. Implementation of Mitigation Measures 3.4-1 through 3.4-12 would reduce this impact to a **less-than-significant** level.

Riparian Habitat

As described in Impact 3.4-9, in the long-term, riparian habitat within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could remove, move, or alter-riparian habitat throughout the project reach. This impact would be reduced to a **less-than-significant** level by Mitigation Measure 3.4-9.

Fish

As described in Impact 3.4-10, in the long term the Program would improve aquatic habitat for native fish. Short-term construction activities could have direct and indirect impacts to aquatic habitat, through potential disturbance to existing vegetation, soils, and species. Short-term impacts would be **less than significant** with the implementation of Mitigation Measure 3.4-10.

Wetlands

As described in Impact 3.4-11, in the long-term, riverine wetlands within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could have direct and indirect impacts to wetlands, through potential disturbance to existing vegetation and soils. Over the long term, impacts to wetlands would be self-mitigated through the conversion of low-quality wetlands to high quality and high function wetlands. Therefore, there would be a **less-than-significant** impact to wetlands.

Species Movement

As described in Impact 3.4-12, implementation of Program activities may temporarily interfere with the movement of species within the project reach, including song sparrow (Modesto population), Swainson's hawk, valley elderberry longhorn beetle, western pond turtle, and white-tailed kite. Resident species such as the North American beaver, North American river otter, and fish species movement may also be temporarily interfered with, due to Program activities. This temporary impact would only occur during construction activities. Mitigation Measure 3.4-11 would prevent any significant impacts on species movement during Project activities. This potentially significant impact would be reduced to a **less-than-significant** level with mitigation.

Herbicides

Herbicide use in the project reach could adversely impact freshwater fish and non-target plants, including elderberry. Implementation of Mitigation Measure 3.4-12 would reduce potentially significant impacts from herbicide use to a **less-than-significant** level.

Russell Ranch

Special-Status Species

As described in Impacts 3.4-1 through 3.4-13, implementation of the proposed Program activities would result in temporary disturbance of the project reach that could support special-status wildlife species, such as federal and California threatened or endangered species of special concern, including the valley elderberry longhorn beetle, Swainson's hawk, and the western pond turtle. Herbicide use during Program activities could impact elderberry plants that may be present within the project reach Implementation of Mitigation Measures 3.4-1 through 3.4-12 would reduce this impact to a **less-than-significant** level.

Riparian Habitat

As described in Impact 3.4-9, in the long-term, riparian habitat within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could remove, move, or alter the vegetation and the channel to enhance riparian habitat throughout the project reach. This impact would be reduced to a **less-than-significant** level by Mitigation Measure 3.4-9.

Fish

As described in Impact 3.4-10, in the long term the Program would improve aquatic habitat for native fish. Short-term construction activities could have direct and indirect impacts to aquatic habitat, through potential disturbance to existing vegetation, soils, and species. Short-term impacts would be **less than significant** with the implementation of Mitigation Measure 3.4-10.

Wetlands

As described in Impact 3.4-11, in the long-term, riverine wetlands within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could have direct and indirect impacts to wetlands, through potential disturbance to existing vegetation and soils. Over the long term, impacts to wetlands would be self-mitigated through the conversion of low-quality wetlands to high quality

and high function wetlands. Therefore, there would be a **less-than-significant** impact to wetlands.

Species Movement

As described in Impact 3.4-12, implementation of Program activities may temporarily interfere with the movement of species within the project reach, including song sparrow (Modesto population), Swainson's hawk, valley elderberry longhorn beetle, western pond turtle, and white-tailed kite. Resident species such as the North American beaver, North American river otter, and fish species movement may also be temporarily interfered with, due to Program activities. This temporary impact would only occur during construction activities. Mitigation Measure 3.4-11 would prevent any significant impacts on species movement during Project activities. This potentially significant impact would be reduced to a **less-than-significant** level with mitigation.

Herbicides

Herbicide use in the project reach could adversely impact freshwater fish and non-target plants, including elderberry. Implementation of Mitigation Measure 3.4-12 would reduce potentially significant impacts from herbicide use to a **less-than-significant** level.

Stevenson Bridge

Special-Status Species

As described in Impacts 3.4-1 through 3.4-13, implementation of the proposed Program activities would result in temporary disturbance of the project reaches that could support special-status wildlife species, such as federal and California threatened or endangered species of special concern, including the valley elderberry longhorn beetle, Swainson's hawk, and the western pond turtle. Herbicide use during Program activities could impact elderberry plants that may be present within this project reach. Implementation of Mitigation Measures 3.4-1 through 3.4-12 would reduce this impact to a **less-than-significant** level.

Riparian Habitat

As described in Impact 3.4-9, in the long term, riparian habitat within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could remove, move or alter-riparian habitat throughout the project reach. This impact would be reduced to a **less-than-significant** level by Mitigation Measure 3.4-9.

Fish

As described in Impact 3.4-10, in the long term the Program would improve aquatic habitat for native fish. Short-term construction activities could have direct and indirect impacts to aquatic habitat, through potential disturbance to existing vegetation, soils, and species. Short-term impacts would be **less than significant** with the implementation of Mitigation Measure 3.4-10.

Wetlands

As described in Impact 3.4-11, in the long-term, riverine wetlands within the project ~~Area~~ reach would be enhanced and restored as part of the Program. Short-term construction activities could have direct and indirect impacts to wetlands, through potential disturbance to existing vegetation and soils. Over the long term, impacts to wetlands would be self-mitigated through the conversion of low-quality wetlands to high quality and high function wetlands. Therefore, there would be a **less-than-significant** impact to wetlands.

Species Movement

As described in Impact 3.4-12, implementation of Program activities may temporarily interfere with the movement of species within the project reach, including song sparrow (Modesto population), Swainson's hawk, valley elderberry longhorn beetle, western pond turtle, and white-tailed kite. Resident species such as the North American beaver, North American river otter, and fish species movement may also be temporarily interfered with, due to Program activities. This temporary impact would only occur during construction activities. Mitigation Measure 3.4-11 would prevent any significant impacts on species movement during Project activities. This potentially significant impact would be reduced to a **less-than-significant** level with mitigation.

Herbicides

Herbicide use in the project reach could adversely impact freshwater fish and non-target plants, including elderberry. Implementation of Mitigation Measure 3.4-12 would reduce potentially significant impacts from herbicide use to a **less-than-significant** level.

Glide Ranch, Nishikawa

Special-Status Species

As described in Impacts 3.4-1 through 3.4-13, implementation of the proposed Program activities would result in temporary disturbance of the project reach that could support special-status wildlife species, such as federal and California threatened or endangered

species of special concern, including the valley elderberry longhorn beetle, Swainson's hawk, and the western pond turtle. Herbicide use during Program activities could impact elderberry plants that may be present within the project reach. Implementation of Mitigation Measures 3.4-1 through 3.4-12 would reduce this impact to a **less-than-significant** level.

Riparian Habitat

As described in Impact 3.4-9, in the long-term, riparian habitat within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could remove, move, or alter riparian habitat throughout the project reach. This impact would be reduced to a **less-than-significant** level by Mitigation Measure 3.4-9.

Fish

As described in Impact 3.4-10, in the long term the Program would improve aquatic habitat for native fish. Short-term construction activities could have direct and indirect impacts to aquatic habitat, through potential disturbance to existing vegetation, soils, and species. Short-term impacts would be **less than significant** with the implementation of Mitigation Measure 3.4-10.

Wetlands

As described in Impact 3.4-11, in the long-term, riverine wetlands within the project ~~Area~~ reach would be enhanced and restored as part of the Program. Short-term construction activities could have direct and indirect impacts to wetlands, through potential disturbance to existing vegetation and soils. Over the long term, impacts to wetlands would be self-mitigated through the conversion of low-quality wetlands to high quality and high function wetlands. Therefore, there would be a **less-than-significant** impact to wetlands.

Species Movement

As described in Impact 3.4-12, implementation of Program activities may temporarily interfere with the movement of species within the project reach including song sparrow (Modesto population), Swainson's hawk, valley elderberry longhorn beetle, western pond turtle, and white-tailed kite. Resident species such as the North American beaver, North American river otter, and fish species movement may also be temporarily interfered with, due to Program activities. This temporary impact would only occur during construction activities. Mitigation Measure 3.4-11 would prevent any significant impacts on species movement during Project activities. This potentially significant impact would be reduced to a **less-than-significant** level with mitigation.

Herbicides

Herbicide use in the project reach could adversely impact freshwater fish and non-target plants, including elderberry. Implementation of Mitigation Measure 3.4-12 would reduce potentially significant impacts from herbicide use to a **less-than-significant** level.

Olmo-Hammond-UCD

Special-Status Species

As described in Impacts 3.4-1 through 3.4-13, implementation of the proposed Program activities would result in temporary disturbance of the project reaches that could support special-status wildlife species, such as federal and California threatened or endangered species of special concern, including the valley elderberry longhorn beetle, Swainson's hawk, and the western pond turtle. Herbicide use during Program activities could impact elderberry plants that may be present within this project reach. Implementation of Mitigation Measures 3.4-1 through 3.4-12 would reduce this impact to a **less-than-significant** level.

Riparian Habitat

As described in Impact 3.4-9, in the long-term, riparian habitat within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could remove, move, or alter-riparian habitat throughout the project reach. This impact would be reduced to a **less-than-significant** level by Mitigation Measure 3.4-9.

Fish

As described in Impact 3.4-10, in the long term the Program would improve aquatic habitat for native fish. Short-term construction activities could have direct and indirect impacts to aquatic habitat, through potential disturbance to existing vegetation, soils, and species. Short-term impacts would be **less than significant** with the implementation of Mitigation Measure 3.4-10.

Wetlands

As described in Impact 3.4-11, in the long-term, riverine wetlands within the project ~~Area~~ reach would be enhanced and restored as part of the Program. Short-term construction activities could have direct and indirect impacts to wetlands, through potential disturbance to existing vegetation and soils. Over the long term, impacts to wetlands would be self-mitigated through the conversion of low-quality wetlands to high quality and high function wetlands. Therefore, there would be a **less-than-significant** impact to wetlands.

Species Movement

As described in Impact 3.4-12, implementation of Program activities may temporarily interfere with the movement of species within the project reach, including song sparrow (Modesto population), Swainson's hawk, valley elderberry longhorn beetle, western pond turtle, and white-tailed kite. Resident species such as the North American beaver, North American river otter, and fish species movement may also be temporarily interfered with, due to Program activities. This temporary impact would only occur during construction activities. Mitigation Measure 3.4-11 would prevent any significant impacts on species movement during Project activities. This potentially significant impact would be reduced to a **less-than-significant** level with mitigation.

Herbicides

Herbicide use in the project reach could adversely impact freshwater fish and non-target plants, including elderberry. Implementation of Mitigation Measure 3.4-12 would reduce potentially significant impacts from herbicide use to a **less-than-significant** level.

I-80 to Old Davis Road, Old Davis Road to Mace

Special-Status Species

As described in Impacts 3.4-1 through 3.4-13, implementation of the proposed Program activities would result in temporary disturbance of the project reaches that could support special-status wildlife species, such as federal and California threatened or endangered species of special concern, including the valley elderberry longhorn beetle, Swainson's hawk, and the western pond turtle. Herbicide use during Program activities could impact elderberry plants that may be present within this project reach. Implementation of Mitigation Measures 3.4-1 through 3.4-12 would reduce this impact to a **less-than-significant** level.

Riparian Habitat

As described in Impact 3.4-9, in the long-term, riparian habitat within the project reaches ~~Area~~ would be enhanced and restored as part of the Program. Short-term construction activities could remove, move, or alter riparian habitat throughout these two project reaches. This impact would be reduced to a **less-than-significant** level by Mitigation Measure 3.4-9.

Fish

As described in Impact 3.4-10, in the long term the Program would improve aquatic habitat for native fish. Short-term construction activities could have direct and indirect

impacts to aquatic habitat, through potential disturbance to existing vegetation, soils, and species. Short-term impacts would be **less than significant** with the implementation of Mitigation Measure 3.4-10.

Wetlands

As described in Impact 3.4-11, in the long-term, riverine wetlands within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could have direct and indirect impacts to wetlands, through potential disturbance to existing vegetation and soils. Over the long term, impacts to wetlands would be self-mitigated through the conversion of low-quality wetlands to high quality and high function wetlands. Therefore, there would be a **less-than-significant** impact to wetlands.

Species Movement

As described in Impact 3.4-12, implementation of Program activities may temporarily interfere with the movement of species within the project reach, including song sparrow (Modesto population), Swainson's hawk, valley elderberry longhorn beetle, western pond turtle, and white-tailed kite. Resident species such as the North American beaver, North American river otter, and fish species movement may also be temporarily interfered with, due to Program activities. This temporary impact would only occur during construction activities. Mitigation Measure 3.4-11 would prevent any significant impacts on species movement during Project activities. This potentially significant impact would be reduced to a **less-than-significant** level with mitigation.

Herbicides

Herbicide use in the project reach could adversely impact freshwater fish and non-target plants, including elderberry. Implementation of Mitigation Measure 3.4-12 would reduce potentially significant impacts from herbicide use to a **less-than-significant** level.

Mace to Road 106A

Special-Status Species

As described in Impacts 3.4-1 through 3.4-13, implementation of the proposed Program activities would result in temporary disturbance of the project reaches that could support special-status wildlife species, such as federal and California threatened or endangered species of special concern, including the valley elderberry longhorn beetle, Swainson's hawk, and the western pond turtle. Herbicide use during Program activities could impact elderberry plants that may be present within this project reach. Implementation of

Mitigation Measures 3.4-1 through 3.4-12 would reduce this impact to a **less-than-significant** level.

Riparian Habitat

As described in Impact 3.4-9, in the long-term, riparian habitat within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could remove, move, or alter-riparian habitat throughout the project reach. This impact would be reduced to a **less-than-significant** level by Mitigation Measure 3.4-9.

Fish

As described in Impact 3.4-10, in the long term the Program would improve aquatic habitat for native fish. Short-term construction activities could have direct and indirect impacts to aquatic habitat, through potential disturbance to existing vegetation, soils, and species. Short-term impacts would be **less than significant** with the implementation of Mitigation Measure 3.4-10.

Wetlands

As described in Impact 3.4-11, in the long-term, riverine wetlands within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could have direct and indirect impacts to wetlands, through potential disturbance to existing vegetation and soils. Over the long term, impacts to wetlands would be self-mitigated through the conversion of low-quality wetlands to high quality and high function wetlands. Therefore, there would be a **less-than-significant** impact to wetlands.

Species Movement

As described in Impact 3.4-12, implementation of Program activities may temporarily interfere with the movement of species within the project reach, including song sparrow (Modesto population), Swainson's hawk, valley elderberry longhorn beetle, western pond turtle, and white-tailed kite. Resident species such as the North American beaver, North American river otter, and fish species movement may also be temporarily interfered with, due to Program activities. This temporary impact would only occur during construction activities. Mitigation Measure 3.4-11 would prevent any significant impacts on species movement during Project activities. This potentially significant impact would be reduced to a **less-than-significant** level with mitigation.

Herbicides

Herbicide use in the project reach could adversely impact freshwater fish and non-target plants, including elderberry. Implementation of Mitigation Measure 3.4-12 would reduce potentially significant impacts from herbicide use to a **less-than-significant** level.

Road 106A to Yolo Bypass Wildlife Area

Special-Status Species

As described in Impacts 3.4-1 through 3.4-13, implementation of the proposed Program activities would result in temporary disturbance of the project reach that could support special-status wildlife species, such as federal and California threatened or endangered species of special concern, including the valley elderberry longhorn beetle, Swainson's hawk, and western pond turtle. Herbicide use during Program activities could impact elderberry plants that may be present within the project reach. Implementation of Mitigation Measures 3.4-1 through 3.4-12 would reduce this impact to a **less-than-significant** level.

Riparian Habitat

As described in Impact 3.4-9, in the long-term, riparian habitat within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could remove, move, or alter riparian habitat throughout the project reach. This impact would be reduced to a **less-than-significant** level by Mitigation Measure 3.4-9.

Fish

As described in Impact 3.4-10, in the long term the Program would improve aquatic habitat for native fish. Short-term construction activities could have direct and indirect impacts to aquatic habitat, through potential disturbance to existing vegetation, soils, and species. Short-term impacts would be **less than significant** with the implementation of Mitigation Measure 3.4-10.

Wetlands

As described in Impact 3.4-11, in the long-term, riverine wetlands within the project reach would be enhanced and restored as part of the Program. Short-term construction activities could have direct and indirect impacts to wetlands, through potential disturbance to existing vegetation and soils. Over the long term, impacts to wetlands would be self-mitigated through the conversion of low quality wetlands to high quality and high function wetlands. Therefore, there would be a **less-than-significant** impact to wetlands.

Species Movement

As described in Impact 3.4-12, implementation of Program activities may temporarily interfere with the movement of species within the project reach, including song sparrow (Modesto population), Swainson's hawk, valley elderberry longhorn beetle, western pond turtle, and white-tailed kite. Resident species such as the North American beaver, North American river otter, and fish species movement may also be temporarily interfered with, due to Program activities. This temporary impact would only occur during construction activities. Mitigation Measure 3.4-11 would prevent any significant impacts on species movement during Project activities. This potentially significant impact would be reduced to a **less-than-significant** level with mitigation.

Herbicides

Herbicide use in the project reach could adversely impact freshwater fish and non-target plants, including elderberry. Implementation of Mitigation Measure 3.4-12 would reduce potentially significant impacts from herbicide use to a **less-than-significant** level.

Table 3.4-3 Summary of Biological Resources Impacts and Mitigation Measures

Reach	Impact 3.4-1: Special-Status Species and Habitats	Impact 3.4-2: Western Pond Turtle	Impact 3.4-3: Giant Garter Snake	Impact 3.4-4: Impacts on Valley elderberry longhorn beetle (VELB)	Impact 3.4-5: Impacts on Swainson's Hawk	Impact 3.4-6: Impacts on Nesting Birds	Impact 3.4-7: Impacts on Special-Status Bats	Impact 3.4-8: Impacts on Rare Plants	Impact 3.4-9: Impacts on Riparian Habitat	Impact 3.4-10: Impacts on Fish	Impact 3.4-11: Impacts on Wetland Habitats	Impact 3.4-12: Impacts on Wildlife Movement	Impact 3.4-13: Impacts on Biological Resources from Herbicide Use	Applicable Mitigation Measures
NAWCA/Mariani	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-12
Duncan-Giovannoni	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-12
Winters Putah Creek Nature Park	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-12
East of 505	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-12
Warren	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-11
Upper McNamara	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-12
Lower McNamara	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-12
MacQuiddy (Lester)	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-12
Russell Ranch	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-12

Table 3.4-3 Summary of Biological Resources Impacts and Mitigation Measures

Reach	Impact 3.4-1: Special-Status Species and Habitats	Impact 3.4-2: Western Pond Turtle	Impact 3.4-3: Giant Garter Snake	Impact 3.4-4: Impacts on Valley elderberry longhorn beetle (VELB)	Impact 3.4-5: Impacts on Swainson's Hawk	Impact 3.4-6: Impacts on Nesting Birds	Impact 3.4-7: Impacts on Special-Status Bats	Impact 3.4-8: Impacts on Rare Plants	Impact 3.4-9: Impacts on Riparian Habitat	Impact 3.4-10: Impacts on Fish	Impact 3.4-11: Impacts on Wetland Habitats	Impact 3.4-12: Impacts on Wildlife Movement	Impact 3.4-13: Impacts on Biological Resources from Herbicide Use	Applicable Mitigation Measures
Stevenson Bridge	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-12
Glide Ranch	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-12
Nishikawa	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-12
Olmo-Hammond-UC Davis	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-12
I-80 to Old Davis Road	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-12
Old Davis Road to Mace	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-12
Mace to Road 106A	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-12
Road 106A to YBWA	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM	SM	MM 3.4-1 – 3.4-12

Notes: NI = No Impact, LS = LTS = Less-than-significant Impact, SM = Significant but Mitigatable to Less-than-significant with measures identified in this section, SU = Significant and Unavoidable, even after mitigation.

3.5 AIR QUALITY, GREENHOUSE GAS EMISSIONS, AND ENERGY

This section evaluates air quality criteria pollutant emissions, greenhouse gas (GHG) emissions, and energy usage that would occur with the implementation of the proposed project.

3.5.1 Setting

Environmental Setting

Air quality is a function of both the rate and location of pollutant emissions, under the influence of meteorological conditions and topographic features that influence pollutant movement and dispersal. Atmospheric conditions such as wind speed and direction, atmospheric stability, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants, which affect air quality.

Regional Topography, Meteorology, and Climate

California is divided geographically into air basins for the purpose of managing air resources on a regional basis. The project site is within the Sacramento Valley Air Basin (SVAB), which encompasses 11 counties including all of Shasta, Tehama, Glenn, Colusa, Butte, Sutter, Yuba, Sacramento, and Yolo counties, the westernmost portion of Placer County and the northeastern half of Solano County. Throughout most of the project site, Putah Creek forms the border between Solano and Yolo Counties, and a portion of the project site is in the cities of Winters and Davis.

The distinctive climate of the SVAB is determined by its terrain and geographic location. The SVAB is bounded by the Northern Sierra Nevada Mountains in the east and the North Coast Ranges to the west. The SVAB's Mediterranean climate is characterized by hot, dry summers and mild, rainy winters with temperatures ranging from 30 to 115 degrees Fahrenheit (°F) annually. Average annual rainfall is 15 inches and occurs primarily from November through March. The prevailing winds are moderate in strength, and consist of dry inland flow from the north and moist marine flow from the south (SACOG, 2011).

The surrounding mountains can trap air pollutants by restricting airflow into and out of the SVAB. During the fall and early winter, large high-pressure cells collect over the Sacramento Valley and reduce surface winds and vertical air flow. These conditions restrict the influx of air into the basin and allow air pollutants to become more

concentrated. Concentrations of surface air pollutants can also increase under the influence of boundary-layer temperature inversions (SACOG, 2011).

Criteria Air Pollutants

Regulation of air pollution is achieved through both federal and state ambient air quality standards and emission limits for individual sources of air pollutants. As required by the federal Clean Air Act, the U.S. Environmental Protection Agency (US EPA) has identified criteria pollutants and has established National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. NAAQS have been established for ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), coarse and fine particulate matter (PM_{10} and $PM_{2.5}$), and lead (Pb). These pollutants are called "criteria" air pollutants because standards have been established for each of them to meet specific public health and welfare criteria.

California has adopted more stringent ambient air quality standards called California Ambient Air Quality Standards (CAAQS) for most of the criteria air pollutants, along with standards for sulfates, hydrogen sulfide, and vinyl chloride. Emissions of these pollutants would not occur with project implementation and therefore are not further analyzed in this EIR.

The physical characteristics and health effects of the criteria pollutants are summarized below:

- Ozone is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections and that can cause substantial damage to vegetation and other materials. Ozone is not emitted directly into the atmosphere, but is a secondary air pollutant produced through a complex series of photochemical reactions involving reactive organic gases (ROG) and nitrogen oxides (NO_x). ROG and NO_x are known as precursor compounds for ozone production. Concentrations tend to be higher in the late spring, summer, and fall, when the long sunny days combine with regional air subsidence inversions to create conditions conducive to the formation and accumulation of secondary photochemical compounds such as ozone.
- CO is a non-reactive pollutant that is a product of incomplete combustion and is mostly associated with motor vehicle traffic. High CO concentrations develop primarily during winter, when periods of light winds combine with the formation of ground level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. In high

concentrations, it can cause physiological and pathological changes sometimes resulting in death by interfering with oxygen transport in the blood.

- PM_{10} and $PM_{2.5}$ represent fractions of particulate matter that can be inhaled, causing adverse health effects. PM in the atmosphere results from many kinds of dust and fume producing industrial and agricultural operations, fuel combustion, and atmospheric photochemical reactions. Some sources of PM, such as demolition and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. Very small particles of certain substances (e.g., sulfates and nitrates) can cause lung damage directly or can contain adsorbed gases (e.g., chlorides or ammonium) that may be injurious to health. Particulates can also damage materials and reduce visibility.
- SO_2 is a combustion product of sulfur or sulfur-containing fuels such as coal. Sulfur dioxide also is a precursor to the formation of atmospheric sulfate and PM (both PM_{10} and $PM_{2.5}$) and contributes to potential atmospheric sulfuric acid formation that could precipitate downwind as acid rain.
- Nitrogen Oxides (NO_x) form when combustion temperatures are extremely high, as in aircraft, truck and automobile engines, and atmospheric nitrogen combines with oxygen to form various oxides of nitrogen. Nitric oxide (NO) and nitrogen dioxide (NO_2) are the most significant air pollutants generally referred to as NOx. Nitric oxide is a colorless and odorless gas that is relatively harmless to humans, quickly converts to NO_2 and can be measured. Nitrogen dioxide has been found to be a lung irritant capable of producing pulmonary edema. Inhaling NO_2 can lead to respiratory illnesses such as bronchitis and pneumonia.
- Lead has a range of adverse neurotoxic health effects, and was formerly released into the atmosphere primarily via leaded gasoline. The phasing out of leaded gasoline in California has resulted in decreasing levels of atmospheric lead.

Toxic Air Contaminants

In addition to criteria air pollutants, toxic air contaminants (TACs) are another group of pollutants of concern. TACs, termed hazardous air pollutants (HAPs) under federal regulations, are air pollutants that may cause or contribute to an increase in mortality or serious illness, or may otherwise pose a hazard to human health. There are various sources of TACs, including industrial processes, commercial operations such as gasoline stations and dry cleaners, as well as motor vehicle exhaust. Nearly 200 substances have been designated TACs under California law, including benzene and diesel particulate matter (DPM).

Existing Air Quality Conditions

The Yolo-Solano Air Quality Management District (YSAQMD) operates a regional monitoring network for ambient concentrations of criteria pollutants. Currently, the criteria pollutants of most concern in the SVAB are ozone and PM. The YSAQMD-operated monitoring stations closest to the project site that represent the rural nature of the project area are the Davis station at UC Davis, approximately 2 miles to the north of the site, and the Woodland station on Gibson Road, approximately 10 miles to the north of the project site. The Davis monitoring station measures hourly ozone, 8-hour ozone, $PM_{2.5}$, and NO_2. The Woodland monitoring station measures hourly ozone, 8-hour ozone, $PM_{2.5}$, and PM_{10}.

Table 3.5-1 summarizes the most recent three years of available air monitoring data (i.e., 2018 through 2020) published by the California Air Resources Board (CARB) for the Davis (for hourly ozone, 8-hour ozone, $PM_{2.5}$, and NO_2) and Woodland (for PM_{10}) stations. The data show a small number of violations related to state and federal ozone standards in 2018, and a high number of violations related to state and federal PM_{10} and $PM_{2.5}$ standards in 2018 (likely related to wildfire). No other state or federal air quality standards were exceeded during the three-year period.

Table 3.5-1 Air Quality Data Summary for Davis and Woodland, CA, 2018-2020

		Days Standard Exceeded		
Pollutant	**Standard**	**2018**	**2019**	**2020**
Davis – UC Davis Campus				
Ozone	State 1–Hour	1	0	0
	Federal 8–Hour	1	0	0
	State 8–Hour	1	0	0
NO_2	Federal 1–Hour	0	0	0
	State 1–Hour	0	0	0
Woodland – Gibson Road				
PM_{10}	Federal 24–Hour	6	0	NA
	State 24–Hour	25	NA	NA
$PM_{2.5}$	Federal 24–Hour	12	NA	NA

Note: NA: No data available. PM_{10} and $PM_{2.5}$ days exceeded are estimated, as they are not measured daily.
Source: California Air Resources Board (CARB). 2022. Aerometric Data Analysis and Management (ADAM). Available at: http://www.arb.ca.gov/adam/

The SVAB is currently designated "nonattainment" for State and federal ozone standards, the State PM_{10} standard, and federal $PM_{2.5}$ standard. The SVAB is designated "attainment" or "unclassified" with respect to the other ambient air quality standards.

Sensitive Receptors

Sensitive receptors represent people who are considered to be more sensitive than others to air pollutant impacts. The reasons for greater than average sensitivity include preexisting health problems, proximity to emissions sources, or duration of exposure to air pollutants. Schools, hospitals, and convalescent homes are considered to be relatively sensitive to poor air quality because children, elderly people, and the infirm are more susceptible to respiratory distress and other air quality related health problems than the general public. Residential areas are considered sensitive to poor air quality because people usually stay home for extended periods of time, with associated greater exposure to ambient air quality. Recreational land uses are also considered sensitive due to the greater exposure to ambient air quality conditions, because vigorous exercise associated with some forms of recreation places a high demand on the human respiratory system.

Greenhouse Gases

GHGs include both naturally occurring and anthropogenic gases that trap heat in the earth's atmosphere. GHGs include but are not limited to carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydro fluorocarbons (HFC), perfluorocarbons (PFC), nitrogen trifluroide (NF_3), and sulfur hexafluoride (SF_6).

Gases that trap heat in the atmosphere are referred to as GHGs because they capture heat radiated from the sun and re-radiated from the Earth's surface as it is reflected back into the atmosphere, roughly analogous to the retention of heat energy in a greenhouse. The accumulation of GHGs has been implicated as a driving force for Global Climate Change. Definitions of climate change vary between and across regulatory authorities and the scientific community, but in general can be described as the changing of the earth's climate caused by natural fluctuations and the impact of human activities that alter the composition of the global atmosphere. Both natural processes and human activities emit GHGs.

The accumulation of GHGs in the atmosphere regulates the earth's temperature; however, emissions from human activities such as electricity production and motor vehicles have elevated the concentration of GHGs in the atmosphere.

Energy

Energy resources include electricity, natural gas, and petroleum fuels (gasoline and diesel). The proposed project would not require electricity or natural gas. Energy resources would be consumed by onsite equipment and vehicles, which would consume petroleum fuels (gasoline and diesel). In 2021, roughly 134.83 billion gallons of finished motor gasoline and 46.82 billion gallons of diesel fuel was consumed by the U.S. transportation sector (U.S. EIA, 2021).

Regulatory Setting

Federal Regulations

United States Environmental Protection Agency

The US EPA has established NAAQS for outdoor concentrations of the following "criteria" pollutants: CO, NO_2, Ozone, SO_2, and PM_{10}, $PM_{2.5}$, and lead. An ambient air quality standard establishes the concentration above which the pollutant is known to cause adverse health effects to sensitive groups within the population such as children and the elderly.

Clean Air Act

Under the federal Clean Air Act (CAA), each state must identify non-attainment areas that do not meet the NAAQS. For any non-attainment designation, a State Implementation Plan (SIP) is developed to define actions to be taken to achieve future attainment of the applicable NAAQS. In summary, an attainment area is any area that meets the NAAQS; a non-attainment area is any area that does not meet the NAAQS; and a maintenance area is any area previously designated non-attainment but is in transition back to attainment. The SVAB is currently in "severe" non-attainment of the 8-hour ozone (2008) NAAQS, "serious" non-attainment of the 8-hour ozone (2015) NAAQS, and "moderate" non-attainment for the $PM_{2.5}$ (2006) NAAQS.

State Regulations

The CARB is responsible for establishing and reviewing the CAAQS, compiling the California SIP, securing approval of the SIP from the EPA, conducting research and planning, and identifying TACs. CARB also regulates mobile sources of emissions in California, such as construction equipment, trucks, and automobiles, and oversees the activities of California's air quality management districts, which are organized at the county or regional level. These districts are primarily responsible for regulating stationary sources at industrial and commercial facilities within their geographic areas. The Districts

are also responsible for preparing the air quality plans required under the federal CAA and the California CAA. The SVAB is currently in nonattainment for the 1-hour and 8-hour ozone CAAQS and the 24-hour and annual PM_{10} CAAQS.

General Requirements for In-Use Off-Road Diesel Fueled Fleets

Adopted in July 26, 2007, the In-Use Off-Road Diesel Vehicle Regulation is intended to reduce emissions of DPM and NO_X from in-use off-road diesel vehicles operating in California. CARB estimates the regulation will significantly reduce DPM and NO_X emissions from the nearly 180,000 off-road diesel vehicles that operate in California, which is necessary to meet state and federal air quality standards. The regulation requires fleet owners to accelerate turnover to cleaner engines and install exhaust retrofits.[1] The regulation also supports the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*, which was adopted by CARB on September 30, 2000.

On-Road Heavy-Duty Diesel Vehicles (In-Use)

On December 12, 2008, CARB approved a new regulation, the *On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation***,** to substantially reduce emissions from existing on-road diesel vehicles operating in California. The regulation requires affected trucks to meet performance requirements between 2011 and 2023. By January 1, 2023, all vehicles must have a 2010 model year engine or equivalent; this includes on-road heavy-duty diesel fueled vehicles with a gross vehicle weight rating greater than 14,000 pounds.[2]

[1] The regulation establishes fleet average emission rates for PM and NO_X that decline over time. Each year, the regulation requires each fleet to meet the fleet average emission rate targets for PM or apply the highest-level verified diesel emission control system to 20 percent of its horsepower. In addition, large and medium fleets are required each year to meet the fleet average emission rate targets for NO_X or to turn over a certain percent of their horsepower (8 percent in early years, and 10 percent in later years). "Turn over" means repowering with a cleaner engine, rebuilding the engine to a more stringent emissions configuration, retiring a vehicle, replacing a vehicle with a new or used piece, or designating a dirty vehicle as a low-use vehicle. If retrofits that reduce NO_X emissions become available, they may be used in lieu of turnover, as long as they achieve the same emission benefits.

[2] In general, the On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation requires owners to reduce emissions in their fleet by upgrading existing vehicles one of three ways. The first option is to install PM retrofits and replace vehicles (or engines) according to a prescribed schedule based on the existing engine model year. The second option is to retrofit a minimum number of engines each year with a high level PM exhaust retrofit and to replace a minimum number of older engines with newer engines meeting the 2010 new engine standards. The third option is to meet a fleet average. With this option, a fleet operator can use PM and NO_X emission factors established by the regulation to calculate the average emissions of the fleet. Then, by the applicable compliance date each year, the owner can demonstrate that the fleet average emissions for PM and NO_X do not exceed the PM and NO_X fleet average emission rate targets set by the regulation.

Local Regulations

Yolo Solano Air Quality Management District (YSAQMD) Air Quality Management Plan

The YSAQMD recently prepared the eighth update of the YSAQMD's 1992 Air Quality Management Plan. The *Triennial Assessment and Plan Update,* May 2019, emission reductions information (2015 to 2017), emission inventory and forecasts, air quality trends up to 2017, and proposed commitments for the 2018-2020 period. While the District is not required to prepare an attainment plan for particulate matter measuring 10 microns and less in diameter (PM_{10}), particulate matter emissions are being reduced through numerous District rules affecting sources, the construction industry, and agricultural burning programs.

As noted in the YSAQMD CEQA Guidelines, even projects not exceeding district PM thresholds should implement Best Management Practices to reduce dust emissions and avoid localized health impacts. Those measures are found in Section 6.1 of the Guidelines (YSAQMD, 2007).

Greenhouse Gas Regulations

Executive Orders

In 2005, in recognition of California's vulnerability to the effects of climate change, Governor Schwarzenegger established Executive Order S-3-05, which set forth a series of target dates by which statewide emissions of GHGs would be progressively reduced, as follows:

- By 2010, reduce GHG emissions to 2000 levels;
- By 2020, reduce GHG emissions to 1990 levels; and
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

In April 2015, Governor Brown issued an executive order (B-30-15) to establish a California GHG reduction target of 40 percent below 1990 levels by 2030.

Assembly Bill 32 – California Global Warming Solutions Act

California passed the California Global Warming Solutions Act of 2006 (Assembly Bill (AB) 32; California Health and Safety Code Division 25.5, Sections 38500 - 38599). AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and establishes a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction

will be accomplished by enforcing a statewide cap on GHG emissions that is being phased in (starting in 2012). To effectively implement the cap, AB 32 directs CARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then CARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires CARB to adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrived at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the state reduces GHG emissions enough to meet the cap. AB 32 also includes guidance on instituting emissions reductions in an economically efficient manner, along with conditions to ensure that businesses and consumers are not unfairly affected by the reductions. Using these criteria to reduce statewide GHG emissions to 1990 levels by 2020 would represent an approximate 25 to 30 percent reduction in current emissions levels. However, CARB has discretionary authority to seek greater reductions in more significant and growing GHG sectors, such as transportation, as compared to other sectors that are not anticipated to significantly increase emissions.

CARB Climate Change Scoping Plan

In 2008, CARB adopted its Scoping Plan, which functions as a roadmap of CARB's plans to achieve GHG reductions in California required by AB 32 through subsequently enacted regulations (CARB 2008). CARB's Scoping Plan contains the main strategies California will implement to reduce carbon dioxide equivalent (CO_2e) emissions by 169 million metric tons (MMT), or approximately 30 percent, from the State's projected 2020 emissions level of 596 MMT of CO_2e under a Business as Usual (BAU) scenario.

The First Update to the Scoping Plan was approved by the CARB in May 2014, and builds upon the initial Scoping Plan with new strategies and recommendations. The Update highlights California's progress toward meeting the "near-term" 2020 GHG emission reduction goals defined in the initial Scoping Plan. It also evaluates how to align the State's "longer-term" GHG reduction strategies with other State policy priorities for water, waste, natural resources, clean energy, transportation, and land use. This Update identified nine key focus areas (energy, transportation, agriculture, water, waste management, and natural and working lands), along with short-lived climate pollutants, green buildings, and the cap-and-trade program.

On November 30, 2017, the Second Update to the Climate Change Scoping Plan was approved by the CARB. The Second Update is the strategy for meeting the 2030 GHG reduction target of 40 percent emissions reductions below 1990 levels. In reference to natural and working lands, the Second Updates notes that "Keeping these lands and waters intact and at high levels of ecological function (including resilient carbon sequestration) is necessary for the well-being and security of Californians in 2030, 2050, and beyond. Forests, rangelands, farms, wetlands, riparian areas, deserts, coastal areas, and the ocean store substantial carbon in biomass and soils." (CARB, 2017, page 13-14).

Senate Bill 32

On September 8, 2016, the governor signed Senate Bill 32 (SB 32) into law, extending AB 32 by requiring the State to further reduce GHGs to 40 percent below 1990 levels by 2030 (the other provisions of AB 32 remain unchanged).

State CEQA Guidelines

In 2007, the legislature passed SB97, which required amendment of the State CEQA Guidelines to incorporate analysis of, and mitigation for, GHG emissions from projects subject to CEQA compliance. These amendments took effect in March 2010.

The Guidelines' revisions include a new section (Section 15064.4) that specifically addresses the significance of GHG emissions. Section 15064.4 calls for a good-faith effort to describe, calculate or estimate GHG emissions. Section 15064.4 further states that the significance of GHG impacts should include consideration of the extent to which the project would increase or reduce GHG emissions; exceed a locally applicable threshold of significance; and comply with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions. The revisions also state that a project may be found to have a less-than-significant impact if it complies with an adopted plan that includes specific measures to sufficiently reduce GHG emissions (Section 15064(h)(3)). Importantly, the revised guidelines provide the lead agency discretion to determine significance thresholds for GHG emissions.

Energy Regulations

Low Carbon Fuel Standard

Under the Climate Change Scoping Plan, the CARB identified the low carbon fuel standard (LCFS) as one of the nine discrete early action measures to reduce California's GHG emissions. The LCFS is designed to decrease the carbon intensity of California's

transportation fuel pool and provide an increasing range of low-carbon and renewable alternatives, which reduce petroleum dependency and achieve air quality benefits.

In 2018, the CARB approved amendments to the regulation, which included strengthening and smoothing the carbon intensity benchmarks through 2030 in-line with California's 2030 GHG emission reduction target enacted through SB 32, adding new crediting opportunities to promote zero emission vehicle adoption, alternative jet fuel, carbon capture and sequestration, and advanced technologies to achieve deep decarbonization in the transportation sector.

3.5.2 Significance Criteria

Criteria Air Pollutants

Criteria for determining significant impacts are based upon the CEQA Guidelines (Appendix G) and professional judgment. These guidelines state that the project would have a significant impact on air quality if it would:

1. Conflict with or obstruct implementation of the applicable air quality plan;
2. Result in cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard;
3. Expose sensitive receptors to substantial pollutant concentrations; or
4. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

The YSAQMD has developed CEQA significance thresholds for project construction and operation for guidance to lead agencies responsible for determining significant air quality impacts for their projects. YSAQMD's significance thresholds are 80 pounds per day of PM_{10} and 10 tons per year of ROG or NOx (YSAQMD, 2007).

Greenhouse Gas Emissions

State CEQA Guidelines (Appendix G), which indicate that the project would have a significant impact on GHG emissions if it would:

1. Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or
2. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs.

Currently, for GHG evaluations, the methodologies and significance thresholds are different in almost every air district. The YSAQMD has not identified a significance threshold for GHG emissions for new projects. It is recognized that for most projects there is no simple metric available to determine if a single project would help or hinder meeting the state's GHG emission reduction goals. The air quality analysis quantifies the GHG emissions to provide a perspective on the amount of GHG emissions this project would generate.

Although it is possible to generally estimate a project's incremental contribution of CO_2 into the atmosphere, it is not possible to determine whether or how a specific project's relatively small incremental contribution might translate into physical effects on the environment (e.g., sea level rise, loss of snowpack, severe weather events, etc.). Given the complex interactions between various global and regional physical, chemical, atmospheric, terrestrial, and aquatic systems that result in the physical expressions of global climate change, it is impossible to discern whether the presence or absence of CO_2 emitted by a specific project would result in any altered conditions.

Therefore, the proposed project is evaluated for significance by analyzing the potential for the proposed project to conflict with the Yolo County Climate Action Plan[3], Solano County Climate Action Plan[4], City of Winters Climate Action Plan[5], and CARB's 2017 Scoping Plan.

Energy

State CEQA Guidelines (Appendix G), which indicate that the project would have a significant impact on energy if it would:

1. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation; or
2. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

[3] Yolo County, Yolo County Climate Action Plan, Adopted March 15, 2011.

[4] Solano County, Solano County Climate Action Plan, Adopted June 7, 2011.

[5] City of Winters, 2021 Final Winters Climate Action Plan, Adopted July 20, 2021.

3.5.3 Impacts and Mitigation Measures

Impacts and mitigation measures are described below both generally and by reach. Applicable impacts and mitigation measures for each reach are summarized in **Table 3.5-4,** at the end of this section.

General Impacts and Mitigation Measures

Impact 3.5-1: Conflict with or Obstruct Implementation of the Applicable Air Quality Plan Implementation.

The applicable air quality plan is the YSAQMD's 1992 AQMP. The YSAQMD recently prepared the eighth update of the 1992 Plan in May 2019. A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan. The proposed project would not result in population or employment growth, as it would only restore and enhance areas along Putah Creek. Consequently, there would be no impacts to the applicable air quality plans, and no mitigation would be required. Thus, there would be **no impacts** related to air quality plans.

Impact 3.5-2: Short-Term Construction Emissions of Criteria Pollutants that May Contribute to Existing or Projected Air Quality Violation.

The proposed project's construction activities would involve hauling of materials and equipment, excavation of channels, channel reconfiguration, grading, and stockpiling and reuse of channel substrate materials. Construction equipment would include dump trucks, rubber-tired loaders, off-highway trucks, tractors/loaders/backhoes, an excavator and a generator. Maximum daily and annual emissions that would be generated from construction activities are presented below. The Roadway Construction Emissions Model Version 9.0 was used to estimate the emissions from construction equipment, fugitive dust associated with construction, worker commuting vehicles and hauling vehicles. The emission estimates assume a maximum of two reaches restored over 6 months (April to October) of construction per year. The air quality calculations for the construction activities can be found in **Appendix F** of this EIR.

As shown above in **Table 3.5-2** and **Table 3.5-3**, the proposed project's construction activities would not exceed the YSAQMD CEQA significance thresholds. Even though the quantitative estimates in Table 3.5-2 and Table 3.5-3 don't indicate a violation of the thresholds, poor construction practices could result in substantial emissions of dust that would be a nuisance and could create localized health impacts (YSAQMD, 2007). Without

implementation of air quality construction Best Management Practices, air quality impacts could be **potentially significant**. With implementation of Mitigation Measure 3.5-1 the impact of air quality emissions from construction would be **less than significant.**

Table 3.5-2 Unmitigated Daily Project Emissions (Pounds per Day)

Condition	PM_{10}
Daily	21.6
YSAQMD CEQA Threshold	*80*
Above CEQA Significant?	*No*

Note: The Roadway Construction Emissions Model, developed by the SMAQMD, is used to assist roadway project and other linear projects with determining the emissions impacts of the project. The model utilizes statewide emission factors based on CARB's OFFROAD2011 and EMFAC2017 models as well as fugitive dust emission factors from US EPA's AP-42.
Source: Roadway Construction Emissions Model, Version 9.0.

Table 3.5-3 Unmitigated Annual Project Emissions (Tons per Year)

Condition	ROG	NO_x
Annual	0.2	2.5
YSAQMD CEQA Threshold	*10*	*10*
Above CEQA Significant?	*No*	*No*

Note: The Roadway Construction Emissions Model, developed by the SMAQMD, is used to assist roadway project and other linear projects with determining the emissions impacts of the project. The model utilizes statewide emission factors based on CARB's OFFROAD2011 and EMFAC2017 models as well as fugitive dust emission factors from US EPA's AP-42.
Source: Roadway Construction Emissions Model, Version 9.0.

Mitigation Measure 3.5-1: Implementation of Construction Best Management Practices.

Project construction activities should implement as feasible and necessary to control dust, the Best Management Practices for construction identified in Section 6.1 of the YSAQMD 2007 CEQA Handbook. Best Management Practices identified to reduce dust emissions include:

- Water all active construction sites at least twice daily. Frequency should be based on the type of operation, soil, and wind exposure.
- Haul trucks shall maintain at least 2 feet of freeboard.
- Cover all trucks hauling dirt, sand, or loose materials.

- Apply non-toxic binders (e.g., latex acrylic copolymer) to exposed areas after cut and fill operations and hydroseed area.
- Apply chemical soil stabilizers on inactive construction areas (disturbed lands within construction projects that are unused for at least four consecutive days).
- Plant tree windbreaks on the windward perimeter of construction projects if adjacent to open land.
- Plant vegetative ground cover in disturbed areas as soon as possible.
- Cover inactive storage piles.
- Sweep streets if visible soil material is carried out from the construction site.
- Treat accesses to a distance of 100 feet from the paved road with a 6-to 12-inch layer of wood chips or mulch.
- Treat accesses to a distance of 100 feet from the paved road with a 6- inch layer of gravel.

Impact 3.5-3: Short-Term Construction Emissions that May Expose Persons to Substantial Levels of Toxic Air Contaminants.

The proposed project would be located in a predominantly rural agricultural area within Yolo and Solano County, and the City of Winters. However, there are several homes north of the creek in the City of Winters. Construction activities would entail the use of diesel equipment that would generate emissions of DPM, which the CARB has categorized as a human carcinogen. Typically, health risks are estimated based on a chronic exposure period of 70 years. Because exhaust emissions associated with construction activities of the proposed project would be relatively low, short-term in nature, move throughout the project vicinity and well below the typical exposure period of 70 years, it is not anticipated that exposure to construction-related DPM would result in an elevated health risk. Thus, the impacts from TACs would be **less than significant**

Impact 3.5-4: Short-Term Objectionable Odors Exposure to Sensitive Receptors.

Although odors rarely cause physical harm, they can lead to considerable distress to the public and can result in citizen complaints to local governments and the YSAQMD. A project may be expected to have a substantial adverse odor impact where it “generates odorous emissions in such quantities as to cause detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which may endanger the comfort,

repose, health, or safety of any such person or the public, or which may cause, or have a natural tendency to cause, injury or damage to business or property" (YSAQMD Rule 2.5).

Short-term objectionable odors could occur during project construction with the use of diesel-powered heavy equipment. However, these odors would be periodic and temporary in nature. Diesel exhaust from construction activities may generate temporary odors while project construction is under way. Once construction activities have been completed, these odors would cease. There are very few receptors throughout most of the project area that could potentially be offended by odors. The project would not generate any objectionable odors that would affect a substantial number of people. Thus, odor impacts would be **less than significant**.

Impact 3.5-5: Long Term Emissions from Project Maintenance.

The proposed project is designed to be self-maintaining, however some maintenance and adaptive management may be required. This may involve periodic trips for inspections of the channel and associated vegetation, and repairs and maintenance as needed. Emissions associated with inspections and maintenance would be short-term and minimal. If any major projects were needed they would undergo separate CEQA review. Thus, long-term emission impacts would be **less than significant**.

Impact 3.5-6: Greenhouse Gases and Global Climate Change Contributions

The proposed project was estimated to generate a maximum of approximately 999 metric tons of CO_2e per year. The air quality calculations for the construction activities can be found in **Appendix F** of this EIR. As noted in Section 3.5.2, Significance Criteria for GHG Emissions, the YSAQMD has not identified a significance threshold for GHG emissions for new projects. Therefore, the proposed project is evaluated for significance by analyzing the potential for the proposed project to conflict with the Yolo County Climate Action Plan, Solano County Climate Action Plan, City of Winters Climate Action Plan, and CARB's 2017 Scoping Plan. For reference, Sacramento County and Placer County have adopted construction GHG significance thresholds of 1,100 and 10,000 metric tons of CO_2e per year, respectively.

There are no GHG reduction goals, measures, or policies that are applicable to the proposed project within Solano County or City of Winters Climate Action Plans. The Yolo County Climate Action Plan, Measure A-6 (Sequester carbon in agricultural landscapes), focuses on reducing GHG emissions through the restoration of riparian forests and other natural habitats. The proposed project would support Measure A-6 from the Yolo County

Climate Action Plan and would not conflict with any GHG reduction goals, measures, or policies as there are no others applicable to the proposed project.

Similarly, CARB's 2017 Scoping Plan discusses the importance of increasing carbon sequestration in natural and working lands such as riparian areas (See Section 3.5.1, Greenhouse Gas Regulations) and notes that natural and working lands are a key sector in the state's climate change strategy because storing carbon in trees, other vegetation, soils, and aquatic sediment is an effective way to remove CO_2 from the atmosphere. The proposed project would restore and enhance the riparian habitat of Putah Creek and support the state's GHG reduction goals within the natural and working lands sector. The proposed project would not conflict with any GHG reduction goals, measures, or policies within CARB's 2017 Scoping Plan as there are no others applicable to the proposed project.

In summary, the proposed project would not conflict with the Yolo County, Solano County, or City of Winters Climate Action Plans, or CARB's 2017 Scoping Plan. Furthermore, the proposed project would support the carbon sequestration objectives related to riparian habitat restoration/preservation within the Yolo County Climate Action Plan and CARB's 2017 Scoping Plan. The proposed project would help to restore and enhance Putah Creek and any GHG emissions associated with the project would be temporary as with all construction projects. Therefore, impacts regarding GHG emissions would be **less than significant**.

Impact 3.5-7: Short-term Energy Use Impacts

The proposed project would require temporary energy consumption for construction equipment, heavy trucks, and worker vehicles (gasoline and diesel fuel). Fuel consumption estimates were estimated using the air quality calculations for the construction activities found in **Appendix F** of this EIR. The proposed project would consume a maximum of approximately 95,000 gallons of diesel fuel and 4,000 gallons of gasoline per year. Energy consumption associated would not be wasteful, inefficient, or unnecessary as the proposed project would help to restore and enhance Putah Creek and energy consumption associated with the project would be temporary as with all construction projects. The proposed project would not conflict with or obstruct state or local plans for renewable energy or energy efficiency. Therefore, impacts regarding energy use would be **less than significant**.

Site-Specific Impacts and Mitigation

All Sites

Construction impacts described in Section 3.5.3 would occur on all of the Project reaches that involve earthmoving activities. The impacts were evaluated in Section 3.5.3 and were determined to be less than significant. Small operational emissions would occur. Therefore, this impact would be less than significant and no mitigation is required.

Table 3.5-4 Summary of Recreation Impacts and Mitigation Measures

Sites	Impact 3.5-1: Conflict with or Obstruct Implementation of the Applicable Air Quality Plan Implementation	Impact 3.5-2: Short-Term Construction Emissions	Impact 3.5-3: Short-Term Construction Toxic Air Contaminants	Impact 3.5-4: Short-Term Objectionable Odors	Impact 3.5-5: Long Term Emissions From Project Maintenance	Impact 3.5-6: Greenhouse Gases and Global Climate Change Contributions	Impact 3.5-7: Short-Term Energy Use Impacts	Applicable Mitigation Measures
NAWCA/Mariani	NI	SM	LTS	LTS	LTS	LTS	LTS	MM 3.5-1
Duncan-Giovannoni	NI	SM	LTS	LTS	LTS	LTS	LTS	MM 3.5-1
Winters Putah Creek Nature Park	NI	SM	LTS	LTS	LTS	LTS	LTS	MM 3.5-1
East of 505	NI	SM	LTS	LTS	LTS	LTS	LTS	MM3.5-1
Warren	NI	SM	LTS	LTS	LTS	LTS	LTS	MM 3.5-1
Upper McNamara	NI	SM	LTS	LTS	LTS	LTS	LTS	MM 3.5-1
Lower McNamara	NI	SM	LTS	LTS	LTS	LTS	LTS	MM 3.5-1
MacQuiddy (Leste)r	NI	SM	LTS	LTS	LTS	LTS	LTS	MM 3.5-1
Russell Ranch	NI	SM	LTS	LTS	LTS	LTS	LTS	MM 3.5-1
Stevenson Bridge	NI	SM	LTS	LTS	LTS	LTS	LTS	MM 3.5-1
Glide Ranch	NI	SM	LTS	LTS	LTS	LTS	LTS	MM 3.5-1
Nishikawa	NI	SM	LTS	LTS	LTS	LTS	LTS	MM 3.5-1
Olmo-Hammond-UCD	NI	SM	LTS	LTS	LTS	LTS	LTS	MM 3.5-1
I-80 to Old Davis Road	NI	SM	LTS	LTS	LTS	LTS	LTS	MM 3.5-1
Old Davis Road to Mace	NI	SM	LTS	LTS	LTS	LTS	LTS	MM 3.5-1
Mace to Road 106A	NI	SM	LTS	LTS	LTS	LTS	LTS	MM 3.5-1
Road 106A to YBWA	NI	SM	LTS	LTS	LTS	LTS	LTS	MM 3.5-1

3.6 NOISE

This section describes the existing noise environment of the Project Area and evaluates potential noise associated with the Project. The applicable noise descriptors, significance criteria for any increased noise, and the potential impacts are discussed below.

3.6.1 Setting

Environmental Setting

Noise Descriptors

To describe noise environments and to assess impacts on noise-sensitive areas, a frequency weighting measure, which simulates human perception, is commonly used. It has been found that A-weighting of sound levels best reflects the human ear's reduced sensitivity to low frequencies, and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA)[1] is cited in most noise criteria. Decibels are logarithmic units that conveniently compare the wide range of sound intensities to which the human ear is sensitive. **Table 3.6-1** identifies typical ranges of decibel levels for common sounds heard in the environment.

Several time-averaged scales represent noise environments and consequences of human activities. The most commonly used noise descriptors are the equivalent A-weighted sound level over a given time period (L_{eq});[2] average day-night 24-hour average sound level (L_{dn})[3] with a nighttime increase of 10 dBA to account for sensitivity to noise during the nighttime; and community noise equivalent level (CNEL),[4] also a 24-hour average that includes both an evening and a nighttime weighting.

[1] A decibel (dB) is a unit of sound energy intensity. Sound waves, traveling outward from a source, exert a sound pressure level (commonly called "sound level") measured in dB. An A-weighted decibel (dBA) is a decibel corrected for the variation in frequency response to the typical human ear at commonly encountered noise levels.

[2] The Equivalent Sound Level (Leq) is a single value of a constant sound level for the same measurement period duration, which has sound energy equal to the time–varying sound energy in the measurement period.

[3] L_{dn} is the day–night average sound level that is equal to the 24–hour A–weighted equivalent sound level with a ten–decibel penalty applied to night between 10:00 p.m. and 7:00 a.m.

[4] CNEL is the average A–weighted noise level during a 24–hour-day, obtained by addition of 7 decibels in the evening from 7:00 to 10:00 p.m., and an addition of a 10–decibel penalty in the night between 10:00 p.m. and 7:00 a.m.

Table 3.6-1 Typical Noise Levels

Noise Level (dBA)	Outdoor Activity	Indoor Activity
90+	Gas lawn mower at 3 feet, jet flyover at 1,000 feet	Rock Band
80-90	Diesel truck at 50 feet	Loud television at 3 feet
70-80	Gas lawn mower at 100 feet, noisy urban area	Garbage disposal at 3 feet, vacuum cleaner at 10 feet
60-70	Commercial area	Normal speech at 3 feet
40-60	Quiet urban daytime, traffic at 300 feet	Large business office, dishwasher next room
20-40	Quiet rural, suburban nighttime	Concert hall (background), library, bedroom at night
10-20		Broadcast / recording studio
0	Lowest threshold of human hearing	Lowest threshold of human hearing

Source: Modified from Caltrans Technical Noise Supplement, 1998.

Existing Noise Environment and Sensitive Receptors

The creek channel where most of the Project activity would take place is mostly undeveloped agricultural open space surrounded primarily by agricultural land. The nearest major noise sources are Interstate 80 (I-80) and I-505, both of which cross the Project alignment. Other sources of noise include traffic noise from other roads that cross and parallel the creek on either side, as well aircraft noise from University Airport, and agricultural operations on adjacent properties. Background noise levels for rural residential and agricultural cropland typically range from 39 dB L_{dn} to 44 dB L_{dn} (EPA, 1978).

Noise sensitive receptors (land uses associated with indoor and/or outdoor activities that may be subject to stress and/or significant interference from noise) typically include residential dwellings, hotels, motels, hospitals, nursing homes, educational facilities, and libraries. Detailed descriptions of noise-sensitive receptors along the Project alignment are presented below, in “Project Area Conditions by Reach.”

Project Area Conditions by Reach

NAWCA/Mariani

This reach contains several houses in Solano County just outside of the Project alignment on the southwest side.

Duncan – Giovannoni

Several houses and farm buildings lie just outside of the alignment on the south and west sides of the alignment in Solano County. Residential areas of the City of Winters lie about 800 feet north of the eastern portion of the alignment.

Winters Putah Creek Nature Park

Recreational, residential and commercial land uses in the City of Winters occur along this reach. Maintenance activities proposed by the Project would not adversely affect recreational activities in this reach.

East of 505

The El Rio Villa residential development lies around 1,000 feet northeast of the eastern side of this reach in unincorporated Yolo County.

Warren

The El Rio Villa residential development lies around 1,000 feet northeast of the reach. There are two large houses that lie 300 to 500 feet to the southeast of the eastern end of the reach in Solano County.

Upper McNamara

There are no sensitive receptors in the vicinity of this reach.

Lower McNamara

There are no sensitive receptors in the vicinity of this reach.

MacQuiddy (Lester)

There is a residence located approximately 50 feet east from the southeast corner of the reach in Solano County.

Russell Ranch

There are several homes to the north of this reach, some as close as 150 feet from the Project alignment in Yolo County. There is also a residence located 150 feet south of the Project alignment in Solano County.

Stevenson Bridge

There are rural residences located to the northwest of Stevenson Bridge in Yolo County.

Glide Ranch

Several rural residential complexes lie immediately to the south of this alignment In Solano County.

Nishikawa

There are no sensitive receptors in the vicinity of this reach.

Olmo-Hammond-UCD

There are no sensitive receptors in the vicinity of this reach.

I-80 to Old Davis Road

This reach contains one residence 550 feet to the south of creek alignment in Solano County.

Old Davis Road to Mace

There are no sensitive receptors in the vicinity of this reach.

Mace to Road 106A

This reach contains one large residence 425 feet north of the Project alignment in Yolo County.

Road 106A to Yolo Bypass Wildlife Area

There are no sensitive receptors in the vicinity of this reach.

Regulatory Setting

Federal, State, and local agencies regulate different aspects of environmental noise. Federal and State agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies. Local regulation of noise involves implementation of general plan policies and noise ordinance standards. Local general plans identify general principles intended to guide and influence development plans; local noise ordinances establish standards and procedures for addressing specific noise sources and activities.

Federal Regulations

Occupational Safety and Health Act of 1970

Federal codes, primarily the Occupational Safety and Health Act (OSHA) of 1970, govern worker exposure to noise levels. These regulations would be applicable to all phases of the Project and are designed to limit worker exposure to noise levels of 85 dB or lower over an 8-hour period (Title 29, Code of Federal Regulations [CFR], Section 1910.95).

U.S. Environmental Protection Agency

Federal regulations have established noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under Title 40 Code of Federal Regulations (CFR) Part 205, Subpart B. The federal truck pass-by noise standard is 80 dB at 15 meters from the centerline of the vehicle pathway. These standards are implemented through regulatory controls on truck manufacturers.

State Regulations

California Noise Exposure Regulations and Title 8, CCR, Section 5095

State of California regulations (California Noise Exposure Regulations and Title 8, CCR, Section 5095) address worker exposure to noise levels. These regulations limit worker exposure to noise levels of 85 dB or lower over an 8-hour period. The State has not established noise levels for various non-work-related environments.

The State of California established noise limits for vehicles licensed to operate on public roads. The pass-by standard for heavy trucks is consistent with the federal limit of 80 dB. The pass-by standard for light trucks and passenger cars (less than 4.5 tons, gross vehicle rating) is also 80 dB at 15 meters from the centerline. These standards are implemented through controls on vehicle manufacturers and by legal sanctions on vehicle operators by State and local law enforcement officials.

Noise Insulation Standards

Title 24 of the CCR, “Noise Insulation Standards” establishes 45 dBA L_{dn} as the limit for interior community noise level for multi-family dwellings, hotels, motels, dormitories, and long-term care facilities. The state’s regulation may be extended by local legislative action to include single-family dwellings.

Noise Compatibility Guidelines

The Noise Compatibility Guidelines recommended by the Governor's Office of Planning and Research (OPR) are shown in **Table 3.6-2**. The guidelines summarize the suggested use of CNEL/ L_{dn} metrics for evaluating land use compatibility. The objective of the Noise Compatibility Guidelines is to provide the community with a means of judging the noise environment it deems to be generally acceptable.

Local Regulations

Solano County Noise Standards

Solano County does not have a noise ordinance nor any exclusion for construction noise. The Noise section of the Public Health and Safety Element of the Solano County General Plan contains Land Use Compatibility Guidelines as well as noise performance standards for non-transportation noise sources shown in **Table 3.6-3**.

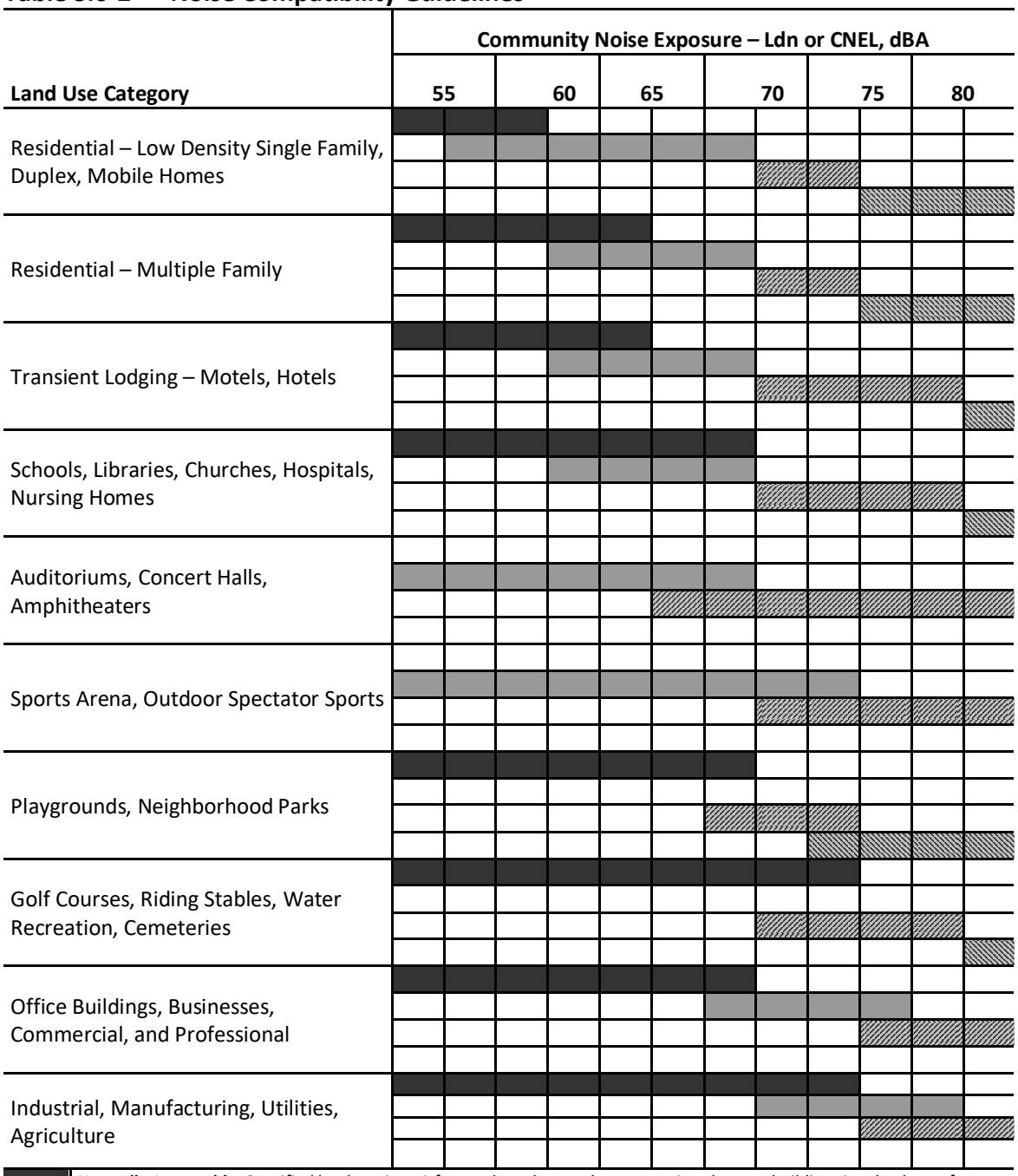
Yolo County Noise Standards

The Health and Safety Element of the 2009 Yolo County General Plan contains noise compatibility guidelines that describe exterior and interior noise standards consistent with the OPR Noise Compatibility Guidelines (see Table 3.6-2) and California State Noise Insulation Standards. Yolo County does not have a noise ordinance nor any exclusion for construction noise.

City of Winters Noise Standards

Section 8.20.070(4) of the City of Winters Noise Ordinance prohibits operating any power tools or equipment used in construction, drilling, repair, alteration, demolition work, or property maintenance between weekday and Saturday hours of seven p.m. and seven a.m. or at any time on Sundays or holidays, such that the sound therefrom creates a noise disturbance across a residential or commercial property line. Domestic power tools or equipment may be operated to ten p.m. provided the maximum noise level across the residential property line shall not exceed seventy (70) dBA.

Table 3.6-2 Noise Compatibility Guidelines



Normally Acceptable. Specified land use is satisfactory based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable. New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice. Outdoor environment will seem noisy.

Normally Unacceptable. New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with needed noise insulation features included in the design. Outdoor areas must be shielded.

Clearly Unacceptable. New construction or development should generally not be undertaken. Construction costs to make the indoor environment acceptable would be prohibitive and the outdoor environment would not be usable.

Source: State of California Governor's Office of Planning and Research (OPR), 2003 General Plan Guidelines.

Table 3.6-3 Non-transportation Noise Standards- Average (dBA L_{eq})/ Maximum (dBA L_{max})[a]

	Outdoor Area		Interior[b]	
Receiving Land Use	**Daytime**	**Nighttime**	**Day and Night**	**Notes**
All Residential	55/70	50/65	35/55	
Transient Lodging	55/75	-	35/55	c
Hospitals and Nursing Homes	55/75	-	35/55	d,e
Theaters and Auditoriums	-	-	30/50	e
Churches, Meeting Halls, Schools, Libraries, etc.	55/75	-	35/60	e
Office Buildings	60/75	-	45/65	e
Commercial Buildings	55/75	-	45/65	e
Playgrounds, Parks, etc.	65/75	-	-	e
Industry	60/80	-	50/70	e

Notes: Leq= equivalent or energy-averaged sound level; Lmax= Highest root-mean-square3 sound level measured over a given period of time

[a] The standards shall be reduced by 5 dBA for sounds consisting primarily of speech or music, and for recurring impulsive sounds. If the existing ambient noise level exceeds the standards, then the noise level standards shall be increased at 5-dBA increments to encompass the ambient.

[b] Interior-noise-level standards are applied within noise sensitive areas of the various land uses, with windows and doors in the closed positions

[c] Outdoor activity areas of transient lodging facilities are not commonly used during nighttime hours.

[d] Hospitals are often noise-generating uses. The exterior-noise-level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.

[e] The outdoor activity areas of these uses (if any), are not typically utilized during nighttime hours.

Source: Solano County General Plan, Public Health and Safety Element, 2008

3.6.2 Significance Criteria

Criteria for determining significant impacts are based upon the California Environmental Quality Act (CEQA) Guidelines (Appendix G) and professional judgment. These guidelines identify thresholds that may be considered to determine whether an impact is significant. Using these thresholds, the proposed Project would be considered to have a significant noise impacts if it were to result in:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Generation of excessive groundborne vibration or groundborne vibration noise levels; or
- For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or

public use airport, would the project expose people residing or working in the project area to excessive noise levels.

The Project would not involve the use of any heavy equipment or processes that would result in significant levels of ground vibration (such as pile drivers), therefore ground-borne vibration and noise levels are not discussed further in this section.

The Project would have no impact related to excessive noise levels due to aircraft noise, therefore aircraft noise levels are not discussed further in this section.

After construction there would not be any long-term noise generating activities, therefore there would be no permanent increase in noise levels and permanent increases in noise levels are not discussed further in this section.

3.6.3 Impacts and Mitigation Measures

Impacts and mitigation measures are described below both generally and by reach. Applicable impacts and mitigation measures for each reach are summarized in **Table 3.6-4**, at the end of this section.

General Impacts and Mitigation Measures

Impact 3.6-1: Temporary Construction Noise Disturbance.

Project construction would occur Monday through Friday between the hours of 7:00 a.m. and 7:00 p.m. Noise impacts would occur primarily during reconfiguration and realignment activities in which heavy construction equipment would be used. Construction equipment used for channel reconfiguration and realignment would include front-end loaders, dump trucks, backhoes, bulldozers, and excavators. This equipment generates maximum noise levels of 76 to 82 dB at a distance of 50 feet (HAW, 2006).

Temporary construction noise in the City of Winters would be compliant with the City of Winters Municipal Code; therefore, construction noise impacts would be considered less than significant at residences in the City of Winters and would not conflict with any local noise standards.

Yolo County does not have a noise ordinance or other noise enforcement code at the present time. Therefore, noise levels at residences in Yolo County would not conflict with any local noise standards.

Noise from construction equipment would exceed the Solano County daytime non-transportation noise standards, shown in **Table 3.6-3,** at residences closest to the Project site in Solano County. This conflict with the Solano County General Plan Noise Element would result in a **potentially significant** impact. With implementation of Mitigation Measure 3.6-1 the potential conflicts of construction noise with local noise standards (Solano County) would still be potentially significant and unavoidable in three of the reaches, as described below in Site-Specific Impacts and Mitigation.

Channel reconfiguration and realignment activities would result in a temporary increase in noise levels in the Project vicinity. Noise from construction equipment (76 to 82 dB L_{max} at 50 feet) would be substantially higher than background ambient noise levels of 39 to 44 dB L_{dn} in rural agricultural settings when construction equipment is in operation. Temporary construction noise would be significant at residences within 400 feet of the Project site, because noise levels would be at 60 dB or higher at this distance and normal conversation is disturbed at levels above 60 dB (Caltrans, 1998). The implementation of Mitigation Measure 3.6-1 would reduce temporary construction noise, but the increases would still be potentially **significant and unavoidable** in six of the reaches.

Mitigation Measure 3.6-1: Noise Reducing Construction Practices.

The following mitigation measures shall be implemented to reduce noise impacts of construction activities within 400 feet of residences:

- Limit construction activities in all cases to 7:00 a.m. to 7:00 p.m.
- Configure the construction site in a manner that keeps noisier equipment and activities as far as possible from noise sensitive locations, including the placement of staging areas as far as practicable from nearby residences.
- Require that all construction equipment powered by gasoline or diesel engines have sound-control devices that are at least as effective as those originally provided by the manufacturer.
- Preventing excessive noise by shutting down idle vehicles or equipment.
- When practical, use noise barriers between major construction activities and noise sensitive land uses or take advantage of existing barrier features (e.g., terrain to block sound transmission to noise-sensitive land uses). To be effective, the barriers shall break the line of sight between the noise-sensitive use and on-site construction equipment.

- Designate an on-site construction complaint and enforcement manager for the project and notify neighbors and occupants within 400 feet of the Project construction area at least 30 days in advance of extreme noise generating activities about the estimated duration of the activity.

Site-Specific Impacts and Mitigation Measures

NAWCA/Mariani

Project activities in this reach consist of maintenance and weed management. These activities do not require the use of heavy equipment, and would not result in a substantial amount of noise. Therefore, noise impacts on this reach would be **less than significant**.

Duncan-Giovannoni

Construction Impacts 3.6-1 could occur on this reach. This reach contains several residences on the Solano County side of the Project alignment, which could be affected by a substantial temporary increase in ambient noise levels. At these residences, the maximum noise levels from heavy equipment could also exceed Solano County noise standards. Construction could be within 100 feet of residences and maximum noise levels could be as high as 75 dB at the closest location to construction. Therefore, temporary construction noise impacts in this reach would be potentially significant at these residences. The implementation of Mitigation Measure 3.6-1 would reduce temporary construction noise impacts. Because construction could be very close to residences and noise barriers may not be feasible, noise impacts would remain **significant and unavoidable.**

The El Rio Villa development lies 800 feet to the north of this reach in Yolo County. At a distance of 800 feet, temporary construction noise would be **less than significant** at these residences.

Winters Putah Creek Nature Park

Stream restoration and recreational improvements proposed for this reach have already been implemented as part of the Winters Putah Creek project. Maintenance activities proposed by the Project would not adversely affect noise levels or sensitive receptors in this reach. Therefore, noise impacts would be **less than significant.**

East of 505

Construction Impact 3.6-1 could occur on this reach. This reach contains the El Rio Villa residential development 1,000 feet northeast of the eastern side of the reach in Yolo

County. Yolo County does not have a noise ordinance or other noise enforcement code at this time. At a distance of 1,000 feet, temporary construction noise would be **less than significant** at these residences.

Warren

Construction Impact 3.6-1 could occur on this reach. This reach contains two residences about 300 to 500 feet southeast of Project construction in Solano County. At these residences, the maximum noise levels from heavy equipment would be 57 to 63 dB. Noise would not exceed Solano County noise standards, but would result in a substantial temporary increase in ambient noise levels at the residence within 400 feet of the Project alignment. Temporary construction noise impacts in this reach would be potentially significant. The implementation of Mitigation Measure 3.6-1 would reduce temporary construction noise impacts. Since construction could be very close to residences and noise barriers may not be feasible, noise impacts would remain **significant and unavoidable**.

This reach also contains the El Rio Villa residential development 1,000 feet northeast of the eastern side of the reach in Yolo County. At a distance of 1,000 feet, temporary construction noise would be **less than significant** at these residences.

Upper McNamara

This reach contains no sensitive receptors in the Project vicinity. Temporary construction noise in the reach would be **less than significant.**

Lower McNamara

This reach contains no sensitive receptors in the Project vicinity. Temporary construction noise in the reach would be **less than significant.**

MacQuiddy (Lester)

Construction Impact 3.6-1 could occur on this reach. This reach contains a residence 50 feet east of the southeast corner in Solano County. At this residence, the maximum noise levels from heavy equipment could be as high as 82 dB. Noise from construction could exceed Solano County noise standards and result in a substantial temporary increase in ambient noise levels. Construction noise in this reach would result in a potentially significant impact. The implementation of Mitigation Measure 3.6-1 would reduce temporary construction noise. Since construction could be very close to residences and noise barriers may not be feasible, noise impacts would remain **significant and unavoidable.**

Russell Ranch

Construction Impact 3.6-1 could occur on this reach. This reach contains rural residences 150 to 200 feet north of the Project alignment in Yolo County, and a residence 150 feet south of the alignment in Solano County. At these residences, maximum noise from construction equipment could be 67 and 70 dB. Noise levels would not exceed Solano County noise standards, but could result in a substantial temporary increase in ambient noise levels at the residences within 400 feet of the Project alignment. Temporary construction noise impacts in this reach would be potentially significant. The implementation of Mitigation Measure 3.6-1 would reduce temporary construction noise impacts. Since construction could be very close to residences and noise barriers may not be feasible, noise impacts would remain **significant and unavoidable**.

Stevenson Bridge

Construction Impact 3.6-1 could occur on this reach. There are rural residences located to the northwest of Stevenson Bridge in Yolo County approximately 150 feet from the Project alignment. Construction equipment would produce maximum noise levels of 70 dB when equipment is closest to the residences, which would result in a potentially significant impact. The implementation of Mitigation Measure 3.6-1 would reduce temporary construction noise impacts. Since construction could be very close to residences, and noise barriers may not be feasible, noise impacts would remain **significant and unavoidable.**

Glide Ranch

Construction Impact 3.6-1 would occur on this reach. Several rural residential complexes lie 50 to 200 feet south of the Project alignment in Solano County. At these residences, maximum noise levels from heavy equipment could be 66 to 82 dB when used nearest to these homes. Noise levels would exceed Solano County noise standards and create a substantial temporary increase in ambient noise levels, resulting in a potentially significant impact. The implementation of Mitigation Measure 3.6-1 would reduce temporary construction noise impacts. Since construction could be very close to residences and noise barriers may not be feasible, noise impacts would remain **significant and unavoidable.**

Nishikawa

This reach contains no sensitive receptors in the Project vicinity. The effects of temporary construction noise in the reach would be **less than significant**.

Olmo-Hammond-UCD

This reach contains no sensitive receptors in the Project vicinity. Temporary construction noise in the reach would be **less than significant**.

I-80 to Old Davis Road

Construction Impact 3.6-1 would occur on this reach. This reach contains one residence 550 feet to the south of Putah Creek alignment in Solano County. At this distance, maximum noise levels from heavy equipment would not exceed Solano County noise standards or result in a substantial temporary increase in ambient noise levels. Therefore, temporary construction noise impacts on this reach would be **less than significant**.

Old Davis Road to Mace

This reach contains no sensitive receptors in the Project vicinity. Temporary construction noise in the reach would be **less than significant**.

Mace to Road 106A

Construction Impact 3.6-1 could occur on this reach. This reach contains one large residence approximately 425 feet north of the Project alignment in Yolo County. Yolo County does not have a noise ordinance or other noise enforcement code at this time. At a distance of 425 feet, maximum noise from construction equipment would be 59 dB at this residence. Therefore, noise impacts in this reach would be **less than significant.**

Road 106A to Yolo Bypass Wildlife Area

This reach contains no sensitive receptors in the Project vicinity. Temporary construction noise in the reach would be **less than significant**.

Table 3.6-4 Summary of Noise Impacts and Mitigation Measures

Sites	Impact 3.6-1 Temporary Construction Noise	Applicable Mitigation Measures
NAWCA/Mariani	LTS	n/a
Duncan-Giovannoni	SU	MM 3.6-1
Winters Putah Creek Nature Park	LTS	n/a
505 E Channel Restoration	LTS	n/a
Warren Weed Control	SU	MM 3.6-1
Upper McNamara Pool	LTS	n/a
Lower McNamara Pool	LTS	n/a
Russell Ranch	SU	MM 3.6-1
MacQuiddy Lester	SU	MM 3.6-1
Stevenson Bridge	SU	MM 3.6-1
Glide Ranch	SU	MM 3.6-1
Nishikawa	LTS	n/a
Olmo-Hammond-UCD	LTS	n/a
I-80 to Old Davis Road	LTS	n/a
Old Davis Road to Mace	LTS	n/a
Mace to Road 106A	LTS	n/a
Road 106A to YBWA	LTS	n/a

Notes: NI = No Impact; LTS = Less than Significant; SU = Significant and Unavoidable.

3.7 HAZARDS AND HAZARDOUS MATERIALS

This section discusses the potential presence of hazardous materials and conditions within the Project Area and analyzes the potential risk of these conditions to existing and proposed receptors. The analysis is based primarily on a screening-level environmental assessment, which included site visits by BSK Associates (BSK) technical staff, review of aerial photographs and topographic maps and relevant environmental documents, and review of regulatory agency databases and web sites.

Thresholds for measuring a project's environmental impacts in this PEIR are drawn from California Environmental Quality Act (CEQA) Guidelines Appendix G (OPR, 2013). The following Appendix G impact topics are not addressed in this PEIR because the Project has no potential to affect them:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25-mile of an existing or proposed school.
- Be located within an airport land use plan, or where such a plan has not been adopted, within 2 miles of a public airport or public use airport, and result in a safety hazard for people residing or working in the project area.
- Be located within the vicinity of a private airstrip, and result in a safety hazard for people residing or working in the project area.
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

3.7.1 Setting

Environmental Setting

Project Area Conditions

A screening environmental assessment was conducted to evaluate conditions in the Project Area and adjacent properties that could represent a potential public health and safety hazard (BSK, 2014) (see **Appendix G** of this EIR). The focus of the screening environmental assessment was to determine the presence or likely presence of any current conditions that indicate an existing release, a past release, or a material threat of a release of hazardous substances and/or petroleum products into the ground, groundwater, or surface water.

The Project Area was assessed for material evidence of current and/or past use or storage of toxic or hazardous materials; including visible on-site ponds, landfills, or other disposal units; above ground or underground storage tanks (USTs) or other chemical storage containers; electrical transformers containing polychlorinated biphenyls (PCBs); and, where field review occurred, visible soil discoloration. Surrounding properties were screened to evaluate any potential impacts to the Project Area or associated site restoration activities from a known or an indicated release of hazardous substance or petroleum products. Non-point sources were not considered in the evaluation, because the primary objective of the assessment was to identify potential point source release of hazardous substances or petroleum products, and no indication of non-point source releases was identified in the initial review of State and federal documentation. As described below, based on the results of the screening environmental assessment, no known hazardous materials or a history of hazardous material usage or contamination within the Project Area were identified (BSK, 2014). Documented hazardous material sites in the Project Vicinity are described below in the Environmental Setting.

Materials Storage

During the assessment no evidence of hazardous materials storage was identified within the Project Area including:

- Underground Storage Tanks (USTs).
- Aboveground Storage Tanks (ASTs).
- Potential Polychlorinated Biphenyl (PCB)-containing equipment.

Pits, Ponds, and Lagoons

No readily identifiable hazardous storage pits, ponds, or lagoons associated with were noted during the Project Area reconnaissance, and no evidence was seen in historical photographs or topographic maps of the Project Area obtained through Environmental Data Resources, Inc. (EDR).

Other Physical Evidence of Contamination

Rural farms may contain underground fuel tanks associated with fueling farm vehicles and above ground tanks for storing agricultural products including pesticides and herbicides. Project Area reconnaissance identified a few locations that were visible features on the banks above, but well outside, the Project Area that may be storage tanks for agricultural refueling or chemical storage (BSK, 2014, pp. 3-4).

Agency Record Review

BSK reviewed the following regulatory agencies websites to obtain reasonably ascertainable and practically reviewable documentation regarding environmental conditions present in the site area and nearby properties (BSK, 2014, p. 2).

Databases reviewed include:

- State Water Resources Control Board (SWRCB), GeoTracker Website
- Department of Toxic Substances Control (DTSC), EnviroStor Website and Record Search

These databases did not list any locations in the Project Area subject to past or present environmental remediation related to hazards or hazardous substances. The databases identified several off-site properties outside of the Project Area as former Leaking Underground Storage Site (LUST) Cleanup Sites. All are located north of the Winters Putah Creek Nature Park Reach:

- Lowrie Truck: 9 Main Street E, Winters CA. approximately 700 feet north of the Project Area
- Barbos'a Auto Center, 400 Railroad Ave, Winters California, approximately 715 feet north of the Project Area
- Winters Fire Department 10 Abbey Street, Winters , approximately 725 feet north of the Project Area

All three sites underwent remediation and were issued no further action (NFA) letters, indicating that clean-up actions were complete (BSK, 2014, pp. 2-3).

The Laboratory for Energy-Related Health Research (LEHR) site is located on Old Davis Road, Davis, approximately 355 feet north of the Project Area on approximately 15 acres. The LEHR site is northeast of the eastern edge of the Interstate 80 (I-80) to Old Davis Road reach and directly north of the western end of the Old Davis Road to Mace reach. The LEHR site was placed on the federal Superfund list in May 1994. The University of California at Davis (UCD) disposed of University wastes in separate landfills and trenches from 1940s through the mid-1960s. For approximately 35 years, Department of Energy (DOE) conducted radiological studies on laboratory animals. Laboratory and animal wastes generated by those experiments were disposed of in trenches, pits, and septic systems. Initial remedial actions to address the contamination included the removal of "bioparts," waste sludge and other radioactive materials and containers. Approximately

8,500 cubic yards of contaminated soil and debris were removed by 2008. The DOE and UCD have entered into agreements with State and federal environmental agencies (DTSC, RWQCB, and U.S. Environmental Protection Agency [US EPA]) to address the contamination (BSK, 2014, pp. 3-4). The US EPA has determined that the LEHR site does not pose an immediate risk to people or the environment (US EPA, 2015).

Other Environmental Hazards

Pipelines and Pipes

For discussion and analysis of potential Project impacts related to pipelines, see Section 3.14, *Utilities*.

Impacts on an Emergency Response Plan or Emergency Evacuation Plan

For discussion and analysis of potential Project impacts on emergency access, see Section 3.12, *Transportation/Traffic*.

Hazards from Mosquitos

Mosquitos breed in ponds, wet meadows, and slow-moving creeks and ditches where ponding occurs due to obstructions, overflow of banks, excessive siltation and back-eddies created from low water flow during the dry months. Mosquitos have been linked to both wildlife and human health risks associated with West Nile virus. Consequently modification of drainage ways (digging, and filling, etc.) is often necessary to allow free flow of water (Sacramento-Yolo Mosquito and Vector Control District – Mosquito Reduction Best Management Practices, 2008, p. 16).

Illicit Methamphetamine Production

Methamphetamine labs are dangerous sources of toxic chemicals in the State of California. These chemicals are typically flammable and explosive (Office of the Attorney General, 2014, p. 16). Furthermore, these chemicals have long-lasting effects within the facilities where they are created. There have been documented reports of methamphetamine production in both Yolo and Solano Counties. The closest documented occurrence to the Project Area occurred in Winters in 2001 (DTSC, 2011, p. 496).

Illicit Marijuana Cultivation

Illegal marijuana cultivation occurs throughout California and has been documented along Putah Creek near Winters. In 2013, Department of Fish and Wildlife officials discovered an illegal marijuana cultivation consisting of 2,658 plants hidden in dense

foliage near the banks of Putah Creek. Newspaper accounts of the event state only that the cultivation area was "west of Winters" and "near the banks of the creek," and so it is unclear whether the cultivation area was within the Project Area (Woodland Daily Democrat, 2013; Davis Enterprise, 2013). Marijuana cultivation requires a variety of measures to maintain and preserve the plants. This creates the potential for growers to use harmful pesticides, rodenticides, and fertilizers (Office of the Attorney General, 2014, p. 12). Improperly disposed chemicals are deposited in the area with the potential to enter rivers or forms of drinking water. For example, in the Putah Creek cultivation incident described above, law enforcement authorities discovered at the site an illegal pesticide, "Furnan" (Carbofuran) (Woodland Daily Democrat, 2013).

Project Area Conditions by Reach

NAWCA/Mariani, Duncan-Giovannoni

No hazards or hazardous materials sites have been identified within or in the vicinity of these reaches.

Winters Putah Creek Nature Park

As discussed above, SWRCB and DTSC databases identify three off-site properties north of the Project Area in this reach as former LUST cleanup sites. All three sites underwent remediation and were issued no further action (NFA) letters, indicating that clean-up actions were complete (BSK, 2014, pp. 2-3).

East of 505, Warren, Upper McNamara, Lower McNnamara, MacQuiddly (Lester), Russell Ranch, Stevenson Bridge, Glide Ranch, Nishikawa, Olmo-Hammond-UCD

No hazards or hazardous materials sites have been identified within or in the vicinity of these reaches.

I-80 to Old Davis Road, Old Davis Road to Mace

Both of these reaches are in the vicinity of the former Laboratory of Energy-related Health Research (LEHR) (UC Davis, 1995, p. 48, Figure 2). The LEHR site is northeast of the eastern edge of the I-80 to Old Davis Road reach and directly north of the western end of the Old Davis Road to Mace reach. As discussed above, UCD and DOE disposed of laboratory and animal wastes, including from radiological studies, in trenches, pits, and septic systems. DOE and UCD have entered into agreements with State and federal environmental agencies (DTSC, RWQCB, and US EPA) and remediation of the site is ongoing (BSK, 2014, pp. 3-4). The US EPA has determined that the LEHR site does not pose an immediate risk to people or the environment (US EPA, 2015).

Mace to Road 106A, Road 106A to Yolo Bypass Wildlife Area

No hazards or hazardous materials sites have been identified within or in the vicinity of these reaches.

Regulatory Setting

Definition of Hazardous Materials

A material is considered hazardous if it appears on a list of hazardous materials prepared by a federal, State, or local agency, or if it has characteristics defined as hazardous by such an agency. A hazardous material is defined in the California Health and Safety Code and Title 22 of the California Code of Regulations (CCR) as:

> (A)ny material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. "Hazardous materials" include, but are not limited to, hazardous substances, hazardous waste, and any material that a handler or the administering agency has a reasonable basis for believing that it would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment (Health and Safety Code section 25501, subdivision (p) cited in 22 CCR Section 66260.10, "Hazardous Material").

Chemical and physical properties cause a substance to be considered hazardous, including the properties of toxicity, ignitability, corrosivity, and reactivity. These terms are defined in the CCR, Title 22, Sections 66261.20-66261.24.

Federal Regulations

<u>U.S. Environmental Protection Agency</u>

The US EPA is responsible for researching and setting national standards for a variety of environmental programs and in certain cases, it delegates responsibility to states and tribes for issuing permits and monitoring and enforcing compliance.

Historically, US EPA the principal agency at the federal level enforcing standards for the generation, transport, and disposal of hazardous waste, acting under the authority of the Resource Conservation and Recovery Act (RCRA). As of August 1, 1992, however, the US EPA authorized the DTSC to implement the State's hazardous waste management program for the US EPA. The US EPA continues to enforce regulation of hazardous

substances under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Comprehensive Environmental Response, Compensation, and Liability Act

CERCLA, commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites, provided for liability of persons responsible for releases of hazardous waste at these sites, and established a trust fund to provide for cleanup when no responsible party could be identified.

The law authorizes two kinds of response actions: short-term removals, where actions may be taken to address releases or threatened releases requiring prompt response, and long-term remedial response actions. Long-term remedial response actions permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening. These actions can be conducted only at sites listed on US EPA's National Priorities List (NPL).

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA), 42 U.S.C Sections 6901 et seq. (1976), gave US EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste, as well a framework for the management of specific non-hazardous wastes.

The1986 amendments to RCRA enabled US EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. RCRA focuses only on active and future facilities and does not address abandoned or historical sites (see CERCLA).

The Federal Hazardous and Solid Waste Amendments (HSWA) are 1984 amendments to RCRA that required phasing out land disposal of hazardous waste. Some of the other mandates of this law include increased US EPA enforcement authority, more stringent hazardous waste management standards, and a comprehensive underground storage tank program.

Federal Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) authorizes the US EPA to secure information on all new and existing chemical substances and to control any of these substances determined to cause an unreasonable risk to public health or the environment. TSCA also includes requirements for the storage, use, and disposal of polychlorinated biphenyl (PCB)-containing materials.

Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), United States Code sections 136 et seq., provides federal control of pesticide distribution, sale, and use. US EPA was given authority under FIFRA not only to study the consequences of pesticide usage but also to require users (farmers, utility companies, and others) to register when purchasing pesticides. Through later amendments to the law, users also must take exams for certification as applicators of pesticides. All pesticides used in the U.S. must be registered (licensed) by the US EPA. Registration assures that pesticides will be properly labeled and will not cause unreasonable harm to the environment if used in accordance with specifications.

State Regulations

The California Environmental Protection Agency (Cal/EPA) and the SWRCB establish rules governing the use of hazardous materials and the management of hazardous waste. Within Cal/EPA, the DTSC has primary regulatory responsibility for the management of hazardous materials and the generation, transport, and disposal of hazardous waste. DTSC also delegates enforcement to local jurisdictions that enter into agreements with the agency.

California Health and Safety Code

Hazardous materials release response plans and inventory requirements are set forth in Chapter 6.95 of Division 20 of the California Health and Safety Code (Section 25500 et seq.). Response plans and inventories are implemented by local governments. In Solano County, this function is performed by the Solano County Department of Resource Management, Environmental Health Services Division (County of Solano, 2015a). In Yolo County, the Yolo County Environmental Health Services Division implements response plans and inventories (County of Yolo, 2015).

California Water Code

California Water Code section 231 requires the California Department of Water Resources (DWR) to develop well standards to protect California's groundwater quality. DWR published two bulletins that encompass the complete minimum requirements for constructing, altering, maintaining, and destroying water wells, monitoring wells, and cathodic protection wells. The standards in DWR Bulletin 74-81 (December 1981) and DWR Bulletin 74-90 (June 1991 supplement to 74-81) apply to all water well drillers in California and the local agencies that oversee them.

Hazardous Waste Control Laws

The California Hazardous Waste Control Law (HWCL) is the State's equivalent to RCRA and closely parallels RCRA by regulating the generation, storage, transportation, treatment, and disposal of hazardous waste in the State. The primary authority for enforcement of HWCL and RCRA lies with the DTSC, which has been authorized by the US EPA to administer all regulations issued under both statutes.

Government Code Section 65962.5 ("Cortese List" Statute)

Government Code section 65962.5 was originally enacted in 1985 and provides for identification of hazardous waste facilities and land designated as hazardous waste property. The list, or a site's presence on the list, affects the local permitting process as well as compliance with CEQA. While Government Code Section 65962.5 makes reference to the preparation of a "list," technology has changed since the law's enactment, and this information is now largely available on the Internet sites of the responsible State agencies. Parties requesting a copy of the Cortese "list" are now referred directly to the appropriate Internet web sites of the boards or departments that are referenced in the statute (Cal/EPA, 2007).

Regional Regulations

Yolo –Solano Air Quality Management District (YSAQMD)

The Yolo-Solano Air Quality Management District protects human health and property from air pollution and was established in 1971 by a joint powers agreement between the Yolo and Solano County Boards of Supervisors. The District's jurisdiction extends over all of Yolo County and the northeast portion of Solano County, from Vacaville on the west, to Rio Vista on the south (YSAQMD, 2015). Under District Rule 4002, the YSAQMD adopted regulations and policies implementing asbestos demolition and renovation requirements developed by the US EPA, known as the National Emission Standards for Hazardous Air Pollutants (NESHAP). NESHAP requires that a thorough inspection for

asbestos-containing material be conducted before any regulated facility is demolished or renovated (CARB, 2013).

Mosquito Vector Control Districts

The two Mosquito Vector Control Districts that have jurisdiction over the Project Area include the Sacramento-Yolo Mosquito and Vector Control District (SYMVCD) and the Solano County Mosquito Abatement District (SCMAD). These agencies create and implement policies and strategies to control and prevent mosquitos in their respective jurisdictions.

SCMAD requires that construction of new ditches must be undertaken to maintain adequate circulation of water (Solano County Mosquito Abatement District- Mosquito Prevention Criteria 2015a). SYMVCD established the following Best Management Practices (BMPs) to promote mosquito reduction:

1. Prevent or eliminate unnecessary standing water that stands for more than 72-96 hours during mosquito season which can start as early as March and extend through October depending on weather.
2. Maintain access for District staff to monitor and treat mosquito breeding sources.
3. Minimize emergent vegetation and surface debris on the water.
4. Contact the District for technical guidance or assistance in implementing mosquito reduction BMPs.

(SYMVCD, 2008, p. 16)

Additionally, the California Department of Public Health (CDPH) and the Mosquito and Vector Control Association of California have developed recommended BMPs that may be voluntarily adopted by property owners and managers to manage this naturally occurring risk (CDPH, 2012, pp. iv, 4-6, 14-17).

Local Regulations

County Environmental Health Services Departments

The Solano County Department of Resource Management, Environmental Health Services Division is the Certified Unified Program Agency (CUPA) for all cities and unincorporated areas within Solano County (County of Solano, 2015a). The corresponding Yolo County entity is Yolo County Environmental Health County (County of Yolo, 2015).

These agencies conduct site inspections of all hazardous materials programs (e.g., aboveground and underground tanks, hazardous waste treatment, hazardous waste generators, hazardous materials management plans, etc.). They also provide emergency response to chemical events to furnish substance identification; health and environmental risk assessment; air, soil, water, and waste sample collection; incident mitigation and cleanup feasibility options; and on-scene coordination for State Superfund incidents. The agencies provide the oversight, investigation, and remediation of unauthorized releases from underground tanks.

Solano County General Plan

The following the Solano County General Plan policies relate to hazardous materials and the proposed Project (County of Solano, 2008, pp. HS-51 to HS-52):

> Policy HS.P-26: Minimize the risks associated with transporting, storing, and using hazardous materials through methods that include careful land use planning and coordination with appropriate federal, State, or County agencies.
>
> Policy HS.P-27: Work to reduce the health risks associated with naturally occurring hazardous materials such as radon, asbestos, or mercury.
>
> Policy HS.P-28: Encourage the use of programs and products by businesses that will result in a reduction of hazardous waste and materials.
>
> Policy HS.P-29: Promote hazardous waste management strategies in this order of priority: source reduction, recycling and reuse, on-site treatment, off-site treatment, and residuals disposal.

Yolo County General Plan

The following the Yolo County General Plan policies relate to hazardous materials and the proposed Project (County of Yolo, 2009):

> Policy HS-4.1 Minimize exposure to the harmful effects of hazardous materials and waste.
>
> Policy HS-4.3 Encourage the reduction of solid and hazardous wastes generated in the county.

Solano County Code

The following section from the Solano County Code is relevant to hazardous materials and the proposed Project (County of Solano, 2015b):

> Except as provided in Chapter 2.2, any use of land or buildings must meet the applicable performance standards listed below:
>
> > All uses are prohibited from discharging liquid, solid, toxic, or hazardous wastes onto or into the ground and into streams, lakes, or rivers except as allowed by applicable local, State and federal laws and regulations.
> >
> > The handling and storage of hazardous materials, the discharge of hazardous materials into the air and water, and the disposal of hazardous waste in connection with all uses shall be in conformance with all applicable local, State, and federal regulations.

3.7.2 Significance Criteria

The following thresholds for measuring a project's environmental impacts are based on CEQA Guidelines Appendix G standards of significance (OPR, 2013). For the purposes of this PEIR, impacts are considered significant if any of the following could result from implementation of the proposed Project:

1. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
2. Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would create a significant hazard to the public or the environment.
3. Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

3.7.3 Impacts and Mitigation Measures

Impacts and mitigation measures are described below both generally and by reach. Applicable impacts and mitigation measures for each reach are summarized in **Table 3.7-1**, at the end of this section.

General Impacts and Mitigation Measures

Impact 3.7-1: Hazards from Existing Contaminated Sites.

The Project Area is not included on a list of hazardous materials sites pursuant to Government Code section 65962.5 (Cortese List) and a screening level environmental hazard assessment did not identify any on-site hazards or hazardous substances. Three former LUST Cleanup Sites are located near the Project Area, but all three sites underwent remediation and were issued no further action (NFA) letters, indicating that clean-up actions are complete (BSK, 2014, pp. 2-3). The LEHR Superfund site is located near the Project Area. The responsible parties for this site, DOE and UCD, have entered into agreements with State and federal environmental agencies and remediation of the site is ongoing (BSK, 2014, pp. 3-4). The US EPA has determined that the LEHR site does not pose an immediate risk to people or the environment (US EPA, 2015). Project activities would have no effect on these off-site areas and would not increase potential environmental hazards potentially associated with these sites.

If soil or groundwater contamination were encountered in the Project Area during the course of construction, project workers could be affected, and, if contaminated soil were placed in the streambed, water quality impacts may occur. This potentially significant impact would be mitigated to a **less-than-significant** level through implementation of the following mitigation measure.

Mitigation 3.7-1: Procedures if Hazardous Materials Discovered.

If evidence of hazardous materials is discovered during Project activities, the Applicant shall notify the appropriate County Environmental Health Services. The Applicant shall test and analyze the materials following proper protocols to determine the presence of hazardous substances prior to making arrangements for off-site reuse/recycling or disposal. Testing shall be performed according to one of the following methods:

1. The method recommended by the County Environmental Health Services in the county in which the materials are located.
2. If the County Environmental Health Services does not specify a method, then the potentially hazardous material shall be tested as follows:
    a. Conduct representative sampling of the material in accordance with procedures specified in Section One of “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods” SW-846, 3rd Edition, US EPA (US EPA, 2014; US EPA, 2013).

b. Arrange for testing of the material by a laboratory following the analytical procedures outlined in CCR Title 22, Division 4.5. The laboratory performing the testing shall be certified to perform the specific waste analysis by the State of California Department of Environmental Health.

c. Deliver samples to the testing laboratory with a "Chain of Custody" type document which indicates the sample type, date and time sample was taken, sample size, source of the waste, quantity of the waste, the type of sample container, place and address of collection, and the name and signature of collector.

3. If testing indicates the presence of contamination, then the contaminated materials shall be excavated and disposed of in a permitted off-site disposal facility prior to completion of construction.

Impact 3.7-2: Contamination from Construction Equipment.

The use of construction vehicles and equipment, such as trucks and excavators, could result in minor contamination releases from gasoline, oil, antifreeze, grease, or other equipment fluid drips or leaks within the Project Area. Implementation of Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential Project impacts related to hazardous materials release to **less than significant**.

Impact 3.7-3: Hazards from Misapplication of Herbicides

As is analyzed in Section 3.2, *Water Quality*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential human health impacts. However, as detailed in Impact 3.2-4, proper application of the limited quantities of these herbicides as proposed by the Project would result in less-than-significant human health risks. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Impact 3.7-4: Fire Hazards.

Proposed Project construction and maintenance activities would not expose people or structures to a significant risk of loss, injury, or death involving wildland fires. In the long term, reduction of invasive riparian vegetation (such as Arundo and tamarisk) along the creek channel would reduce the risk of fire. Nonetheless, because construction and maintenance activities would be conducted using power equipment and vehicles, a potential exists for an accidental ignition of a wildland fire. Implementation of Mitigation Measure 3.7-2 would reduce this impact to **less than significant** by requiring on-site fire

suppression equipment and spark arrestors on all equipment with internal combustion engines and restricting activities on high fire danger days.

Mitigation Measure 3.7-2: Fire Prevention Measures.

1. All earthmoving and portable equipment with internal combustion engines shall be equipped with spark arrestors.
2. Work crews shall have appropriate fire suppression equipment available at the work site.
3. On days when the fire danger is high and a burn permit is required (as issued by the Yolo-Solano Air Quality Management District), flammable materials, including flammable vegetation slash, shall be kept at least 10 feet away from any equipment that could produce a spark, fire, or flame.

Site-Specific Impacts and Mitigation Measures

NAWCA/Mariani

Hazardous Materials

No hazards or hazardous materials sites have been identified within or in the vicinity of this reach. However, if hazardous materials were discovered in this reach during the course of construction, a potentially significant impact could arise. This impact would be mitigated to a **less-than-significant** level through implementation of Mitigation Measure 3.7-1. Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential risks related to construction vehicle and equipment fluid drips, spills, or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Fire Hazard

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.7-4 above. Implementation of Mitigation Measure 3.7-2 would reduce this potential impact to **less than significant**.

Duncan-Giovannoni

Hazardous Materials

No hazards or hazardous materials sites have been identified within or in the vicinity of this reach. However, if hazardous materials were discovered in this reach during the course of construction, a potentially significant impact could arise. This impact would be mitigated to a **less-than-significant** level through implementation of Mitigation Measure 3.7-1. Mitigation Measure 3.2-2 would reduce potential risks related to construction vehicle and equipment fluid drips, spills, or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Fire Hazard

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.7-4 above. Implementation of Mitigation Measure 3.7-2 would reduce this potential impact to **less than significant**.

Winters Putah Creek Nature Park

Because restoration activities have already been completed for this reach, proposed Project activities would only involve maintenance. Thus, there is **no impact** in this reach related to hazardous materials being discovered in this reach during the course of construction. Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential risks related to construction vehicle and equipment fluid drips or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

East of 505

Hazardous Materials

No hazards or hazardous materials sites have been identified within or in the vicinity of this reach. However, if hazardous materials were discovered in this reach during the

course of construction, a potentially significant impact could arise. This impact would be mitigated to a **less-than-significant** level through implementation of Mitigation Measure 3.7-1. Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential risks related to construction vehicle and equipment fluid drips, spills, or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Fire Hazard

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impacts 3.7-4 above. Implementation of Mitigation Measure 3.7-2 would reduce this potential impact to **less than significant**.

Warren

Hazardous Materials

No hazards or hazardous materials sites have been identified within or in the vicinity of this reach. However, if hazardous materials were discovered in this reach during the course of construction, a potentially significant impact could arise. This impact would be mitigated to a **less-than-significant** level through implementation of Mitigation Measure 3.7-1. Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential risks related to construction vehicle and equipment fluid drips, spills, or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Fire Hazard

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impacts 3.7-4 above. Implementation of Mitigation Measure 3.7-2 would reduce this potential impact to **less than significant**.

Upper McNamara

Hazardous Materials

No hazards or hazardous materials sites have been identified within or in the vicinity of this reach. However, if hazardous materials were discovered in this reach during the course of construction, a potentially significant impact could arise. This impact would be mitigated to a **less-than-significant** level through implementation of Mitigation Measure 3.7-1. Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential risks related to construction vehicle and equipment fluid drips, spills, or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Fire Hazard

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impacts 3.7-4 above. Implementation of Mitigation Measure 3.7-2 would reduce this potential impact to **less than significant**.

Lower McNamara

Hazardous Materials

No hazards or hazardous materials sites have been identified within or in the vicinity of this reach. However, if hazardous materials were discovered in this reach during the course of construction, a potentially significant impact could arise. This impact would be mitigated to a **less-than-significant** level through implementation of Mitigation Measure 3.7-1. Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential risks related to construction vehicle and equipment fluid drips, spills, or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Fire Hazard

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impacts 3.7-4 above. Implementation of Mitigation Measure 3.7-2 would reduce this potential impact to **less than significant**.

MacQuiddy (Lester)

Hazardous Materials

No hazards or hazardous materials sites have been identified within or in the vicinity of this reach. However, if hazardous materials were discovered in this reach during the course of construction, a potentially significant impact could arise. This impact would be mitigated to a **less-than-significant** level through implementation of Mitigation Measure 3.7-1. Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential risks related to construction vehicle and equipment fluid drips, spills, or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Fire Hazard

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impacts 3.7-4 above. Implementation of Mitigation Measure 3.7-2 would reduce this potential impact to **less than significant**.

Russell Ranch

Hazardous Materials

No hazards or hazardous materials sites have been identified within or in the vicinity of this reach. However, if hazardous materials were discovered in this reach during the course of construction, a potentially significant impact could arise. This impact would be mitigated to a **less-than-significant** level through implementation of Mitigation Measure 3.7-1. Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential risks related to construction vehicle and equipment fluid drips, spills, or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Fire Hazard

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impacts 3.7-4 above. Implementation of Mitigation Measure 3.7-2 would reduce this potential impact to **less than significant**.

Stevenson Bridge

Hazardous Materials

No hazards or hazardous materials sites have been identified within or in the vicinity of this reach. However, if hazardous materials were discovered in this reach during the course of construction, a potentially significant impact could arise. This impact would be mitigated to a **less-than-significant** level through implementation of Mitigation Measure 3.7-1. Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential risks related to construction vehicle and equipment fluid drips, spills, or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Fire Hazard

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impacts 3.7-4 above. Implementation of Mitigation Measure 3.7-2 would reduce this potential impact to **less than significant**.

Glide Ranch

Hazardous Materials

No hazards or hazardous materials sites have been identified within or in the vicinity of this reach. However, if hazardous materials were discovered in this reach during the course of construction, a potentially significant impact could arise. This impact would be mitigated to a **less-than-significant** level through implementation of Mitigation Measure

3.7-1. Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential risks related to construction vehicle and equipment fluid drips, spills, or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Fire Hazard

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impacts 3.7-4 above. Implementation of Mitigation Measure 3.7-2 would reduce this potential impact to **less than significant**.

Nishikawa

Hazardous Materials

No hazards or hazardous materials sites have been identified within or in the vicinity of this reach. However, if hazardous materials were discovered in this reach during the course of construction, a potentially significant impact could arise. This impact would be mitigated to a **less-than-significant** level through implementation of Mitigation Measure 3.7-1. Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential risks related to construction vehicle and equipment fluid drips, spills, or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Fire Hazard

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impacts 3.7-4 above. Implementation of Mitigation Measure 3.7-2 would reduce this potential impact to **less than significant**.

Olmo-Hammond-UCD

Hazardous Materials

No hazards or hazardous materials sites have been identified within or in the vicinity of this reach. However, if hazardous materials were discovered in this reach during the course of construction, a potentially significant impact could arise. This impact would be mitigated to a **less-than-significant** level through implementation of Mitigation Measure 3.7-1. Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential risks related to construction vehicle and equipment fluid drips, spills, or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Fire Hazard

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impacts 3.7-4 above. Implementation of Mitigation Measure 3.7-2 would reduce this potential impact to **less than significant**.

I-80 to Old Davis Road

Hazardous Materials

No hazards or hazardous materials sites have been identified within or in the vicinity of this reach. However, if hazardous materials were discovered in this reach during the course of construction, a potentially significant impact could arise. This impact would be mitigated to a **less-than-significant** level through implementation of Mitigation Measure 3.7-1. Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential risks related to construction vehicle and equipment fluid drips, spills, or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Fire Hazard

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impacts 3.7-4 above. Implementation of Mitigation Measure 3.7-2 would reduce this potential impact to **less than significant**.

Old Davis Road to Mace

Hazardous Materials

No hazards or hazardous materials sites have been identified within or in the vicinity of this reach. However, if hazardous materials were discovered in this reach during the course of construction, a potentially significant impact could arise. This impact would be mitigated to a **less-than-significant** level through implementation of Mitigation Measure 3.7-1. Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential risks related to construction vehicle and equipment fluid drips, spills, or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Fire Hazard

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impacts 3.7-4 above. Implementation of Mitigation Measure 3.7-2 would reduce this potential impact to **less than significant**.

Mace to Road 106A

Hazardous Materials

No hazards or hazardous materials sites have been identified within or in the vicinity of this reach. However, if hazardous materials were discovered in this reach during the course of construction, a potentially significant impact could arise. This impact would be mitigated to a **less-than-significant** level through implementation of Mitigation Measure 3.7-1. Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential risks related to construction vehicle and equipment fluid drips, spills, or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Fire Hazard

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.7-4 above. Implementation of Mitigation Measure 3.7-2 would reduce this potential impact to **less than significant**.

Road 106A to Yolo Bypass Wildlife Area

Hazardous Materials

No hazards or hazardous materials sites have been identified within or in the vicinity of this reach. However, if hazardous materials were discovered in this reach during the course of construction, a potentially significant impact could arise. This impact would be mitigated to a **less-than-significant** level through implementation of Mitigation Measure 3.7-1. Mitigation Measure 3.2-2 (Section 3.2, *Water Quality*) would reduce potential risks related to construction vehicle and equipment fluid drips, spills, or leaks to a **less-than-significant** level.

As is analyzed in Section 3.4, *Biological Resources*, misapplication of herbicides during activities to reduce invasive species and weeds could result in potential environmental impact. Implementation of Mitigation Measure 3.4-12 would reduce this potential impact to **less than significant**.

Fire Hazard

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impacts 3.7-4 above. Implementation of Mitigation Measure 3.7-2 would reduce this potential impact to **less than significant**.

Table 3.7-1 Summary of Hazard Impacts and Mitigation Measures

Site	Impact 3.7-1 Hazardous Materials	Impact 3.7-2 Construction Equipment	Impact 3.7-3 Herbicides Hazards	Impact 3.7-3 Fire Hazards	Applicable Mitigation Measures
NAWCA/Mariani	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2
Duncan-Giovannoni	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2
Winters Putah Creek Nature Park	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2
East of 505	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2
Warren	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2
Upper McNamara	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2
Lower McNamara	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2
MacQuiddy (Lester)	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2
Russell Ranch	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2
Stevenson Bridge	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2
Glide Ranch	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2
Nishikawa	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2
Olmo-Hammond-UCD	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2
I-80 to Old Davis Road	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2
Old Davis Road to Mace	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2
Mace to Road 106A	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2
Road 106A to YBWA	SM	SM	SM	SM	MM 3.2-2, 3.4-12, 3.7-1, 3.7-2

NI = no impact, LS = LTS = Less than Significant Impact, SM = Significant but mitigatable to less than significant with measures identified in this section, and SU = Significant and Unavoidable, even after mitigation.

3.8 LAND USE

This section describes the existing land uses in the project area, including urban (including population and housing), institutional (i.e., University of California, Davis (UC Davis), and agricultural uses. Applicable State and local land use policies are summarized. It then assesses the potential effects of the proposed project restoration activities (both construction and post-construction) on these land uses. Mitigation measures are identified as applicable.

Because the project wound neither displace nor create housing or population, there is no possibility that an adverse impact could occur and those issues are not addressed further in this chapter.

3.8.1 Setting

Environmental Setting

General Setting

Existing Land Uses

Land use patterns in the Central Valley over the past 200 years began with the establishment of homesteads, and farming and grazing enterprises that converted native habitats to developed rural uses. More recent urban development has constrained historic rural uses and resulted in additional losses of native habitats, including riparian habitat along creeks and rivers. This regional trend is reflected in changes in land uses along Putah Creek.

The Project alignment passes through parts of Yolo and Solano Counties (and frequently forms the boundary between the two counties), as well as the City of Winters. The Project extends from below the Putah Diversion Dam to the western boundary of the Yolo Bypass Wildlife Area. Land uses along the Project alignment are generally agricultural, with the exception of where the creek passes through the City of Winters, portions of the University of California, Davis, and occasional isolated residential and industrial areas. The creek is incised in a small canyon along much of the Project alignment, and the land use in the channel area where most project activities would occur is primarily undeveloped, non-agricultural open space. A number of roads and bridges either cross or parallel the creek, on the level areas on either side of the creek canyon. Publicly accessible trails and

other recreational areas abut the creek in several areas. Specific land uses along each Project reach are described below.

The following list characterizes current land ownership, land use, and resource management conditions along Putah Creek (EDAW, 2005):

- Riparian habitat. Less than 2,000 acres of riparian corridor presently exists along lower Putah Creek and Pleasants Creek, representing less than 0.2 percent of the total acreage (1,182,336 acres) of Solano and Yolo counties.
- Adjacent agricultural and native vegetation lands. The vast majority, about 70 percent, of lands adjacent to (i.e., bordering) the riparian corridors of lower Putah, Pleasants, and Dry creeks are agricultural lands, nearly all of which are designated as Prime Farmland, Farmland of Statewide Importance, or Farmland of Local Importance.
- Urban development. Urban development accounts for approximately 4 percent of the land adjacent to the riparian corridors and consists primarily of low-density residential development, commercial, and light industrial uses. The majority of developed land occurs on the north side of Putah Creek, in Yolo County. The majority of urban development adjacent to the riparian corridor occurs in the City of Winters.
- Private and public ownership. GIS analysis shows that most (78 percent) of the land within and adjacent to the lower Putah Creek and Pleasants Creek riparian corridors is privately owned. Public lands account for about 21.2 percent of the corridor and adjacent parcels.
- Public access/recreation. Public access is available on publicly owned lands in and near lower Putah Creek in or near the Project alignment. These include (from west to east):
  - Lake Solano County Park,
  - Winters Putah Creek Nature Park,
  - Stevensons Bridge,
  - UC Davis Putah Creek Riparian Reserve, and
  - Davis South Fork Preserve.

Recreational land uses are not addressed further in this section, but are addressed in detail in Section 3.10, *Recreation*.

Project Site Conditions

NAWCA/Mariani

Land uses along this reach include a broad swath of creekside open space/habitat (not publicly accessible), surrounded by orchards and natural habitats, some of which have been previously restored. Several houses and farm buildings lie just outside of the alignment on the southwest side of the alignment. Public access to the creek is available from farm roads off of Putah Creek Road, which runs east/west, south of this alignment.

Duncan-Giovannoni

Land uses along this reach include a relatively broad (300 to 500 feet) swath of creekside open space/habitat (not publicly accessible), surrounded by orchards. Several houses and farm buildings lie just outside of the alignment on the south and west sides of the alignment. Residential areas of the City of Winters lie about 800 feet north of the eastern portion of the alignment. An industrial/storage area lies just southeast of the alignment. Public access to the creek is available from Putah Creek Road, which parallels the southeast edge of this alignment.

Winters Putah Creek Nature Park

This reach is bordered on the east by a mix of urban uses in the City of Winters, including residential, commercial, and recreational land uses. The creek flows through the Winters Putah Creek Nature Park in this reach.

East of 505

Land uses along this reach are comprised of a 200- to 250-foot swath of open space/habitat (not publicly accessible), surrounded by orchards. An industrial storage and processing facility lies immediately north of the western side of the alignment. The El Rio Vista residential development lies around 1,000 feet northeast of the eastern side of this site and the northwest side of the Warren site. Public access to the creek is available from Putah Creek Road, which parallels the southeast edge of this alignment.

Warren

Land uses along this reach are comprised of around 250-foot swath of creekside open space/habitat (not publicly accessible), surrounded by orchards. The El Rio Vista residential development lies around 1,000 feet northeast of the eastern side of the northwest side of the Warren site. There are two large houses that lie 300 to 500 feet to

the southeast of the eastern end of Warren site. There is no public access to the creek in this reach.

Upper McNamara

Land uses along this reach are comprised of a 250- to 300-foot swath of open space/habitat, surrounded by orchards. A pair of large electrical transmission lines traverse the center of this reach.

Lower McNamara

Land uses along this reach are comprised of a 250-foot swath of open space/habitat (not publicly accessible), surrounded by orchards. There is an electrical transmission line crossing the eastern end of this reach. There is no public access to the creek in this reach.

MacQuiddy (Lester)

Land uses along this reach are comprised of a 350-foot swath of open space/habitat (not publicly accessible), surrounded by orchards. There is a residence located approximately 50 feet east from the southeast corner of the reach. Farm structures are just south of the eastern portion of the reach. There is no public access to the creek in this reach.

Russell Ranch

Land uses along this reach are comprised of a 300-foot swath of open space/habitat within the project reach and the north there is a 500-foot strip of nonagricultural open space, surrounded by field crops and orchards. There is one set of agricultural buildings and storage immediately adjacent to the south side of this reach at Martinez Lane. There is no public access to the creek in this reach.

Stevenson Bridge

Land uses along this reach are comprised of a 250-foot swath of open space/habitat within the project reach, surrounded by orchards to the south and a mixture of rural residential and associated out buildings to the northwest of Stevenson Bridge. To the east of Stevenson Bridge, the open space area widens to about 550 feet. Field crops lie to the north of the portion of the alignment that is to the east of Road 95-A. There is heavy informal recreational use of the east side of the bridge (see Section 3.10, *Recreation*).

Glide Ranch

Land uses along this reach are comprised of a 400- to 600-foot swath of open space/habitat within the project reach, surrounded primarily by field crops. Several rural residential complexes lie immediately to the south of this alignment.

Nishikawa

Land uses along this reach are comprised of a 400- to 600-foot swath of open space/habitat within the project reach, surrounded on the south by field crops and on the north by a wastewater pond and treatment facility. There is public access to the north side of the creek from Pedrick Road/Lincoln Highway.

Olmo-Hammond-UCD

Land uses along this reach are comprised of a 300- to 500-foot swath of open space/habitat within the project reach, surrounded by a variety of agricultural uses including some agricultural buildings. Additionally, UCD facilities including an airport and animal/ research facilities are located 1,000 to 1,500 feet north of this reach. The south side of the creek is part of UC's Putah Creek Riparian Preserve, and includes recreational facilities (see Section3.10, *Recreation*).

I-80 to Old David Road

Land uses along this reach are comprised of a 400- to 700-foot swath of open space/habitat within the project reach, surrounded by a mixture of agricultural uses. University facilities are located just north of the eastern portion of this alignment, near Old Davis Road. The south side of the creek in this reach is part of the UC Putah Creek Riparian Preserve.

Old Davis Road to Mace

Land uses along this reach are comprised of a 300- to 900-foot-wide area of open space/ habitat, surrounded by agricultural uses with the exception of UCD research facilities immediately north of the westernmost portion of this reach. There is substantial access for pedestrians and drivers to this site from UC Davis, which is to the north of Putah Creek.

Mace to Road 106A

Land uses along this reach are comprised of a 200- to 700-foot span with the exception of the eastern-most portion that widens to around 1,700 feet. The land uses are comprised of open space/habitat, surrounded by orchards and field crops including rice.

There is public access to the creek from Road 106A and 5th Street runs along the creek on the south end for the lower third of the alignment. The City of Davis South Fork Preserve is located in this reach, just south of Mace Road.

Road 106A to Yolo Bypass Wildlife Aea

Land uses along this reach are comprised of a 150- to 300-foot span surrounded entirely by field crops.

Regulatory Setting

Federal Regulations

There are no federal land use regulations applicable to this stretch of Putah Creek. Federal regulations regarding biological resources, water quality, and air quality are addressed in those sections of this EIR.

State Regulations

Land Use

The only State land use regulations applicable to this stretch of Putah Creek are associated with the UC Davis 2003 Long Range Development Plan (UC Davis, 2003). With respect to the area of Putah Creek adjacent to the University, the Plan states:

- Maintain and expand low-density academic, support, and research park uses along the Hopkins Road corridor. Include an open space setback along the west side of Hopkins Road for an off-street bike path and landscaped area to connect points north to the Putah Creek Riparian Reserve (UC Davis, 2003, p. 44).
- Continue to use lands between the Research Park and Putah Creek for agricultural field research (UC Davis, 2003, p. 46).
- Utilize Russell Ranch as a location for a variety of long-term uses to keep the Ranch predominantly as open space and agricultural land. Locate agricultural and environmental field uses with needs for long-term research or site development, stability of surrounding land uses, and freedom from development pressure, on lands south of Road 32. These include (UC Davis, 2003, p. 48):
  - Lands dedicated to the Putah Creek Riparian Reserve.
  - Habitat mitigation and restoration areas.
  - Long-Term Research on Agricultural Systems (LTRAS).

- The Land, Air, and Water Resources Department (LAWR), for long-term climatological and meteorological research.
- Mitigation land identified for long-term preservation in agricultural use.

Agriculture

Williamson Act

The California Land Conservation Act of 1965 (referred to as the Williamson Act) allows local governments to enter contracts with private property owners to protect land for agricultural and open space purposes. This voluntary program offers tax breaks by assessing lands based on actual use (agricultural or open space) as opposed to their potential full market value, creating a financial incentive to maintain farmland and open space, as opposed to allowing conversion to other uses. The Williamson Act program uses rolling 10-year contracts that renew annually until either party files a "notice of non-renewal." If an owner decides to opt out, the land is still protected for 10 years while the tax liability increases in annual increments up to its full market value. Much of the land adjacent to the Project alignment is under Williamson Act contract.

Local Regulations

General Plan Land Use Designations

The Project alignment of Putah Creek forms the boundary between Yolo and Solano Counties for much of its reach. It also flows through lands owned by University of California, Davis, as well as the City of Winters.

Solano County

The Solano County General Plan Land Use Element Figure LU-1, Land Use Diagram (Solano County, 2008) shows the Solano County portion of the NACWA reach as Rural Residential, and the downstream reaches Agriculture, some of which include an Agricultural Reserve overlay.

The Rural Residential designation provides for single-family residences on 2.5- to 10-acre parcels. Clustering is permitted.

The Agriculture designation provides areas for the practice of agriculture as the primary use, including areas that contribute significantly to the local agricultural economy, and allows for secondary uses that support the economic viability of agriculture. Agricultural

land use designations protect these areas from intrusion by nonagricultural uses and other uses that do not directly support the economic viability of agriculture.

Yolo County

Most of the Yolo County reaches of the Project alignment are designated Agriculture in the Yolo County General Plan. However, the Russell Ranch, Nishikawa, Olmo-Hammond-UCD, and I-80 to Old Davis Road reaches are designated for Public/Quasi-Public use (Yolo County General Plan Land Use Map, 2009).

The Agriculture (AG) land use designation includes the full range of cultivated agriculture, such as row crops, orchards, vineyards, dryland farming, livestock grazing, forest products, horticulture, floriculture, apiaries, confined animal facilities and equestrian facilities. It also includes agricultural industrial uses (e.g., agricultural research, processing and storage; supply; service; crop dusting; agricultural chemical and equipment sales; surface mining; etc.) as well as agricultural commercial uses (e.g., roadside stands, "Yolo Stores," wineries, farm-based tourism (e.g., u-pick, dude ranches, lodging), horseshows, rodeos, crop-based seasonal events, ancillary restaurants and/or stores) serving rural areas. Agriculture also includes farmworker housing, surface mining, and incidental habitat.

Public and Quasi-Public (PQ) includes public/governmental offices, places of worship, schools, libraries, and other community and/or civic uses. It also includes public airports, including related visitor services, and infrastructure including wastewater treatment facilities, municipal wells, landfills, and stormwater detention basins. It may include agricultural buffer areas.

The Countywide General Plan Conservation and Open Space Element (Figure CO-2) shows trail linkages along Putah Creek between existing access sites in the cities of Winters and Davis, and extension of an existing bicycle trail west of Davis.

General Plan Policies and Other Applicable Land Use Regulations

Solano County General Plan – Resources Chapter

The Resources chapter of the Solano County General Plan functions as the plan's Open Space Element. The purpose of the Resources Chapter is to identify the goals, policies, and implementation measures that will be used by the County in day-to-day decision making to protect natural, cultural, and open space resources. The chapter focuses on

conserving, preserving, and enhancing these resources to ensure a high quality of life for current and future county residents. The Open Space Element is used to manage all open space areas, including undeveloped wilderness lands and outdoor recreation uses. The California Government Code defines that open space should be preserved for the preservation of natural resources, managed production of resources, recreation, and public health and safety.

The following policies of the Resources chapter are applicable to the Project site:

> Policy RS.G-1: Manage and preserve the diverse land, water, and air resources of the county for the use and enrichment of the lives of present and future generations.
>
> Policy RS.G-2: Ensure continued presence and viability of the county's various natural resources.
>
> Policy RS.G-3: Repair environmental degradation that has occurred, and seek an optimum balance between the economic and social benefits of the county's natural resources.
>
> Policy RS.G-4: Preserve, conserve, and enhance valuable open space lands that provide wildlife habitat; conserve natural and visual resources; convey cultural identity; and improve public safety.
>
> Policy RS.G-10: Foster sound management of the land and water resources in Solano County's watersheds to minimize erosion and protect water quality using best management practices and protect downstream waterways and wetlands

Agriculture

The goals and policies of the General Plan Agricultural Element are intended to provide a framework for achieving the agricultural vision. Applicable policies include:

> Policy AG.P-25: Facilitate partnerships between agricultural operations and habitat conservation efforts to create mutually beneficial outcomes. Although such partnerships are to be encouraged throughout the county, additional emphasis should be focused in locations where the Resource Conservation Overlay and Agricultural Reserve Overlay coincide.

Policy AG.P-35: Lands within the Agriculture designations may be redesignated to Watershed or Marsh.

Right-to-Farm Ordinance

Chapter 2.2 of the Solano County Code protects farm operations from nuisance complaints associated with residential uses located next to active agricultural operations. These complaints often cause farm operators to cease or curtail operations. They may also deter others from investing in farm-related improvements that would support the county's agriculture economy. This "right-to-farm ordinance", as it is commonly known, guarantees the right to continue agricultural operations, including, but not limited to, cultivating and tilling the soil, burning agricultural byproducts, irrigating, raising crops and/or livestock, and applying approved chemicals in a proper manner to fields and farmland. This ordinance limits the circumstances under which agriculture may be considered a nuisance. To prevent future conflicts, notice of this ordinance is given to purchasers of real property in the county.

Yolo County

The 2030 County of Yolo Countywide General Plan (Yolo County, 2009) Agriculture and Economic Development Element includes the following goals and policies applicable to the proposed Project:

Policy AG-2.8 Facilitate partnerships between agricultural operations and habitat conservation efforts to create mutually beneficial outcomes.

Policy AG-2.9 Support the use of effective mechanisms to protect farmers potentially impacted by adjoining habitat enhancement programs, such as "safe harbor" programs and providing buffers within the habitat area.

Policy AG-2.10 Encourage habitat protection and management that does not preclude or unreasonably restrict on-site agricultural production.

3.8.2 Significance Criteria

Land Use

Criteria for determining significant impacts are based upon the CEQA Guidelines (Appendix G) and professional judgment. These guidelines state that a project would have a potentially significant impact on land use and planning if it would:

1. Physically divide an established community.
2. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.
3. Conflict with any applicable habitat conservation plan or natural community conservation plan. This criterion is addressed in the biological resources sections and therefore is not evaluated in this section.

In addition, the following criterion is used to determine significant impacts on land use and planning if it would:

4. Cause a substantial conflict with adjacent or nearby land uses.

Agriculture

Criteria for determining significant impacts are based upon the CEQA Guidelines (Appendix G) and professional judgment. These guidelines state that a project would have a potentially significant impact on agricultural resources if it would:

1. Convert a substantial amount of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Important Farmland), as shown on the maps for the Farmland Mapping & Monitoring Program (FMMP) by the California Resources Agency, to non-agricultural use.
2. Conflict with existing zoning for agricultural use, or with a Williamson Act contract.
3. Involve other changes in the existing environment that, due to their location or nature, could result in the conversion of farmland to non-agricultural uses.

The CEQA statute (Public Resources Code [PRC] Section 21060.1[a]) defines Agricultural Land as "prime farmland, farmland of statewide importance, or unique farmland, as defined by the USDA land inventory and monitoring criteria as modified for California."

3.8.3 Impacts and Mitigation Measures

Impacts and mitigation measures are described below both generally and by reach. Applicable impacts and mitigation measures for each reach are summarized in Table 3.8-1, at the end of this section.

General Impacts and Mitigation Measures

Impact 3.8-1: Potential Construction Conflicts with Adjacent Non-Agricultural Land Uses.

The project effects would be limited to areas within the reaches proposed for restoration. Therefore existing residential, industrial, and university land uses adjacent to and near the restoration sites would not be affected by the Project. Potential short-term conflicts with adjacent land uses from construction noise, dust, and traffic are addressed in those chapters of this EIR. Therefore no mitigation is required.

Impact 3.8-2: Potential Conflicts with Adjacent Agricultural Land Uses.

As described in the Setting section, above, the vast majority of the land adjacent to the Project site is in active agricultural use. Construction of the Project could potentially result in conflicts with adjacent agricultural operations from construction vehicles using farm roads, and storage of soils and construction materials and equipment. Post-restoration, boaters and hikers in the restored creek channel may find their way onto adjacent agricultural lands due to increased access afforded by removal of existing dense non-native vegetation along the creek banks.

Mitigation Measure 3.8-1: Coordinate with Adjacent Landowners and Implement Access Restrictions.

The following measures shall be implemented to reduce impacts of restoration on adjacent agricultural lands:

- The Project sponsor shall coordinate with adjacent landowners providing access and/or storage areas for project construction activities and materials. Access and construction work area plans acceptable to all parties shall be developed prior to the start of any construction abutting potentially affected lands.
- In locations where post-construction access to private agricultural lands by the public may be facilitated by restoration efforts, the Project shall provide warning signage (i.e., Private Property – No Trespassing) and wildlife-friendly fencing along the creek as needed.

Site-Specific Impacts and Mitigation Measures

NAWCA/Mariani

Land Use

Project development in this reach would not change or otherwise adversely affect long-term existing or planned land uses of the site or adjacent properties.

General Plan/Policy Compliance

The Project would be consistent with applicable Solano and Yolo General Plan land use designations and policies as it would not reduce recreational access or interfere with agricultural activities (after mitigation).

Agriculture

Construction and maintenance of this reach would involve access through orchard properties, however all of the work would be located within the open space/ riparian/creekside areas. Construction access and activities could interfere with agricultural activities if not coordinated. Long-term unpermitted access also could potentially interfere with agricultural activities. These impacts would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.8-1.

Duncan-Giovannoni

Land Use

Project development in this reach would not change or otherwise adversely affect long-term existing or planned land uses of the site or adjacent properties.

General Plan/Policy Compliance

The Project would be consistent with applicable Solano and Yolo General Plan land use designations and policies as it would not reduce recreational access or interfere with agricultural activities (after mitigation). As described in the Setting section, public access to the creek is available from Putah Creek Road, which parallels the southeast edge of this alignment.

Agriculture

Construction and maintenance of this reach would involve access through orchard properties, however, all of the work would be located within the open space/

riparian/creekside areas. Construction access and activities could interfere with agricultural activities if not coordinated. Long-term unpermitted access also could potentially interfere with agricultural activities. These impacts would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.8-1, above.

Winters Putah Creek Nature Park

Maintenance activities proposed by the Project would not adversely affect land uses in this reach. Most improvements in this reach have already occurred with the implementation of the Winters Putah Creek Nature Park project, so Project changes would be minimal.

East of 505

Land Use/Population and Housing

Project development in this reach would not change or otherwise adversely affect long-term existing or planned land uses of the site or adjacent properties. There are no residences on the alignment.

General Plan/Policy Compliance

The Project would be consistent with applicable Solano and Yolo General Plan land use designations and policies as it would not reduce recreational access or interfere with agricultural activities (after mitigation). As noted in the Setting, public access to the site is available from Putah Creek Road.

Agriculture

Construction and maintenance of this reach would involve access through orchard properties, however, all of the work would be located within the open space/riparian/creekside areas. Construction access and activities could interfere with agricultural activities if not coordinated. Long-term unpermitted access also could potentially interfere with agricultural activities. These impacts would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.8-1, above.

Warren

Land Use/Population and Housing

Project development in this reach would not change or otherwise adversely affect long-term existing or planned land uses of the site or adjacent properties. There are two large

residences southeast of the site but no impacts to population or housing would occur from the Project.

General Plan/Policy Compliance

The Project would be consistent with applicable Solano and Yolo General Plan land use designations and policies as it would not reduce recreational access or interfere with agricultural activities (after mitigation). There is no public access to this reach.

Agriculture

Construction and maintenance of this reach would involve access through orchard properties, however, all of the work would be located within the open space/ riparian/creekside areas. Construction access and activities could interfere with agricultural activities if not coordinated. Long-term unpermitted access also could potentially interfere with agricultural activities. These impacts would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.8-1, above.

Upper McNamara

Land Use/Population and Housing

Project development in this reach would not change or otherwise adversely affect long-term existing or planned land uses of the site or adjacent properties. There are no residences on this reach.

General Plan/Policy Compliance

The Project would be consistent with applicable Solano and Yolo General Plan land use designations and policies as it would not reduce recreational access or interfere with agricultural activities (after mitigation). As described in the Setting, there is informal public access to the site via Putah Creek Road along the western half of the Upper McNamara reach.

Agriculture

Construction and maintenance of this reach would involve access through orchard properties, however, all of the work would be located within the open space/riparian/creekside areas. Construction access and activities could interfere with agricultural activities if not coordinated. Long-term unpermitted access also could potentially interfere with agricultural activities. These impacts would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.8-1, above.

Lower McNamara

Land Use/Population and Housing

Project development in this reach would not change or otherwise adversely affect long-term existing or planned land uses of the site or adjacent properties. There are no residences on this site.

General Plan/Policy Compliance

The Project would be consistent with applicable Solano and Yolo General Plan land use designations and policies as it would not reduce recreational access or interfere with agricultural activities (after mitigation). There is no public access to the creek in this reach.

Agriculture

Construction and maintenance of this reach would involve access through orchard properties, however, all of the work would be located within the open space/riparian/creekside areas. Construction access and activities could interfere with agricultural activities if not coordinated. Long-term unpermitted access also could potentially interfere with agricultural activities. These impacts would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.8-1, above.

MacQuiddy (Lester)

Land Use/Population and Housing

Project development in this reach would not change or otherwise adversely affect long-term existing or planned land uses of the site or adjacent properties. There is one residence approximately 50 feet from the site as well as farm structures to the southeast of the site. These structures are located beyond the site and no impacts to population or housing would occur.

General Plan/Policy Compliance

The Project would be consistent with applicable Solano and Yolo General Plan land use designations and policies as it would not reduce recreational access or interfere with agricultural activities (after mitigation). There is no public access to this site.

Agriculture

Construction and maintenance of this reach would involve access through orchard properties, however, all of the work would be located within the open

space/riparian/creekside areas. Construction access and activities could interfere with agricultural activities if not coordinated. Long-term unpermitted access also could potentially interfere with agricultural activities. These impacts would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.8-1, above.

Russell Ranch

Land Use/Population and Housing

Project development in this reach would not change or otherwise adversely affect long-term existing or planned land uses of the site or adjacent properties. There are no residences on this site.

General Plan/Policy Compliance

The Project would be consistent with applicable Solano and Yolo General Plan land use designations and policies as it would not reduce recreational access or interfere with agricultural activities (after mitigation). There is no public access to this site.

Agriculture

Construction and maintenance of this reach would involve access through orchard properties, however, all of the work would be located within the open space/riparian/creekside areas. Construction access and activities could interfere with agricultural activities if not coordinated. Long-term unpermitted access also could potentially interfere with agricultural activities. These impacts would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.8-1, above.

Stevenson Bridge

Land Use/Population and Housing

Project development in this reach would not change or otherwise adversely affect long-term existing or planned land uses of the site or adjacent properties. As discussed in the Setting, a mixture of rural residential and associated out buildings lie northwest of the bridge.

General Plan/Policy Compliance

The Project would be consistent with applicable Solano and Yolo General Plan land use designations and policies as it would not reduce recreational access or interfere with agricultural activities (after mitigation).

Agriculture

Construction and maintenance of this reach would involve access through orchard properties, however, all of the work would be located within the open space/riparian/creekside areas. Construction access and activities could interfere with agricultural activities if not coordinated. Long-term unpermitted access also could potentially interfere with agricultural activities. These impacts would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.8-1, above.

Glide Ranch

Land Use/Population and Housing

Project development in this reach would not change or otherwise adversely affect long-term existing or planned land uses of the site or adjacent properties. Several rural residence compounds lie just south of this reach.

General Plan/Policy Compliance

The Project would be consistent with applicable Solano and Yolo General Plan land use designations and policies as it would not reduce recreational access or interfere with agricultural activities (after mitigation). Levee Road provides public access to this reach.

Agriculture

Construction and maintenance of this reach would involve access through orchard properties, however, all of the work would be located within the open space/riparian/creekside areas. Construction access and activities could interfere with agricultural activities if not coordinated. Long-term unpermitted access also could potentially interfere with agricultural activities. These impacts would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.8-1, above.

Nishikawa

Land Use/Population and Housing

Project development in this reach would not change or otherwise adversely affect long-term existing or planned land uses of the site or adjacent properties. There are no residences on or adjacent to the site.

General Plan/Policy Compliance

The Project would be consistent with applicable Solano and Yolo General Plan land use designations and policies as it would not reduce recreational access or interfere with agricultural activities (after mitigation). The north side of the creek on this site is publicly accessible by Pedrick Road/Lincoln Highway and a walking path provides recreational access as well.

Agriculture

Construction and maintenance of this reach would involve access through orchard properties, however, all of the work would be located within the open space/riparian/creekside areas. Construction access and activities could interfere with agricultural activities if not coordinated. Long-term unpermitted access also could potentially interfere with agricultural activities. These impacts would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.8-1, above.

Olmo-Hammond-UCD

Land Use/Population and Housing

Project development in this reach would not change or otherwise adversely affect long-term existing or planned land uses of the site or adjacent properties. There are no residences on this site.

General Plan/Policy Compliance

The Project would be consistent with applicable Solano and Yolo General Plan land use designations and policies as it would not reduce recreational access or interfere with agricultural activities (after mitigation). Add statement re including trail linkages.

Agriculture

Agricultural land uses on the south side of the creek may be affected during construction if work is done from that side of the channel. Implementation of Mitigation Measure 3.8-1 would reduce this impact to **less than significant**.

I-80 to Old Davis Road

Land Use/Population and Housing

Project development in this reach would not change or otherwise adversely affect long-term existing or planned land uses of the site or adjacent properties. There are no residences on this site.

General Plan/Policy Compliance

The Project would be consistent with applicable Solano and Yolo General Plan land use designations and policies as it would not reduce recreational access or interfere with agricultural activities (after mitigation). As described in the Setting, this site is publicly accessible by Highway 80 and Old Davis Road, as well as the Putah Creek Riparian Preservation Trail.

Agriculture

Construction and maintenance of this reach would involve access through orchard properties, however, all of the work would be located within the open space/riparian/creekside areas. Construction access and activities could interfere with agricultural activities if not coordinated. Long-term unpermitted access also could potentially interfere with agricultural activities. These impacts would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.8-1, above.

Old Davis Road to Mace

Land Use/Population and Housing

Project development in this reach would not change or otherwise adversely affect long-term existing or planned land uses of the site or adjacent properties.

General Plan/Policy Compliance

The Project would be consistent with applicable Solano and Yolo General Plan land use designations and policies as it would not reduce recreational access or interfere with agricultural activities (after mitigation). Add statement re including trail linkages

Agriculture

Agricultural land uses on the south side of the creek may be affected during construction if work is done from that side of the channel. Implementation of Mitigation Measure 3.8-1 would reduce this impact to **less than significant**.

Mace to Road 106A

Land Use/Population and Housing

Project development in this reach would not change or otherwise adversely affect long-term existing or planned land uses of the site or adjacent properties. There are no residences on this site.

General Plan/Policy Compliance

The Project would be consistent with applicable Solano and Yolo General Plan land use designations and policies as it would not reduce recreational access or interfere with agricultural activities (after mitigation). As described in the Setting section, there is public access to this site via Road 106A and 5th Street.

Agriculture

Construction and maintenance of this reach would involve access through orchard properties, however all of the work would be located within the open space/riparian/creekside areas. Construction access and activities could interfere with agricultural activities if not coordinated. Long-term unpermitted access also could potentially interfere with agricultural activities. These impacts would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.8-1, above.

Road 106A to Yolo Bypass Wildlife Area

Land Use/Population and Housing

Project development in this reach would not change or otherwise adversely affect long-term existing or planned land uses of the site or adjacent properties.

General Plan/Policy Compliance

The Project would be consistent with applicable Solano and Yolo General Plan land use designations and policies as it would not reduce recreational access or interfere with agricultural activities (after mitigation). As described in the Setting, there is limited public access to this site via Road 106A and farm roads.

Agriculture

Construction and maintenance of this reach would involve access through orchard properties, however all of the work would be located within the open space/riparian/creekside areas. Construction access and activities could interfere with

agricultural activities if not coordinated. Long-term unpermitted access also could potentially interfere with agricultural activities. These impacts would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.8-1, above.

Table 3.8-1 Summary of Land Use and Agriculture Impacts and Mitigation Measures

Sites	Impact 3.8-1 Potential Construction Conflicts with Adjacent Non-Agricultural Land Uses	Impact 3.8-2 Potential Conflicts with Adjacent Agricultural Land Uses	Applicable Mitigation Measures
NAWCA/Mariani	NI	SM	MM 3.8-1
Duncan-Giovannoni	NI	SM	MM 3.8-1
Winters Putah Creek Nature Park	NI	SM	MM 3.8-1
East of 505	NI	SM	MM 3.8-1
Warren	NI	SM	MM 3.8-1
Upper McNamara	NI	SM	MM 3.8-1
Lower McNamara	NI	SM	MM 3.8-1
MacQuiddy (Lester)	NI	SM	MM 3.8-1
Russell Ranch	NI	SM	MM 3.8-1
Stevenson Bridge	NI	SM	MM 3.8-1
Glide Ranch	NI	SM	MM 3.8-1
Nishikawa	NI	SM	MM 3.8-1
Olmo-Hammond-UCD	I	SM	MM 3.8-1
I-80 to Old Davis Road	NI	SM	MM 3.8-1
Old Davis Road to Mace	NI	SM	MM 3.8-1
Mace to Road 106A	NI	SM	MM 3.8-2
Road 106A to YBWA	NI	SM	MM 3.8-2

NI = no impact, LS = LTS = Less than Significant Impact, SM = Significant but mitigatable to less than significant with measures identified in this section, and SU = Significant and Unavoidable, even after mitigation.

3.9 AESTHETICS

This section generally describes the existing visual quality of the creek and publicly accessible viewpoints. It then evaluates the short-term (construction) and long-term (post restoration) impacts of the restoration projects on public views. Mitigation measures are identified as appropriate.

3.9.1 Setting

Environmental Setting

General Setting

Methods

Field visits were conducted in June 2014 with the Streamkeeper to selected sites characteristic of the proposed restoration areas. These included visually accessible locations along lower Putah Creek, from the Putah South Canal Diversion Dam to the Los Rios Check Dam on the west side of the Yolo Bypass. These locations were visually assessed from public roads where road and parking access were available along the riparian corridor. In addition, for the Duncan-Giovannoni site, private orchard roads were used to access the creek. Google Earth satellite imagery was used to supplement these visits for sites that were not visually accessible.

General Visual Character

Agricultural landscapes, the Sacramento–San Joaquin Delta (Delta) and marshlands, and oak- and grass-covered hills are the primary aesthetic resources in the Project Area. Prominent scenic resources include marshlands and Delta waters located to the south, the Coast Range extending in a north-south direction west of the Project Area, and expanses of agricultural lands located on either side of the creek in most areas.

Agricultural lands account for more land than any other land use, which, in turn, defines much of the county's visual character, supports wildlife habitats and migration corridors, provides open space and recreational amenities for residents and visitors, and acts as a separator defining the County's cities.

The visual quality of the Upper Reach of the Lower Putah Creek does not vary much along different viewing locations. The typical view is comprised of a narrow row of tall trees on both sides of the creek banks, which lead down to either a still or slowly moving pool, or to a flowing stream. On either side of the creek further from the tops of

the banks are views of flat agricultural land (orchards and field crops) interspersed with farm complexes and residences. The views from areas near the University of California Davis, and the City of Winters are more diverse with a greater mix of buildings and infrastructure from residences, the university, and commercial activity. Typically, the visual character of the creek encompasses the following.

- The creek is seen as a channel cut down into steep banks (see Figure 3.9-1).
- Riparian vegetation including native and non-native trees, shrubs, and various grasses growing in a narrow strip on both sides of the creek. Some views have dense strands of native and non-native vegetation down to the creek channel, whereas other sections are steeper banks with eroding slopes (see Section 3.4, *Biological Resources,* for details) (see Figure 3.9-2).
- Within the channels, either a narrow stream or a wider pool fills the entire channel from bank to bank (see Figures 3.9-3 and 3.9-4).
- Large pools with heavy vegetation around them have formed where gravel mining has deepened and widened the creek, or where diversions have backed up creek waters (see Figure 3.9-5).
- In a few locations, roads and bridges cross the creek, providing visual access to the channel area (see Figure 3.9-6).
- In a few locations, parks or public open space and trails have been constructed alongside the creek (see Figures 3.9-7 and 3.9-8).
- Along most of the study area agricultural fields and orchards abutting the narrow riparian band (see Figure 3.9-9).
- In a few locations, housing has been built near the channel.
- The creek also passes through or near urbanized portions of the University of California Davis campus and the City of Winters, where public views are afforded and where urban development encroaches into creek views.

<u>Visual Access</u>

The majority of the Upper Reach of Lower Putah Creek is only visible to farmers and local residents where the creek channel abuts their property, and is not visible to the public unless they canoe the creek (see Section 3.8, *Land Use*). These private views are seen from private ranch roads and fields.

Figure 3.9-1 View of Putah Creek Showing Steepened Banks

Figure 3.9-2 View of Putah Creek Showing Dense Riparian Vegetation

Figure 3.9-3 View of Narrow, Flowing Area Putah Creek Stream

Figure 3.9-4 View of Wide Pool Area of Putah Creek (Backed Up By Agricultural Diversion Dam)

Figure 3.9-5 View of Pool Area (Former Gravel Pit)

Figure 3.9-6 View of Mature Trees from Mace Road Bridge Over Putah Creek

Figure 3.9-7 View of Creekside Picnic Area on UC Davis Putah Creek Riparian Preserve

Figure 3.9-8 View of Recently Restored Creek Channel and Public Paths at Winters Nature Park

Figure 3.9-9 View of Agricultural Lands Near Putah Creek

Portions of the creek channel are viewable to the public in the few places where there are road/bridge crossings and where roads approach the creek vicinity. The public views generally are of trees and other vegetation along the upland strip surrounding the creek banks. In a few locations, there is also a visual opening to the water. These views of short stretches of the creek or adjacent vegetation can be seen from the following road crossings or adjacent parallel stretches:

- Putah Creek Road
- Holmes Lane
- Winters Road
- Railroad Avenue
- Highway 505
- Boyce Road
- Martinez Lane
- Stevenson Bridge Road/Highway 95-A
- Levee Road

- Pedrick Road/Lincoln Highway
- Highway 80
- Old Davis Road
- Mace Boulevard
- Road 106-A to Yolo Bypass

Portions of the 21-mile Project alignment are accessible to the public from three parks. The most upstream park is Lake Solano County Park, located at the west end of the Project alignment below Lake Solano. Views of the creek also are afforded from Winters Putah Creek Nature Park in the City of Winters, where restoration has already been implemented. Additionally, the public can view the creek at Putah Creek Picnic Area (also called Camp Putah) on Levee Road at the western edge of the University of California, Davis facility. Canoeists also have views of the creek channel from the water.

Views and viewpoints along each reach are summarized below.

Project Area Conditions by Reach

NAWCA/Mariani

The visual character of this reach is dominated by a broad swath of creekside open space/habitat (not publicly accessible), surrounded by orchards and natural forested and open areas. Portions of the alignment may be visible from Putah Creek Road and several houses that lie just outside of the alignment on the southwest side of the creek. There is no formal access to this alignment, therefore views of the channel area are limited to people informally accessing that area from nearby farm roads.

Duncan-Giovannoni

Views of this reach consist of walnut groves that can be seen from Putah Creek Road. The approach to the creek is only visible from the private orchard property (no public viewing access) as a downward sloping embankment with an opening to the creek view where the water area appeared to be a wider span (stagnant pool) than other viewable locations. The vegetation views on this site included grasses, maple trees, dense reeds, blackberry, elderberry, and wild roses.

Winters Putah Creek Nature Park

Views of this reach are afforded from the trails in the Putah Creek Nature Park, as well as from the bridges crossing the creek in the City of Winters. The creek has already been restored in this reach, and views are of a naturalistic creek channel with riparian vegetation. Views also include the historic railroad bridge.

East of 505

In this reach, public views of Putah Creek are available from Highway 505 (crosses above the creek on the west border) and Putah Creek Road. The public views are of small areas of riparian vegetation (as described for the Duncan Giovannoni site), as well as a line of taller trees.

Warren

In this reach, Putah Creek Road diverges south and there are no public views from the road. The creek may be visually accessible from some of the residences in the El Rio subdivision, which is north of the site.

Upper McNamara

Putah Creek Road extends along the western half of the Upper McNamara Pool reach, with a slight public view of trees between the creek and road until Putah Creek Road diverges south. There are no other public viewing locations in this site.

Lower McNamara

Putah Creek Road lies too far south to afford any public views of the creek on this reach. From the surrounding farmland, there may be private views of riparian vegetation and tall trees bordering the creek.

MacQuiddy (Lester)

This reach has essentially same view as previously described in the Lower McNamara reach. Only farm roads may offer predominantly private views of the creek, and rows of trees can be seen in more distant views.

Russell Ranch

Martinez Lane parallels the creek on the Russell Ranch site north of Putah Creek Road. There may be public views of riparian vegetation and tall trees bordering the creek in this reach from Martinez Lane.

Stevenson Bridge

This reach is crossed by Stevenson Bridge and Highway 95-A and thus there are public views of the riparian vegetation and channel area from both crossing points. From the bridge, there are two sections that provide overlooks to the creek including riparian vegetation, slowly flowing water, and pool areas.

Glide Ranch

In the Glide Ranch site, Levee Road crosses Putah Creek from the north shore to the eastern section. There are views of from a few residences situated along the surrounding unpaved roads and from a few other lightly travelled adjacent farm roads. These views are of riparian vegetation, primarily a line of trees visible from the road.

Nishikawa

The public can access the Nishikawa reach by driving up to the back of the riparian zone from Pedrick Road/Lincoln Highway. The creek views are similar to other sites, with a strip of trees and a slow-moving pool of water. There is also a walking path near the creek and through the riparian vegetation of this site, which permits views of the channel and associated vegetation.

Olmo-Hammond-UCD

There is public access from UCD in both directions along the Putah Creek Riparian Preservation Trail, which runs into the Olmo-Hammond-UCD reach (continuing from the Nishikawa site) along the north side of the creek. A paved levee road and a picnic area also provide visual access to the creek by the public. From the trail, there are views of riparian vegetation, large oak trees shading the path, and stagnant pools of creek water.

Highway 80 to Old Davis Road

On this site, Putah Creek is crossed by Highway 80 on the west and Old Davis Road on the east. There are public views of small areas of the creek from these roads. Additionally, a train track and a hiking trail cross the creek and provide public views of riparian vegetation, taller trees on the banks, as well as pooled water in the creek.

Old Davis Road to Mace

There is substantial visual access for pedestrians and drivers to this reach from UC Davis, which is on the north side of Putah Creek. Public views of the creek are available from Levee Road and an adjacent parking lot, from which paths lead down to the creek providing access from the university. Viewers may see a thin strip of trees and a large

stagnant/slow moving pool with green algae. The more distant scenic views include University research facilities to the north leading to Mace Road as well as agricultural landscapes to the south of the creek.

Mace to Road 106A

Road 106A and 5th Street runs along the creek on the south end for the lower third of the alignment. From these roads, there is a public view of Putah Creek as a still pool lined by a thin riparian strip of vegetation and trees. The landscape is agricultural and there are no residences with views of the creek.

Road 106A to Yolo Bypass Wildlife Area

This reach is only accessible by farm roads and surrounded by agricultural lands, and thus there are primarily only private views of the creek area. Similar to other sites that are mostly obscured from public view, views are comprised of a thin band of trees and a stagnant pool.

Regulatory Setting

Federal Regulations

There are no applicable State or federal regulations pertaining to visual quality.

State Regulations

There are no applicable State or federal regulations pertaining to visual quality.

Local Regulations and Regional Context

Solano County

The county's scenic resources policies and programs work in two ways. According to the General Plan, the County's scenic resource policies work in two ways: (1) they protect valued landscape features found throughout the county, and (2) they ensure that new urban or rural development within the scenic roadway corridors is developed in a manner that respects and maintains the integrity of the viewsheds (Solano County, 2008, p. RS-5).

Within the *Resources Chapter* of the General Plan, the following policies address visual resources (Solano County, 2008, p. RS-5):

> Policy RS.G-4: Preserve, conserve, and enhance valuable open space lands that provide wildlife habitat; conserve natural and visual resources; convey cultural identity; and improve public safety.
>
> Policy RS.G-6: Preserve the visual character and identity of communities by maintaining open space areas between them.

County area and specific plans also contain language aimed at preserving, conserving, and enhancing visual resource values within the target planning area. The plans identify viewsheds or general scenic resources to be protected or improved. Plans that discuss visual resource protection explicitly include the Tri-City and County Cooperative Plan for Agriculture and Open Space Preservation. The scenic resource policies from these plans follow (Solano County, 2008, p. RS-37).

> Policy RS.P-35: Protect the unique scenic features of Solano County, particularly hills, ridgelines, wetlands, and water bodies.
>
> Policy RS.P-36: Support and encourage practices that reduce light pollution and preserve views of the night sky.
>
> Policy RS.P-37: Protect the visual character of designated scenic roadways.

There are no State-designated scenic highways in Solano County in general or specifically in the study area (EDAW, 2008, page 4-1-1).

<u>Yolo County</u>

With respect to the study area that encompasses Putah Creek in Yolo County, the visual resources include a mesh of rangeland, crop fields, and riverine landscapes that adjoin developed areas. Yolo County General Plan policies relating to visual character or scenic resources include (Solano County, 2008, pp. LU-29, 30):

> Policy CC-1.2: Preserve and enhance the rural landscape as an important scenic feature of the County.
>
> Policy CC-1.3: Protect the rural night sky as an important scenic feature to the greatest feasible extent where lighting is needed.

Policy CC-1.4: Identify and preserve, where possible, landmarks and icons which contribute to the identity and character of the rural areas.

Policy CC-1.5: Significant site features, such as trees, water courses, rock outcroppings, historic structures and scenic views shall be used to guide site planning and design in new development. Where possible, these features shall become focal points of the development.

Policy CC-1.11: Require the development of open space corridors, bicycle paths and trails integrating waterways, scenic areas and County parks where appropriate, in collaboration with affected land owners as a part of Project approval. The intent is to connect each community and city and other special places and corridors, throughout the County.

Policy CC-1.12: Preserve and enhance the scenic quality of the County's rural roadway system. Prohibit projects and activities that would obscure, detract from, or negatively affect the quality of views from designated scenic roadways or scenic highways.

Policy CC-1.13: The following routes are designated as local scenic roadways:

- State Route 128 (Winters to Napa County line)

Policy CC-1.14: Designate other scenic roadways or routes where appropriate using the following criteria: the roadway or route traverses a scenic corridor, water feature, open space area or other interesting or unique areas, both urban and rural and may include bikeways, hiking and riding trails and pedestrian ways.

Policy CC-1.15: The following features shall be protected and preserved along designated scenic roadways and routes, except where there are health and safety concerns:

- Trees and other natural or unique vegetation.
- Landforms and natural or unique features.
- Views and vistas.
- Historic structures (where feasible), including buildings, bridges and signs.

Policy CC-1.16: The following features shall be stringently regulated along designated scenic roadways and routes with the intent of preserving and protecting the scenic qualities of the roadway or route:

- Signage.
- Architectural design of adjoining structures.
- Construction, repair and maintenance operations.

City of Winters

The City of Winters General Plan was adopted in 1992 (does not appear to have a more recent update). The following policy may be relevant to visual quality for Putah Creek (City of Winters, 1992, p. II-69):

Policy VIII.A.6: The City shall promote the creation of a continuous and integrated open space network that includes Putah Creek, Dry Creek, city parks, schools, the golf course, the North Area drainage detention lake, the Open Space Preserve, and landscaped roadways.

3.9.2 Significance Criteria

Criteria for determining significant impacts are based upon the CEQA Guidelines (Appendix G) and professional judgment. These guidelines state that the project would have a significant impact on visual quality if it would:

- Have a substantial adverse effect on a scenic vista:
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway
- Substantially degrade the existing visual character or quality of the site and its surroundings, or
- Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area.

Because the Project Description limits construction to be 7:00 a.m. to 7:00 p.m., night lighting impacts are not considered further in this EIR.

3.9.3 Impacts and Mitigation Measures

Impacts and mitigation measures are described below both generally and by reach. Applicable impacts and mitigation measures for each reach are summarized in Table 3.9-1, at the end of this section.

General Impacts and Mitigation Measures

Impact 3.9-1: Construction Impacts to Views.

Shorter-term temporary impacts on views would occur during the construction phase when there will be vegetation and tree removal as well as construction equipment. For most of the reaches, construction and final changes would not be visible by more than a few people and mostly seen from a substantial distance. The primary visual impact to all of the sites would be temporary changes in the creek channel's appearance during restoration activities. The aesthetics and views of the riparian zone would be temporarily impacted during the restoration work. The primary visual impact would be the change in the channel's appearance from the removal of riparian vegetation and non-native tall trees, earth moving, storage of equipment near the creek, and potentially construction fencing. The views during these activities would change from existing views of dense vegetation to more barren areas as well as construction equipment and workers in the sites during construction. In some areas, the creek feature would temporarily disappear while the flows would be piped around the construction area.

Construction activities would be done in phases with approximately 3 to 5 miles being restored per year. Because of: 1) the short duration of project construction; 2) the limited extent of each year's work; 3) the limited near-field visibility of most reaches to the public; and 4) the distance of more heavily traveled roads from the corridor, most of the visual impacts associated with construction would not be considered significant. However, in areas with substantial public use and visibility, construction activities such as earth moving, vegetation removal, and equipment storage may negatively affect views during the construction period. Mitigation Measure 3.9-1 would reduce this impact to a **less-than-significant** level.

Mitigation Measure 3.9-1: Construction Fencing and Educational Signage.

In areas where construction activities would be visible to substantial numbers of viewers, SCWA shall place interpretive signage explaining the restoration process and goals. In addition, stockpiles shall be located away from public views and, if that is not

feasible, screening fencing shall be placed to limit public views of equipment storage and soil stockpiles from public paths and recreation areas.

Impact 3.9-2: Long-Term Impacts on Views.

Over the longer term, visual quality would be affected by re-vegetation that would begin with more barren views until the new vegetation grows to sufficiently create wider expanses of green around the restored riparian corridor. In the long-term, both visual quality and visual access would be improved, with elimination of many of the stagnant pools and weedy areas and reestablishment of a more free-flowing creek surrounded by native vegetation. In the long-term, the restoration work would be beneficial to visual quality and therefore the long-term impacts are positive and no mitigation is required.

An example of post-construction visual impacts is afforded by the recently completed Winters Park creek restoration project (see Figure 3.9-8). The Winters Putah Creek Nature Park site is a recreation area with benches and an opening leading to the creek, where there are youth camps and swimming in the creek. The water view is a series of faster-moving creek segments interspersed with small pools. There is also a view of a short downward path to the creek covered in a mix of gravel and surface growth. The view of the creek banks and access path includes vegetation, mostly medium to taller trees creating a shaded setting.

Site-Specific Impacts and Mitigation Measures

NAWCA/Mariani

Construction impacts described in Impact 3.9-1 would occur on this reach. However, because of the limited public viewpoints described in the Setting section, this impact would be minimal.

Duncan-Giovannoni

Construction impacts described in Impact 3.9-1 would occur on this reach. The reach is crossed by Putah Creek Road, and views from this crossing would be affected during construction. However those views are limited and most viewers would be in passing vehicles, with only a few seconds of viewing time. Therefore, this impact would be less than significant and no mitigation is required. Long-term impacts on visual quality on this reach would be positive since the reach would be re-vegetated.

Winters Putah Creek Nature Park

Maintenance activities proposed by the Project would not adversely affect visual quality in this reach.

East of 505

Construction impacts described in Impact 3.9-1 would occur on this reach. The site is crossed by Highway 505 and paralleled by Putah Creek Road. During construction, views from these crossings would be affected, however those views are limited and most viewers would be in passing vehicles, with only a few seconds of viewing time. Therefore this impact would be less than significant and no mitigation is required. Long-term impacts on visual quality on this reach would be positive since the reach would be re-vegetated.

Warren

Construction impacts described in Impact 3.9-1 would occur on this reach, however, because the reach is not publicly accessible, this impact would be less than significant and no mitigation is required. Long-term impacts on visual quality on this reach would be positive since the reach would be re-vegetated.

Upper McNamara

Construction impacts described in Impact 3.9-1 would occur on this reach. The site is visible from Putah Creek Road. However those views are limited and most viewers would be in passing vehicles, with only a few seconds of viewing time. Therefore, this impact would be less than significant and no mitigation is required. Further, long-term impacts on visual quality on this reach would be positive since the reach would be re-vegetated.

Lower McNamara

Construction impacts described in Impact 3.9-1 would occur on this reach, however, because the reach is not publicly accessible by any road crossings or trails, this impact would be less than significant and no mitigation is required. Long-term impacts on visual quality on this reach would be positive since the reach would be re-vegetated.

MacQuiddy (Lester)

Construction impacts described in Impact 3.9-1 would occur on this reach, however, because the reach is not publicly accessible by any road crossings or trails, this impact would be less than significant and no mitigation is required. Long-term impacts on visual quality on this reach would be positive since the reach would be re-vegetated.

Russell Ranch

Construction impacts described in Impact 3.9-1 would occur on this reach, however, because the reach is not publicly accessible by any road crossings or trails, this impact would be less than significant and no mitigation is required. Long-term impacts on visual quality on this reach would be positive since the reach would be re-vegetated.

Stevenson Bridge

Construction impacts described in Impact 3.9-1 would occur on this reach. The site is crossed by Stevenson Creek Bridge/Highway 95-A. During construction, views from this crossing would be affected. During construction, views from these crossings would be affected, however those views are limited and most viewers would be in passing vehicles, with only a few seconds of viewing time. Therefore this impact would be less than significant and no mitigation would be required. Long-term impacts on visual quality on this reach would be positive since the reach would be re-vegetated.

Glide Ranch

Construction impacts described in Impact 3.9-1 would occur on this reach. There are no public views from roads or trails. There may be limited views from several houses and farm roads. This impact would be less than significant due to the distance between these properties and the construction activities as well as the limited number of potential viewers. Thus, no mitigation is required. Long-term impacts on visual quality on this reach would be positive since the reach would be re-vegetated.

Nishikawa

Construction impacts described in Impact 3.9-1 would occur on this reach. The site is crossed by Pedrick Road/Lincoln Highway. During construction, views from these crossings would be affected, however those views are limited and most viewers would be in passing vehicles, with only a few seconds of viewing time. Therefore visual impacts would be less than significant. Long-term impacts on visual quality on this reach would be positive since the reach would be re-vegetated.

Olmo-Hammond-UCD

Construction impacts described in Impact 3.9-1 would occur on this reach. The reach is publicly accessible, includes a public picnic/camp area, and is crossed by hiking trails, views from which would be adversely affected during construction. This impact would be reduced to a less than significant level by implementation of Mitigation Measure

3.9-1. Long-term impacts on visual quality on this reach would be positive since the reach would be re-vegetated.

I-80 to Old Davis Road

Construction impacts described in Impact 3.9-1 would occur on this reach. The site is crossed by several roads and trails: Highway 80 on the West and Old Davis Road on the East as well as a hiking trail and train track. The public views at these crossings and access points would be affected during construction. This impact would be reduced to a less than significant level by implementation of Mitigation Measure 3.9-1. Long-term impacts on visual quality on this reach would be positive since the reach would be re-vegetated.

Old Davis Road to Mace

Construction impacts described in Impact 3.9-1 would occur on this reach. The site is paralleled by Levee Road and crossed by Old Davis Road, and Mace Boulevard. The views of the creek from these crossings would be affected during construction, however those views are limited and most viewers would be in passing vehicles, with only a few seconds of viewing time. Therefore visual impacts would be less than significant. Long-term impacts on visual quality on this reach would be positive since the reach would be re-vegetated.

Mace to Road 106A

Construction impacts described in Impact 3.9-1 would occur on this reach. The site is crossed by Road 106A and 5th Street. During construction, views from these crossings would be affected, however those views are limited and most viewers would be in passing vehicles, with only a few seconds of viewing time. Project construction also would adversely affect views from the City of Davis South Fork Preserve. This impact is significant but would be reduced to less-than-significant by implementation of Mitigation Measure 3.9-1. Long-term impacts on visual quality on this reach would be positive since the reach would be re-vegetated.

Road 106A to Yolo Bypass Wildlife Area

Construction impacts described in Impact 3.9-1 would occur on this reach, and the western edge of this alignment would be visible briefly from cars passing along the Road 106A bridge. In addition, although the site is publically accessible at its lower end, and there may be limited views from farm roads, traffic in the area is generally limited to local agricultural and resource management personnel. Therefore, this impact would be less than significant and no mitigation is required. Long-term impacts on visual quality

on this reach would be positive because stagnant pools would be replaced by a flowing creek and associated riparian restoration.

Table 3.9-1 Summary of Visual Quality Impacts and Mitigation Measures

Sites	Impact 3.9-1 Construction Impacts to Views	Impact 3.9-2 Long-Term Adverse Impacts on Views	Applicable Mitigation Measures
NAWCA/Mariani	LTS	NI	n/a
Duncan-Giovannoni	LTS	NI	n/a
Winters Putah Creek Nature Park	NI	NI	n/a
East of 505	LTS	NI	n/a
Warren	NI	NI	n/a
Upper McNamara	LTS	NI	n/a
Lower McNamara	NI	NI	n/a
Russell Ranch	NI	NI	n/a
MacQuiddy (Lester)	NI	NI	n/a
Stevenson Bridge	LTS	NI	n/a
Glide Ranch	LTS	NI	n/a
Nishikawa	LTS	NI	n/a
Olmo-Hammond-UCD	SM	NI	MM 3.9-1
I-80 to Old Davis Road	SM	NI	MM 3.9-1
Old Davis Road to Mace	SM	NI	MM 3.9-1
Mace to Road 106A	SM	NI	MM 3.9-1
Road 106A to YBWA	LTS	NI	n/a

NI = no impact, LS = LTS = Less than Significant Impact, SM = Significant but mitigatable to less than significant with measures identified in this section, and SU = Significant and Unavoidable, even after mitigation.

3.10 RECREATION

This section describes the existing recreation facilities and uses in the project area as well as applicable state and local policies. It then assesses the potential effects of the proposed project restoration activities (both construction and post-construction) on these uses. Mitigation measures are identified as applicable.

3.10.1 Setting

Environmental Setting

General Setting

Existing Recreation Facilities and Uses

The Project extends from below the Putah Diversion Dam to the western boundary of the Yolo Bypass Wildlife Area. Publicly accessible trails and other recreational areas abut the creek in several areas. The public can enjoy views of the creek and start/end canoe trips from picnic areas and trails in these parks; however, the creek is not heavily used for boating due to numerous stagnant pools, shallow areas, and vegetation hazards.

Public Access/Recreation

Public access is available on publicly owned lands in and near lower Putah Creek in or near the Project alignment. These include (from west to east):

- **Lake Solano County Park:** Lake Solano Park is located off of Highway 128, just west of the upstream terminus of the project alignment. It caters especially to campers, picnickers, kayakers, canoers, and anglers. The park has a Nature Center and trail opportunities for short day hikes, bird watching, and wildlife photography. Owned by the Bureau of Reclamation, Lake Solano is managed for public recreation by Solano County. More than 60,000 visitors a year enjoy recreational activities both on and off the water. The lake is considered one of the best fly-fishing spots in the Sacramento Valley. The County operates a campground with 58 campsites, many with water and electric hookups. There are restrooms with flush toilets, sinks, and hot showers. The day use area has picnic sites, group picnic pads for rent, a free boat launch (non-motorized boats only), parking, and restrooms. The picnic area is located directly east of the campground.
- **Winters Putah Creek Nature Park:** This City of Winters Park, located in Winters between the proposed Duncan/Giovannoni and East of 505 sites, is partially open

and nearing completion. It includes a restored stream channel as well as picnic areas, bicycle and pedestrian trails.

The old railroad bridge will be converted for pedestrian and bicycle access to a trail system connecting the two sides of the stream. A spiral ramp leading from the south end of the railroad bridge will provide access to the south floodplain trail network, and a footbridge across the full floodplain of the Creek, near the I-505 bridge right of way, will provide crossing downstream.

- **Stevenson Bridge:** This bridge spans Putah Creek which lies about 100 feet below at the junction of County Road 95a (Yolo County) and Stevenson Bridge Road (Solano County). The bridge area is host to substantial informal recreation use, is heavily used by graffiti artists, and includes an informal path along the creek. The bridge was built in 1923 and has been identified by the state of California as eligible for the National Register of Historic Places. It is one of only three bridges in California that utilizes an architectural design known as the "overhead tie arch." The age and condition of the bridge have led the state to declare it “structurally deficient” and “functionally obsolete.” In 2007, Yolo and Solano counties approved a $5.5 million rehabilitation plan. The construction, to date, has not happened, and an outpouring of support from the community stopped the City's plan to buff the graffiti.
- **University California, Davis (UC Davis) Putah Creek Riparian Reserve:** The Putah Creek Riparian Reserve is a stream and grassland ecosystem, managed for teaching, research, wildlife, and habitat protection. There are approximately 640 acres within the Reserve, with 380 acres at the Russell Ranch and the remainder on the main UC Davis campus. A majority of the Putah Creek Riparian Reserve lands on the main campus are open to the public for passive recreation activities, such as fishing, boating, swimming, and hiking. The publicly accessible areas are located along Putah Creek, from the parking area at Pedrick Road/Road 98, downstream to the parking area at Old Davis Road, on the north side of the creek. Other areas, such as Russell Ranch, are not open to the general public, but are open to research and teaching use. Bicycles are allowed on the Preserve but must remain on the levee road, and are not allowed on trails. The south bank of the creek is privately owned, and not accessible to the public for recreation use.

  The Preserve includes four access/parking areas:

  - The Old Davis Road Parking Area is located on the north side of the creek, downstream from the Old Davis Road Bridge via the paved levee road to the gravel parking area. There are no restroom facilities.

  - The Brooks Road Parking is located south of the intersection of Levee Road and Brooks Road, west of Highway 113. It includes a gravel parking area with two picnic tables. There are no restroom facilities.
  - Fire Ring Picnic Grounds is on the north side of Levee Road next to the picnic area. There are picnic tables, a drinking fountain, and a fire pit. There are no restroom facilities.
  - The Road 98/Pedrick Road Parking Area is located west of County Road 98, just north of Putah Creek at the County Road 98/Pedrick Road Bridge. This is a gravel and dirt lot and there are no restroom facilities and is located at the western-most end of the Putah Creek Reserve. There is one portable restroom available at this location.

- **Davis South Fork Preserve:** The City of Davis has restored 120 acres of riparian woodland and grassland habitat along the South Fork of Putah Creek. The South Fork Preserve is intended to demonstrate that wildlife habitat, managed public access, commercial agriculture and flood control facilities can coexist with minimal conflicts. There is a parking lot and interpretive signage with plans for trails in the future.
- **Informal Recreation Use:** Informal recreational use of the creek occurs at various points along the creek. The primary informal recreation use is swimming in some of the deep pools, including the large pool at the eastern edge of the Winters/Putah Creek Park.

Specific recreational uses along each Project reach are described under Project Site Conditions, below.

Project Area Conditions by Reach

NAWCA/Mariani

There is no formal recreational access to this North American Wetlands Conservation Act (NAWCA) alignment. Informal public access to the creek is available from farm roads off of Putah Creek Road, which runs east/west, south of this alignment. Informal access to this site on the south side of the creek also may be available from the Lake Sonoma Park area, to the west.

Duncan-Giovannoni

There is no formal recreational access to this alignment. Public access to the creek is available from Putah Creek Road, which parallels the southeast edge of this alignment. This alignment also lies just upstream from the Winters Putah Creek Nature Park.

Winters Putah Creek Nature Park

This reach is subject to heavy recreational use. Recreation improvements on this reach, including trails, benches, picnic areas, and creekside access areas along this reach have been implemented in the past few years as part of the Winters Putah Creek Nature Park project. Informal recreational use of the large pool at the eastern edge of this Park as a swimming hole also has occurred.

East of 505

Public access to the creek is available from Putah Creek Road, which parallels the southeast edge of this alignment. There is no formal recreational access to this alignment.

Warren

There is no public access to the creek in this reach. There is no formal recreational use of this alignment.

Upper McNamara

There are no formal recreational facilities or access in this reach. There is informal public access to the creek from Putah Creek Road, which extends along the western half of the Upper McNamara Pool.

Lower McNamara

There is no public access to the creek in this reach. There is no formal recreational use of this alignment.

MacQuiddy (Lester)

There is no public access to the creek in this reach. There is no formal recreational use of this alignment.

Russell Ranch

The north side of this reach is a part of the UC Davis Putah Creek Riparian Reserve; however, there is no public access to the creek in this reach. There is no formal recreational use of this alignment.

Stevenson Bridge

There are no formal recreational facilities or access in this reach. As described above there is heavy informal recreational use of the east side of the bridge. The access to the

bridge is proposed for realignment, which could potentially provide an opportunity for enhanced public access (Marovich, 2014).

Glide Ranch

There are no formal recreational facilities or access in this reach. Levee Road provides informal public access to the creek for recreation in this reach.

Nishikawa

There is public access to the north side of the creek from Pedrick Road/Lincoln Highway. There is also a walking path (Putah Creek Riparian Preserve Trail) that provides recreational access within this reach.

Olmo-Hammond-UCD

There is public access from UC Davis in both directions along the Putah Creek Riparian Preserve Trail, which runs into the Olmo-Hammond-UCD site (continuing from the Nishikawa site) along the north side of the creek. A paved levee road and a picnic area also provide recreational access to the creek.

I-80 to Old Davis Road

Putah Creek is crossed by U.S. Highway 80 on the west, and Old Davis Road provides public access from the east. Additionally, the Putah Creek Riparian Preserve Trail crosses the creek and provides recreational access.

Old Davis Road to Mace

There is substantial access for pedestrians and drivers to this site from UC Davis, which is to the north of Putah Creek. There is informal public access to the creek from Levee Road.

Mace to Road 106A

There is public access to the creek from Road 106A and 5th Street runs along the creek on the south end for the lower third of the alignment. There is a gated parking lot and a trail that provides access to the previously restored riparian area (City of Davis South Fork Preserve) on Putah Creek on the south side of Mace Road.

Road 106A to Yolo Bypass Wildlife Area

There is informal public access to the creek via farm roads from Road 106A.

Regulatory Setting

Federal Regulations

There are no federal regulations applicable to recreation on this stretch of Putah Creek.

State Regulations

Land Use

The only State land use regulations applicable to this stretch of Putah Creek are associated with the University of California, Davis 2003 Long Range Development Plan (UC Davis, 2003). With respect to recreational uses along the area of Putah Creek adjacent to the University, the Plan states:

> Maintain and expand low-density academic, support, and research park uses along the Hopkins Road corridor. Include an open space setback along the west side of Hopkins Road for an off-street bike path and landscaped area to connect points north to the Putah Creek Riparian Reserve. (UC Davis, 2003, p. 44)

Local Regulations

Solano County

The Park and Recreation Element (Solano County, 2003) includes the following proposal relevant to the proposed Project (p. 34):

> Work with public agencies to solve the silt problem at Lake Solano County Park.
>
> *Rationale*
> The siltation build up on Putah Creek adjacent to the County Park is causing a negative impact on the park resources and recreation uses. Historically, Putah Creek in this location has been 7 to 8 feet deep; however, it is currently about 2 to 4 feet deep. As the water becomes shallower, it becomes warmer which results in an increase growth of algae. Algae growth can be harmful to aquatic life and humans engaging in water contact activities. The creek is located on federal land (Bureau of Reclamation) as is most of the County Park. The integrity of its water source is important to the Solano Water Agency (SWA).
>
> Although it would be very expensive to dredge the entire creek (reportedly $50 billion dollars), less expensive methods should be explored with government

agencies and others who have an interest in the water quantity and quality of the creek. The County should initiate discussions with the Bureau of Reclamation and the SWA to encourage the development of a strategy for the future protection of Putah Creek and its recreation use for visitors to Lake Solano County Park. Once a strategy is adopted, the County should assist to the extent of its capability.

Park and Recreation Element

The Park and Recreation Element (Solano County, 2003), adopted before the current General Plan, identifies general policies for managing and improving the county's park and recreational facilities. Objectives and associated policies in the Park and Recreation Element include the following.

Objective 3: Identify, preserve and manage significant regional recreation and natural areas.

Policy C: The County shall work to protect identified recreational sites and natural resource areas.

Objective 5: Encourage appropriate multiple uses of public land for recreation and other uses.

Yolo County

The 2030 County of Yolo Countywide General Plan (Yolo County, 2009) Conservation and Open Space Element includes the following goals and policies applicable to the Proposed Project:

Goal CO-1: Natural Open Space. Provide a diverse, connected and accessible network of open space, to enhance natural resources and their appropriate use.

Policy CO-1.1 Expand and enhance an integrated network of open space to support recreation, natural resources, historic and tribal resources, habitat, water management, aesthetics, and other beneficial uses.

Policy CO-1.2 Develop a connected system of recreational trails to link communities and parks throughout the county.

Policy CO-1.3 Create a network of regional parks and open space corridors that highlight unique resources and recreational opportunities for a variety of users.

Policy CO-1.6 Develop "gateways" or trailheads that provide access for the public to County, State, and Federal lands. Where located on private land, gateways shall be developed working with willing landowners.

Policy CO-1.7 Support efforts by willing landowners and non-profit groups to provide new opportunities for outdoor recreation. (Policy CO 1.29)

Policy CO-1.8 Encourage responsible stewardship of private lands. Promote increased opportunities for public access to waterways and other natural areas.

Policy CO-1.9 Promote the conservation of resources in new and existing park and open space facilities.

Policy CO-1.11 Coordinate the development of recreation areas and public open space with regional trail planning.

Policy CO-1.21 Emphasize the use of native grasses, shrubs and trees as the primary focus of restoration within resource parks and other open spaces.

Policy CO-1.23 Increase public access and recreational uses along waterways wherever feasible, particularly Cache Creek, Lower Putah Creek, the Yolo Bypass, and the Sacramento River.

Policy CO-1.26 Support improved access for bank fishing.

3.10.2 Significance Criteria

The criteria used for determining the significance of an effect on recreational resources are based on Appendix G of the State of California Environmental Quality Act (CEQA) Guidelines (Environmental Checklist) and professional standards and practices. Effects on both water-dependent and water-enhanced (land based) recreation opportunities may be considered significant for purposes of CEQA if an alternative would result in any one of the following conditions.

- The permanent loss or closure of well-established recreational facilities or activities.
- The substantial long-term reduction of recreation opportunities and experiences, such as reduce the amount of area available for a particular type of recreation.
- Cause an increase in the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

- Result in potential inconsistencies with plans and policies related to the protection of recreation resources in the project area.

3.10.3 Impacts and Mitigation Measures

Impacts and mitigation measures are described below both generally and by reach. Applicable impacts and mitigation measures for each reach are summarized in **Table 3.10-1**, at the end of this section.

General Impacts and Mitigation Measures

Impact 3.10-1: Adverse Effects on Recreation.

Recreation within the reaches would be temporarily affected during construction and potentially for a period of time following construction due to disturbance of facilities due to construction and associated access restrictions. The primary impacts would be loss of access to the creek and associated recreational amenities, including trails, picnic areas, and boating access. Because of the staging of the project (no more than 5 miles of restoration/year) this loss of access would be limited. However, for certain high-use areas (e.g., near UC Davis, at segments adjacent to Winters Putah Creek Park, and just downstream from Lake Sonoma), loss of access could be significant. Mitigation Measure 3.10-1 would reduce this impact, however depending on the feasibility of mitigation; the impacts may remain significant and unavoidable at certain higher-use sites. After restoration is complete, then access to most sites would be restored and, in some cases, improved.

During construction, certain segments of the creek would be dewatered, eliminating boating access. This impact would be less than significant because few boaters use the creek and limitations would be temporary. After restoration, boating conditions on many of the sites may be improved compared to existing conditions, with better defined channels, better flow currents, and less dangerous, non-native vegetation in and around the channel.

Removal of the deep pools as part of the Project would eliminate some informal swimming holes. It is possible that some pools may be retained off-channel. Because this use is generally on private lands, and not formally permitted in most cases, and because the Project would generally improve stream conditions for recreation, as described above, this impact is considered less than significant.

As described under Local Regulations, above, Yolo County's General Plan includes numerous policies promoting recreational access to Putah Creek. Although the Proposed Project does not include specific recreational access enhancements, it would replace existing trails and recreational facilities that would be affected by construction, and would not preclude future recreational enhancement along the creek. Mitigation Measure 3.10-2 would reduce this impact to a **less-than-significant** level.

Mitigation 3.10-1: Provide Alternate Access to High-Use Recreational Sites.

The following measures shall be implemented as feasible to reduce impacts of construction access:

- Where feasible, provide alternate trail and creek access where such access would be eliminated due to Project construction.
- Stage restoration work in high-use areas to permit continued access to parts of reaches that are not undergoing active construction activities.
- Minimize construction work limits.
- To the maximum extent feasible, store equipment and soil stockpiles within the active construction zone.
- If necessary, provide alternate access to picnic areas and formal trails/pathways that avoid the active construction zone.
- Provide an alternative canoe take out above the Olmo-Hammond-UCD site when boat take-out at that site is interrupted.

Mitigation 3.10-2: Implement Applicable Yolo County Recreation Policies, Where Feasible.

The Project sponsors shall work closely with Solano and Yolo Counties, UC Davis, and adjacent landowners to facilitate their provision of public access and recreational infrastructure into the proposed Project on public lands and in places where the landowner is a willing participant and where impacts to sensitive biological resources can be avoided.

Site-Specific Impacts and Mitigation Measures

NAWCA/Mariani

This reach is not currently used for any formal public recreational activities. Informal use of the creek in this reach would be reduced or eliminated by the Project. This use is

minimal and its elimination would be **less than significant.** In the long-term, boating access through this site would be improved compared to existing conditions.

Duncan-Giovannoni

This reach is not currently used for any formal public recreational activities. Informal use of the pool in this reach would be reduced or eliminated by the Project. This use is minimal and its elimination would be **less than significant**. In the long term, boating access through this site would be improved compared to existing conditions.

Winters Putah Creek Nature Park

Recreation improvements proposed for this reach have already been implemented as part of the Winters Putah Creek project. Maintenance activities proposed by the Project would not adversely affect recreational activities in this reach. There would be **no impact** to recreational resources in this reach from the proposed Project.

East of 505

This reach is not currently used for any formal public recreational activities. Any informal use of the pool in this site would be reduced or eliminated by the Project. This use is minimal and its elimination would be **less than significant**. In the long term, boating access through this site would be improved compared to existing conditions.

Warren

Given that there is no public access to this reach, it is not currently used for any formal or informal public recreational activities. Although the Project has **no impact** on this reach, implementation of Mitigation Measure 3.10-2 would potentially improve recreational infrastructure and public access to the site.

Upper McNamara

This reach is not currently used for any formal public recreational activities. There is informal recreational use of the pool in this site, accessible via Putah Creek Road, which would be reduced or eliminated by the Project. This use is minimal though and its elimination would be **less than significant**. In the long term, boating access through this site would be improved compared to existing conditions.

Lower McNamara

This reach is not currently publicly accessible by any road crossings or trails and thus it is not used for any formal public recreational activities. Any informal use of the pool or

creekside in this site would be reduced or eliminated by the Project. This use is minimal and its elimination would be **less than significant**. In the long term, re-vegetation would improve the site and boating access as compared to existing conditions.

MacQuiddy (Lester)

This reach is not publicly accessible by any roads or trails and it is not currently used for any formal public recreational activities. Potential informal use of the pool or creek banks in this site would be reduced or eliminated by the Project. The elimination of any informal recreational access, if any, would be **less than significant**. In the long term, the vegetation and riparian resources of this site would be improved compared to existing conditions.

Russell Ranch

This reach is in an agricultural area (privately owned south of the creek and part of the UC Putah Creek Preserve north of the creek) and is not currently used for any formal public recreational activities. Any informal use of the pool or creek banks in this site would be reduced or eliminated by the Project. Given that this use is minimal its elimination would be l**ess than significant.** In the long-term, the recreational resources of this site (e.g., boating access) would be improved compared to existing conditions.

Stevenson Bridge

While this reach is not currently used for any formal public recreational activities, there is heavy informal recreational use of the area near the bridge that would be temporarily disrupted during construction. The site may be enhanced by the Project after construction, with the potential for more formal recreational access to be created. Thus, the impact on current informal recreational activities would be **significant but mitigated** by Mitigation Measure 3.10-1. In the long term, recreational resources (e.g., boating access) through this site would be improved compared to existing conditions.

Glide Ranch

This reach is not currently used for any formal public recreational activities. Informal use of the pool in this site would be reduced or eliminated by the Project. This use is minimal and its elimination would be **less than significant.** In the long-term, recreational access through this site would be improved compared to existing conditions.

Nishikawa

This reach is currently publicly accessible by Pedrick Road and the Putah Creek Riparian Preserve Trail for recreational activities. Recreational use of this site would be temporarily reduced or eliminated by the Project during construction. This impact would be **significant but mitigated** by Mitigation Measure 3.10-1.In the long-term, recreational resources and access associated with this site would be improved compared to existing conditions.

Olmo-Hammond-UCD

As described in the Setting section, above, this reach is publicly accessible via Putah Creek Riparian Preservation Trail, includes a public picnic/camp area, and is crossed by hiking trails, views from which could be adversely affected during construction. This impact would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.10-1. Long-term impacts on recreational resources on this reach would be positive because the existing stagnant pool would be transformed to a free-flowing creek, and the channel habitat would be enhanced. Trails and boating access would be restored after construction of the creek restoration.

I-80 to Old Davis Road

This reach is has limited formal public recreational activities associated with the Putah Creek Riparian Preserve and there is informal use via the Putah Creek Riparian Preserve Trail to the creekside and pool in this site. The Project would reduce or eliminate this access during construction but the recreational value would be enhanced in the longer term (e.g., boating access and creekside vegetation) compared to existing conditions. These temporary impacts would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.10-2.

Old Davis Road to Mace

As described in the Setting section, above, this reach is publicly accessible, includes a public picnic/camp area, and is crossed by hiking trails, views from which could be adversely affected during construction. This impact would be reduced to a **less-than-significant** level by implementation of Mitigation Measure 3.10-1. Long-term impacts on recreational resources on this reach would be positive because the existing stagnant pool would be transformed to a free-flowing creek, and the channel habitat would be enhanced. Trails and boating access would be restored after construction of the creek restoration.

Mace to Road 106A

This reach has formal and informal access for recreational activities, pedestrians, and drivers from UC Davis and informally from Levee Road. There is a gated parking lot and a trail accessing the previously restored riparian area (City of Davis South Fork Preserve) on Putah Creek on the south side of Mace Road. This parking lot has not been consistently accessible to the public but nonetheless has provided some public access. The use of this site would be temporarily reduced or eliminated by the Project during construction. In the longer term, with Mitigation Measure 3.10-1, the recreational value of the site (potentially including the parking access) would be improved compared to existing conditions. The impact is **less than significant,** with the potential for site improvement resulting from mitigation.

Road 106A to Yolo Bypass Wildlife Area

This reach is not currently used for any formal public recreational activities. The limited informal use of the pool or creekside riparian zone in this site would be temporarily reduced or eliminated by the Project during construction. As the recreational use is minimal, its temporary elimination would be **less than significant.** In the long-term, boating access and other recreation associated with this site would be improved compared to existing conditions.

Table 3.10-1 Summary of Recreation Impacts and Mitigation Measures

Sites	Level of Recreational Access/Use (High, Limited, or None)	Impact 3.10-1 Adverse Effects on Recreation	Applicable Mitigation Measures
NAWCA/Mariani	None	NI	n/a
Duncan-Giovannoni	Limited	LTS	n/a
Winters Putah Creek Nature Park	High	LTS	n/a
East of 505	Limited	LTS	n/a
Warren	None	NI	n/a
Upper McNamara	Limited	LTS	n/a
Lower McNamara	None	NI	n/a
MacQuiddy (Lester)	None	NI	n/a
Russell Ranch	None	NI	n/a
Stevenson Bridge	High (Informal)	SM	NM 3.10-1
Glide Ranch	Limited	LTS	n/a
Nishikawa	High	SM	MM 3.10-1
Olmo-Hammond-UCD	High	SM	MM 3.10-1
I-80 to Old Davis Road	High	SM	MM 3.10-1
Old Davis Road to Mace	High	SM	MM 3.10-1
Mace to Road 106A	Limited-High	SM	MM 3.10-1
Road 106A to YBWA	Limited	LTS	n/a

NI = no impact, LS = LTS = Less than Significant Impact, SM = Significant but mitigatable to less than significant with measures identified in this section, and SU = Significant and Unavoidable, even after mitigation.

3.11 CULTURAL RESOURCES

This section describes the existing cultural resources setting for the Project region, including a discussion of the prehistoric and historic-era sites documented in the Project corridor, a review of the research methodology, and a summary of applicable State and local policies. It then assesses the potential effects of the proposed Project restoration activities (both construction and post-construction) on these uses. Mitigation measures are identified as applicable.

To determine if any recorded sites, features, or artifacts that could be affected by Project ground disturbances are located along and near lower Putah Creek, Solano Archaeological Services conducted a record search through the Northwest Information Center (NWIC) of the California Historical Resources Information System (CHRIS) in 2014. CHRIS serves as an archive for California Department of Parks and Recreation Series 523 archaeological site records and other data on archaeological and historic resources throughout California. The results of this record search document the existence of prehistoric and historic-era resources in areas previously surveyed within the watershed, and provide a basis for assessing the cultural resource sensitivity of specific areas along Putah Creek. No field studies have been performed for this Project.

3.11.1 Setting

Environmental Setting

Archaeological and Ethnographic Context

Native Americans have inhabited coastal and interior portions of California for over 10,000 years. The Putah Creek watershed, with its varied topography and rich floral and faunal resources, has been an important area for settlement and subsistence for at least 5,000 years. Although no direct evidence for the earliest inhabitants has been found in the Putah Creek area, the Paleo-Indian Period (10,000 B.C. to 6,000 B.C.) was the time frame that saw the first entry of humans into California. Many of the earliest sites were probably located along the postglacial coastal shoreline. Rising water levels have now covered those sites and most interior sites that remain are situated along lakeshores, or areas that used to be lakeshores. While Paleo-Indian artifacts have never been found in the Putah Creek or Solano County regions, it is likely that these people at least traveled through the region, hunting the prolific game that would have lived in the area and gathering seasonally available plant materials.

Other cultural groups appear to have occupied the region during later prehistoric periods. However, the area encompassing Putah Creek and from the town of Princeton south to San Pablo Bay and Suisun Bay, was occupied by the Patwin and their descendants from late prehistoric era to the present day. Their traditional territory covered three physiographic regions from east to west: both banks of the Sacramento River and its dense tree, vine, and brush vegetation interspersed with great tule marshes; flat open grassland plains with occasional oak groves; and the lower hills of the eastern Coast Range. Most of the population was concentrated along the river in large villages and in smaller settlements along the Putah Creek and Cache Creek drainages. Villages along Putah Creek included *Chemocu*, Putato (or *Poo-tah-toi*), and *Liwai* where the present-day cities of Davis and Winters now stand.

The prehistoric sites that are known within the Project corridor have been identified, in general, as relatively intensive occupation sites. Given the local natural setting that includes the proximity of potable water, habitats supporting a rich variety of flora and fauna, and the gentle nature of the terrain, it is not surprising that local Native Americans made relatively concentrated use of the area. The intensity of this landscape use is reflected in the occupation/mound sites as reported in **Table 3.11-1** below. While burials have not been identified in any of these sites, the possibility that they could be encountered in the area must be taken into consideration.

In general, the prehistoric sites noted in and near the Project Area often exhibit dark, rich midden soils accumulated over centuries of occupation. Most of these sites contain the remnants of stone and/or bone tools and tool manufacture, food remains, food processing areas, and the like. One site, CA-Yol-164, may be the remains of a village that was occupied and documented in the earliest days of European settlement in the area. Two other sites, CA-Sol-253 and CA-Sol-255, had glass trade beads along with historic artifacts, suggesting that these sites also were occupied by Native Americans early in the Historic period. Several of these sites have been adversely affected by agricultural activities, road construction, or residential development. However, remains of these sites can still be identified and several of them may well be larger than is currently known. In addition, it is likely that other sites, as yet undiscovered, lay within the Putah Creek corridor. These may well have been buried by floodwater deposition, farming, or other factors, and would only be uncovered by construction, utility trenching, farming, or similar ground disturbing activities.

Table 3.11-1 Previously Recorded Sites in the APE

P#/Trinomial	Author	Description	CRHR Eligibility	Date(s) Recorded
P-48-017/ CA-SOL-9	W.C.M., Goins	Prehistoric burial site	Potentially eligible	1946
P-48-018/ CA-SOL-10	W.C.M.	Prehistoric habitation site with hearth	Potentially eligible	1946
P-48-112/ CA-SOL-274/H	Johnson, Ross	Prehistoric burial and habitation site, historic-era structure	Potentially eligible	1971, 2003
P-48-549	Les, et al.	Historic-era Southern Pacific Railroad segment	Ineligible as segment	1986-2011
P-48-678	Bartoy	Prehistoric "Sunburn Terrace Campsite" lithic scatter	Potentially eligible	2004
P-48-750	Coleman	Historic-era Harris House	Ineligible	2006
P-48-785	Cervantes	Historic-era Stevenson Bridge Refuse Dump	Ineligible	2007
P-48-866	Bowen and Kuzak	Historic-era 4531 Putah Creek Road	Ineligible	2006
P-48-899	Berg and Brink	Prehistoric isolated handstone	Ineligible	2011
P-48-955/ P-57-642	Bowen and Kuzak	Historic-era Southern Pacific Railroad Bridge	Eligible	2006
P-48-965	Grijalva	Historic-era refuse scatter	Ineligible	2012
P-57-132	Les, et al.	Historic-era landscape (orchard)	Ineligible	1986, 2007, 2012
P-57-436	Bartoy	Historic-era Putah Creekbank Trash Dump	Ineligible	2004

Note: CRHR = California Register of Historical Resources
Source: Northwest Information Center (NWIC) of the California Historical Resources Information System (CHRIS), Database Search, December 2014

Historic Context

While the Gold Rush of the mid-19th century clearly prompted the large scale European settlement of the Central Valley, mass settlement of Putah Creek and its vicinity did not occur until after the California Pacific Railroad line was built in 1868 and the establishment of Davisville (Davis) that year. Residents in Davisville and the surrounding area saw additional benefits from railroad expansion in 1868 when the California Pacific Railroad built a junction and depot on land purchased from Isaac Davis. This facility, along with branch lines extending into the Napa Valley, greatly improved transportation throughout northern California and further established the Davis area as an important agricultural center. In fact, the construction of the junction and depot was a major consideration in the decision to establish the University Farm in Davisville in 1907.

Well before the arrival of the railroad, the Putah Creek region was recognized as a prime agricultural area thanks in large part to John Wolfskill. Although only one of many farmers and ranchers in the Putah Creek area, he was one of the most prominent and his influence on Central Valley agriculture can be seen to this day. Wolfskill's success in horticulture and viticulture established the towns of Davis and Winters as prime areas for fruit and nut cultivation. In 1937, a land donation formed the basis for a horticultural experiment station currently operating in connection with the University of California, Davis (UC Davis).

The area's first town, Buckeye, was established ca. 1865, approximately 2 miles northeast of Winters. This fledgling community was short-lived, however, and by 1875 was abandoned when the Vaca Valley Railroad bypassed the small town and extended its line into Yolo County. The railroad, having received the commitment of land from Theodore Winters and D.P. Edwards, and financial assistance from area landowners, made plans for a new depot and town-site named Winters, after the local entrepreneur.

The town of Winters grew rapidly at this time, largely due to its status as the northeastern terminus of the Vaca Valley Railroad. By the late 1870s, Winters had become a busy agricultural and commercial center with three trains daily and rapid business and residential development, some of which were established and owned by a local Chinese population. Having originally come to the area in the 1870s to work on the railroad, some Chinese settled in the Winters area and established a small commercial district of their own along Putah Creek. By the 1890s, many Japanese had also come to the region to work on local farms and ranches, and before long, established themselves in the small Asian community. Apricots, peaches, cherries, plums, pears, oranges, almonds, figs, barley, wheat, and vegetables were all grown and harvested in the area, with agriculture being the primary source of economic activity for all segments of the community.

Putah Creek itself, long before the establishment of ranches, farms, towns, and railroads, was a major attraction for Native Americans and Europeans residing in the area. As agricultural endeavors, fruit orchards in particular, increased in the Davis and Winters areas, the need for additional control of the waters flowing in Putah Creek became evident. A severe drought in the early and mid-1930s and severe flooding in 1935 prompted the planning and construction of a dam across the creek by the town of Winters for water storage and flood control. The Putah Creek percolation dam was finally approved and ultimately built by the Depression-era Works Progress Administration. When completed in 1938, the dam served to moderate area flooding.

Further alterations of Putah Creek in the following decades included the U.S. Army Corps of Engineers (USACE) Putah Creek project, including construction of the Putah Creek South Fork channel in the 1940s to prevent flooding in the Davis area. Various channel-altering gravel mining operations also occurred that operated well into the 1970s. However, probably the single greatest change to the creek itself occurred with the construction of the Solano Project by the U.S. Bureau of Reclamation. The facilities included the Monticello Dam, the Putah Diversion Dam, and the Putah South Canal. By the early 1960s, the project was complete and the Monticello Dam (named for the small town it ultimately inundated) flooded the Berryessa Valley, destroying a prime agricultural valley, but creating an important water and recreational resource.

Cultural Resources Documented in Project Area

Thirteen cultural resources including sites and isolates have been documented by the NWIC to be located within the Putah Creek corridor (Table 3.11-1). Another site, the Stevenson Bridge, was documented by Caltrans in 2013. An additional 27 sites or isolated artifacts have been found within ¼-mile of Putah Creek, but these are situated far from any potential impacts resulting from activities related to the watershed and are not listed in Table 3.11-1.

The sites formally documented in the Putah Creek corridor include two bridges, a railroad segment, a historic farmstead (Chambers Farmstead), and several prehistoric sites and artifacts. The Southern Pacific Railroad bridge (P-48-955), constructed in 1923, was evaluated by California Department of Transportation (Caltrans) engineers and found to be eligible for listing on the National Register of Historic Places (NRHP) (Caltrans, 1990). Another bridge, the "Stevenson Bridge" is located within the Project Area and was recommended NRHP eligible by Caltrans in 2013. Four of the prehistoric sites (P-48-017, P-48-018, P-48-112, and P-48-678) are likely eligible for NRHP listing based on the documented presence of human remains and/or the possibility that they retain significant physical integrity and data potential. These significant resources are described below. Cultural resources recommended not NRHP/CRHR eligible are not discussed further as any Project-related disturbances to them would not constitute significant impacts per California Environmental Quality Act (CEQA).

- **P-48-017/CA-SOL-9:** Recorded in 1946 by W.C.M. and John Goins, this one-page site record describes the site location along the south side of Putah Creek on a narrow neck of land. Alluvial soils yielded pestle fragments, clam-shell beads, and glass beads, indicating a proto-historic presence to the site chronology. Someone named Mr. Hemingway reported that this site contains prehistoric burials in light, friable soils in contrast to the surrounding alluvium. As the site to date has never been

archaeologically tested or updated, and may contain significant intact archaeological deposits, Solano Archaeological Services (SAS) preliminarily recommends site P-48-017/CA-SOL-9 is potentially eligible for listing in the CRHR.

- **P-48-018/CA-SOL-10:** Originally recorded in 1946 by W.C.M., this one-page record states that this site was found along the south bank of Putah Creek on the edge of a stream terrace above the floodplain. Alluvial soils yielded habitation material including obsidian projectile points, *Olivella* shell beads, clam-shell beads, modified animal bone tools, and numerous ash lenses. Other material included chert and quartzite. The record indicates that the site has been partially disturbed by grading activities. As the site to date has never been archaeologically tested or updated, and may contain significant intact archaeological deposits, SAS preliminarily recommends site P-48-018/CA-SOL-10 has potentially eligible for listing in the CRHR.
- **P-48-112/CA-SOL-271/H:** This site was originally recorded in 1971 by Patti Johnson. Located along the south bank of Putah Creek approximately 1 mile east of Pedrick Road, the site was reported to contain an open midden on a slight rise with a historic-era (late 1800s) on top of the mound. The midden area measures approximately 90 meters by 60 meters. Prehistoric features included ash deposits, and at least three burials (two adults and an infant) scattered by post-depositional trenching for irrigation. Artifacts include obsidian, chert, and basalt debitage, a Haliotis ornament fragment, a modified bone tool, several charmstones, red ochre, and flake scrapers. The site record contains a handwritten note that Johnson conducted test excavations at the site in 1973, but the results are not indicated anywhere on the record or at the NWIC. In 2003 the site was updated by J. Ross. According to Ross, during the site relocation attempt neither the midden, small house, nor any concentrations of artifacts were observed. Several artifacts were observed along a dirt access road in the vicinity, likely along the western portion of the originally recorded site by Johnson. The observed artifacts included a charmstone fragment, a pestle fragment, and assorted lithic debris. Ross excavated eight shovel probes to only 50 centimeters (cm) deep in the area where the artifacts were recovered, but only found a single obsidian flake. The update indicates that the site may be either destroyed or significantly impacted. Based on analyzing the written documentation for site CA-SOL-271/H, it is in the opinion of SAS that sufficient archaeological testing has not been conducted to adequately assess the site's overall integrity and CRHR eligibility. Subsurface excavation was only conducted down to 50 cm in a location off-set from the original descriptions of the site by Johnson. It is entirely possible that at least a portion of the site lies intact subsurface below 50 cm. Additionally, research can be conducted on

the history of the removal of the original house structure. As such, SAS recommends site P-48-112/CA-SOL-271/H as preliminarily eligible for the CRHR.

- **P-48-955/P-57-642:** This site consists of the Southern Pacific Railroad Bridge in the City of Winters. This resource has two primary numbers due to its location in two counties (Solano and Yolo). According to the records provided by Mark Bowen and Chris Kuzak in 2006, the bridge, a steel pratt truss design, was originally evaluated in 1989 and 2004 (see Caltrans Bridge Inventory below). The record by Bowen and Kuzak indicate that the California Office of Historic Preservation deemed the bridge as eligible for the NRHP in that it served as a reminder of the enormous impact that bridging the Putah Creek by the first railroad (Vaca Valley Railroad) has on the birth and development of Winters. The construction of the bridge, however, is not uncommon. Bowen and Kuzak evaluated the bridge for CEQA criteria, and found it to also be eligible on under Criterion 1 for its association with the Vaca Valley Railroad and its role in providing a means of transporting fruit grown in Winters as a desired export to local agricultural communities in the area. SAS concurs with all of the aforementioned recommendations.
- **P-48-678:** Recorded by Kevin Bartoy in 2004, this prehistoric site consists of a prehistoric lithic scatter south of Putah Creek on a level terrace above the creek bank. Most of the material was observed on a dirt road extending in an east-west direction for approximately 500 meters, but due to dense ground vegetation the north-south boundaries were estimated to be approximately 100 to 200 meters. Identified cultural material includes an obsidian hand tool, a green chert hand tool, seven flakes of red chert, and a single fragment of calcined faunal remains. The record did not discuss the potential for subsurface discovery, but elaborated that all of the artifacts were recovered along the ground surface. Given the record's lack of discussion on site integrity and possible subsurface deposition, SAS recommends preliminarily site P-48-678 as potentially eligible for CRHR listing.
- **Stevenson Bridge:** The concrete Stevenson Bridge (Dixon Historic Property Directory #046218), Caltrans Structure Maintenance & Investigations (SM&I) #23C0092. This structure was recommended eligible for NRHP listing by Caltrans in the 2013 SM&I index. This structure is one of only three such remaining bridges in California that utilizes an architectural design known as the "overhead tie arch."

NAWCA/Mariani

Two documented significant cultural resources (P-48-017 and P-48-018) are known to be located within the North American Wetlands Conservation Act (NAWCA) reach on the south bank of Putah Creek. Site P-48-017 was documented in 1946 as containing human

remains and ethnographic-era materials such as glass trade beads. This site has also not been re-recorded since the original 1946 site record. Documentary evidence and U.S. Geological Survey (USGS) topographic mapping suggests much of this Project site has been heavily impacted by gravel mining and P-48-017 may have been destroyed. However, pending additional research it must be assumed that the site remains as originally documented.

Site P-48-018 was also originally documented in 1946 and was noted to contain human remains and artifacts such as shell beads. The site has not been re-recorded since the original documentation in 1946. Due to the presence of human burials and possibly undisturbed features and archaeological materials, this site appears to be eligible for CRHR listing and is considered a Historical Resource for the purposes of CEQA.

Duncan-Giovannoni

There are no known cultural resources in this reach.

Winters Putah Creek Nature Park

The historic Southern Pacific railroad bridge (P-48-955/P-57-642) is located in this reach.

East of 505

There are no known cultural resources in this reach.

Warren

There are no known cultural resources in this reach.

Upper McNamara

There are no known cultural resources in this reach.

Lower McNamara

There are no known cultural resources in this reach.

MacQuiddy (Lester)

One documented significant cultural resource (P-48-678) is known to be located within the MacQuiddy (Lester) project reach on the south bank of Putah Creek. Site P-48-678 was originally documented in 2004 as a large lithic scatter measuring approximately 500 meters east-west and 200 meters or more north-south. No subsurface investigations were undertaken in 2004 and it is not presently known if the site retains additional subsurface and potentially intact archaeological materials and/or human interments.

Consequently, pending additional research it must be assumed that the site retains important scientific data and is eligible for listing on the CRHR.

Russell Ranch

There are no known cultural resources in this reach.

Stevenson Bridge

One documented significant cultural resource (Caltrans SM&I Bridge #23C0092, Dixon Historic Property Directory #046218) is known to be located within the Stevenson Bridge project reach. This structure, the Stevenson Bridge, was recommended eligible for NRHP listing by Caltrans in the 2013 SM&I index.

Glide Ranch

There are no known cultural resources in this reach.

Nishikawa

There are no known cultural resources in this reach.

Olmo-Hammond-UCD

One documented significant cultural resource (P-48-112) is known to be located within the Olmo-Hammond-UCD project reach on the south bank of Putah Creek. Site P-48-112 was originally documented in 1971 and was revisited in 2003. The site was noted as containing midden soils and human burials but with only limited subsurface investigations having taken place in 2003 it is not presently known if the site exhibits additional subsurface and potentially intact archaeological materials and human interments. Consequently, pending additional research it must be assumed that the site retains important scientific data and is eligible for listing on the CRHR.

I-80 to Old Davis Road

One documented significant cultural resource (P-48-955/P-57-642) is known to be located within the I-80 to Old Davis Road project reach. This structure, a Southern Pacific Railroad bridge, was recommended eligible for NRHP and CRHR listing in 1989, 2004, and 2006.

Old Davis Road to Mace

There are no known cultural resources in this reach.

Mace to Road 106A

There are no known cultural resources in this reach.

Road 106A to Yolo Bypass Wildlife Area

There are no known cultural resources in this reach.

Regulatory Setting

Multiple State and federal laws govern the treatment of cultural resources. Both CEQA and Public Resources Code (PRC) Section 5024 apply to State-owned resources and state sponsored projects. Because the proposed Project includes actions that involve issuance of federal permits, there is a federal nexus and compliance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 Code of Federal Regulations [CFR] 800, 36 CFR 60, and 36 CFR 63) is required.

Section 106 – National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966, as amended, sets forth national policy and procedures for historic properties, defined as districts, sites, buildings, structures, and objects included in or eligible for listing in the National Register of Historic Places. Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and to allow the Advisory Council on Historic Preservation the opportunity to comment on those undertakings, following regulations issued by the Council (36 CFR 800).

Under Section 106, cultural resource significance is evaluated in terms of eligibility for listing in the NRHP. The NRHP criteria for evaluation are defined at 36 CFR 60.4 as follows: The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling and association, and meet the following:

- Are associated with events that have made a contribution to the broad pattern of our history;
- Are associated with the lives of people significant in our past;
- Embody the distinct characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- Have yielded, or are likely to yield, information important in prehistory or history (36 CFR 60.4).

If historic properties are identified in the Project Area, effects of the proposed Project on those properties must be assessed. If effects would be adverse, the federal agency would continue working with the consulting parties to resolve the adverse effects through modifications to the proposed Project, avoidance, minimization, or mitigation (36 CFR 800.5-800.6).

California Environmental Quality Act—Statute and Guidelines

CEQA requires that public agencies that finance or approve public or private projects must assess the Project's impacts on cultural resources (CEQA Guidelines Section 15064.5). "Cultural resource" is a general term that that encompasses CEQA's definition of historical resources (PRC Section 21084.1) and unique archaeological resources (PRC Section 21083.2). CEQA requires that alternative plans or mitigation measures must be considered if a project would result in significant effects on important cultural resources; only significant cultural resources, however, need to be addressed (CEQA Guidelines Section 15064.5 [a][3]). Therefore, prior to the development of mitigation measures, the significance of cultural resources with the potential to be impacted by the proposed Project must be determined. The criteria for determining historical significance are defined in PRC Section 5024.1.

CEQA Guidelines also require that a lead agency make provisions for the accidental discovery of historical or archaeological resources. Pursuant to Section 15064.5, subdivision (f), these provisions should include "an immediate evaluation of the find by a qualified archaeologist. If the find is determined to be an historical or unique archaeological resource, contingency funding and a time allotment sufficient to allow for implementation of avoidance measures or appropriate mitigation should be available. Work could continue on other parts of the building site while historical or unique archaeological resource mitigation takes place."

California Public Resources Code Sections 5024.1

PRC Section 5024.1 establishes the CRHR, which is the authoritative guide for identifying the state's historical resources to indicate what properties are to be protected, if feasible, from substantial adverse change. In order for a resource to be eligible for the CRHR it must be over 50 years old, retain its historic integrity, and satisfy one or more of the following criteria:

- Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
- Is associated with the lives of persons important in our past.

- Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.
- Has yielded, or may be likely to yield, information important in prehistory or history.

Discoveries of Human Remains under California Public Resources Health and Safety Code Section 7050.5(b-c) and 5097.98(a)

In the event of discovering human remains, there shall be no further excavation or disturbance of the remains until they are examined by the County Coroner. The Coroner has two working days to determine the nature of those remains. If the Coroner determines that the remains are Native American archaeological remains, he/she would contact the Native American Heritage Commission (NAHC) by telephone within 24 hours.

Once the NAHC has been notified of the discovery of Native American human remains, it shall immediately notify those persons believed to be the most likely descended (MLD). The MLD may inspect the site of the discovery and recommend to the owner methods of treating, with dignity, the human remains and any associated grave goods. The descendants shall complete their inspection and make recommendations or preferences for treatment within 48 hours of being granted access to the site.

3.11.2 Significance Criteria

The criteria used for determining the significance of an effect on recreational resources are based on Appendix G of the CEQA Guidelines (Environmental Checklist) and professional standards and practices. Effects on both historic and prehistoric resources may be considered significant for purposes of CEQA if an alternative would result in any one of the following conditions.

- A substantial adverse change in the significance of an historical resource as defined in California Code of Regulations (CCR) Section 15064.5.
- A substantial adverse change in the significance of an archaeological resource as defined in CCR Section 15064.5.
- Disturb human remains, including remains interred outside of established cemeteries. For the purposes of this analysis disturbance may consist of direct excavation or damage through compaction even where the resource is not directly excavated.
- Under Section 106 of the NHPA (36 CFR 800.5 (a)(1), an adverse effect on an historic property is found when an activity may alter, directly or indirectly, any of the characteristics of an historic property that qualify it for inclusion in the NRHP. The

alteration of characteristics is considered adverse if it may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

Local Regulations

Yolo County Code

Chapter 8 of the Yolo County Code provides guidance for the treatment of local historic landmarks and historic districts. Overseen by the Historic Resources Commission, this section of the code provides for the identification, protection, enhancement, perpetuation, and use of cultural resources within the County that reflect elements of its cultural, agricultural, social economic, political, aesthetic, military, maritime, engineering, archaeological, religious, ethnic, natural, architectural and other heritage. Criteria used in defining a landmark or historic district consist of the following:

- A building, structure, object, particular place, vegetation, or geology, may be designated a County historic landmark if it meets one or more of the following criteria:
- It exemplifies or reflects valued elements of the County's cultural, agricultural, social, economic, political, aesthetic, military, religious, ethnic, natural vegetation, architectural, maritime, engineering, archaeological, or geological history; or
- It is identified with persons or events important in local, State, or national history; or
- It reflects significant geographical patterns, including those associated with different eras of settlement and growth and particular transportation modes; or
- It embodies distinguishing characteristics or an architectural style, type, period, or method of construction or is a valuable example of the use of indigenous materials or craftsmanship; or
- It is representative of the notable work of a builder, designer or architect; or
- It represents an important natural feature or design element that provides a visual point of reference to members of the community.

Yolo County General Plan

The Conservation, Open Space Element, Land Use, and Community Character Element sections of the 2030 Yolo County General Plan include policies and actions related to cultural resources. These policies and actions are extensive and include the following presented here as examples:

Policy CC-1.15: The following features shall be protected and preserved along designated scenic roadways and routes, except where there are health and safety concerns:

- Trees and other natural or unique vegetation
- Landforms and natural or unique features
- Views and vistas
- Historic structures (where feasible), including buildings, bridges and signs

Policy CO-4.1: Identify and safeguard important cultural resources.

Policy CO-4.2: Implement the provisions of the State Historical Building Code and Uniform Code for Building Conservation to balance the requirements of the Americans with Disabilities Act with preserving the architectural integrity of historic buildings and structures.

Action CO-A56: Establish an inventory and map of known significant historic and cultural resources, as well as sensitive areas where such resources are likely to occur. Work with the Rumsey and Cortina Tribes to identify sacred sites and develop a cultural sensitivity map. This information is protected as confidential under State law.

Action CO-A61: Require cultural resources inventories of all new development projects in areas where a preliminary site survey indicates a medium or high potential for archaeological, historical, or paleontological resources. In addition, require a mitigation plan to protect the resource before the issuance of permits. Mitigation may include:

- Having a qualified archaeologist or paleontologist present during initial grading or trenching;
- Redesign of the Project to avoid historic or paleontological resources;
- Capping the site with a layer of fill; and/or
- Excavation and removal of the historical or paleontological resources and curation in an appropriate facility under the direction of a qualified professional.

Solano County General Plan

Chapter 4 of the Solano County General Plan addresses resources, including “substantial historic and prehistoric sites.” Its purpose is to identify the goals and policies Solano

County will implement in its daily decision-making process to protect resources. Included in the General Plan are the following goals and policies pertaining to cultural resources:

> Goal RS.G-1: Manage and preserve the diverse land, water, and air resources of the county for the use and enrichment of the lives of present and future generations.
>
> Goal RS.G-4: Preserve, conserve, and enhance valuable open space lands that provide wildlife habitat; conserve natural and visual resources; convey cultural identity; and improve public safety.
>
> Policy RS.P-38: Identify and preserve important prehistoric and historic structures, features, and communities.
>
> Policy RS.P-39: Tie historic preservation efforts to the County's economic development pursuits, particularly those relating to tourism.
>
> Policy RS.P-40: Consult with Native American governments to identify and consider Native American cultural places in land use planning.

Additionally, the new General Plan provides implementation programs that identify specific action plans to achieve the goals and policies discussed above.

> Implementation Program RS.I-25: Require cultural resources inventories of all new development projects in areas identified with medium or high potential for archeological or cultural resources. Where a preliminary site survey finds medium to high potential for substantial archaeological remains, the County shall require a mitigation plan to protect the resource before issuance of permits. Mitigation may include:
>
> - Having a qualified archaeologist present during initial grading or trenching (monitoring); redesign of the Project to avoid archaeological resources;
> - Capping the site with a layer of fill; and/or
> - Excavation and removal of the archaeological resources and curation in an appropriate facility under the direction of a qualified archaeologist.
> - Alert applicants for permits within early settlement areas to the potential sensitivity if significant archaeological resources are discovered during construction or grading activities, such activities shall cease in the immediate area

of the find until a qualified archaeologist can determine the significance of the resource and recommend alternative mitigation.

Implementation Program RS.1-26: Work with federal and state agencies to identify, evaluate and protect the county's important historic and prehistoric resources. Programs administered by such agencies may include:

- California Historical Landmarks
- California Points of Historical Interest
- California Register of Historic Resources
- National Register of Historic Places
- State Historic Building Code

Implementation Program RS.1-27: Refer to the state Senate Bill 18 guidelines and requirements regarding cultural resources. Programs the County will engage in may include:

- Ensuring local and Native American governments are provided with information early in the planning process.
- Working with Native American governments to preserve and protect Native American cultural sites by designating them as open space where possible.
- Providing management and treatment plans to preserve cultural places, and working with Native American groups to manage their cultural places.

Implementation Program RS.1-38: Protect and promote the county's historic and prehistoric resources by:

- Providing educational programs to the public, staff, and commissions that promote awareness of the county's history and the value in preserving historic or prehistoric resources; and
- Exploring and developing historic or prehistoric sites that can be used appropriately as visitor-oriented destinations.

Implementation Program RS.1-29: Develop historic preservation programs and development guidelines to prevent the loss of significant historic buildings and structures.

3.11.3 Impacts and Mitigation Measures

General Impacts and Mitigation Measures

Impact 3.11-1: Construction Impacts to Significant Cultural Resources.

The proposed Project is located in a region where significant prehistoric and historic-era sites have been documented. The presence of documented significant (per CEQA criteria) cultural resources within the Project Area indicates that there is a possibility that additional significant sites, features, and artifacts could be discovered or disturbed as a result of Project-related ground-disturbing activities. Subsurface disturbances could potentially destroy or damage as-yet undiscovered prehistoric or historic-era cultural resources. If these resources were to represent "unique archaeological resources" or "historical resources" as defined by CEQA, a significant impact would occur.

As listed below, construction impacts could occur in the NAWCA, MacQuiddy (Lester), and Olmo-Hammond-UCD project reaches where a total of four significant (per CEQA criteria) cultural resources (P-48-017, P-48-018, P-48-112, and P-48-678) have been documented.

Mitigation Measures 3.11-1 and 3.11-2 would reduce this impact to a **less-than-significant level.**

Mitigation Measure 3.11-1: Establish a Buffer.

In order to minimize or eliminate the possibility that Project-related ground-disturbances would impact the integrity of the documented site components and/or human remains, a buffer of at least 100 feet shall be defined around the presently-mapped boundaries of each archaeological site. No ground-disturbing Project activities could occur within this buffer or the mapped site boundaries. This would reduce potential impacts to less-than-significant levels.

Mitigation Measure 3.11-2: If Unrecorded Cultural Resources are Encountered.

If an inadvertent discovery of cultural materials (e.g., unusual amounts of shell, animal bone, glass, ceramics, structure/building remains, dark soil deposits and charcoal, stone implements and flakes, etc.) is made during Project-related construction activities, ground disturbances in the area of the find shall be halted and a qualified professional archaeologist will be notified regarding the discovery. The archaeologist shall determine whether the resource is potentially significant per the CRHR and develop appropriate mitigation to protect the integrity of the resource and ensure that no additional resources

are impacted. Mitigation could include, but not necessarily be limited to preservation in-place, archival research, subsurface testing, or contiguous block unit excavation and data recovery.

Implementation of the above mitigation measure would reduce potentially significant impacts resulting from inadvertent damage or destruction of unknown cultural resources during construction to a less-than-significant level.

Impact 3.11-2: Construction Impacts to Human Remains.

Subsurface disturbances could potentially uncover unmarked historic-era or prehistoric burials. Any such disturbance would represent a significant impact.

The documented presence of human remains at several recorded sites within the Project Area (P-48-017, P-48-018, and P48-112) indicates that there is a possibility that as-yet undiscovered human remains could be unearthed during ground-disturbing activities. California law recognizes the need to protect historic-era and Native American human burials, skeletal remains, and items associated with Native American interments from vandalism and inadvertent destruction. The procedures for the treatment of Native American human remains are contained in California Health and Safety Code Section 7050.5 and Section 7052 and PRC Section 5097. If any human remains were unearthed during Project construction, a significant impact would occur. Mitigation Measure 3.11-3 would reduce this impact to a less-than-significant level.

Mitigation Measure 3.11-3: Human Remains.

The county sheriff/coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code Section 7050.5[b]). If the coroner determines that the remains are those of a Native American, he or she must contact the NAHC by phone within 24 hours of making that determination (Health and Safety Code Section 7050[c]).
Following the coroner's findings, the property owner, contractor or Project proponent, an archaeologist, and the NAHC-designated MLD shall determine the ultimate treatment and disposition of the remains and take appropriate steps to ensure that additional human interments are not disturbed. The responsibilities for acting upon notification of a discovery of Native American human remains are identified in PRC Section 5097.9.

The landowner shall ensure that the immediate vicinity (according to generally accepted cultural or archaeological standards and practices) is not damaged or disturbed by further

development activity until consultation with the MLD has taken place. The MLD shall have 48 hours to complete a site inspection and make recommendations after being granted access to the site. A range of possible treatments for the remains, including nondestructive removal and analysis, preservation in place, relinquishment of the remains and associated items to the descendants, or other culturally appropriate treatment may be discussed. Assembly Bill (AB) 2641 suggests that the concerned parties may extend discussions beyond the initial 48 hours to allow for the discovery of additional remains. AB 2641(e) includes a list of site protection measures and states that the landowner shall comply with one or more of the following:

- Record the site with the NAHC or the appropriate Information Center;
- Utilize an open-space or conservation zoning designation or easement; and/or
- Record a document with the county in which the property is located.

The landowner or their authorized representative shall rebury the Native American human remains and associated grave goods with appropriate dignity on the property in a location not subject to further subsurface disturbance if the NAHC is unable to identify a MLD or the MLD fails to make a recommendation within 48 hours after being granted access to the site. The landowner or their authorized representative may also re-inter the remains in a location not subject to further disturbance if they reject the recommendation of the MLD, and mediation by the NAHC fails to provide measures acceptable to the landowner. Adherence to these procedures and other provisions of the California Health and Safety Code and AB 2641(e) will reduce potential impacts to human remains to a less-than-significant level.

Site-Specific Impacts and Mitigation Measures

NAWCA/Mariani

If archaeological sites P-48-018, and P-48-017 were disturbed or destroyed by Project-related ground-disturbing activities, a significant impact would occur. Mitigation Measures 3.11-1 through 3.11-3 would reduce this impact to a **less-than-significant** level.

Duncan-Giovannoni

There are no known cultural resources sites in this reach. Mitigation Measures 3.11-2 and 3.11-3 would reduce impacts to any unknown cultural resources in this reach to a **less-than-significant** level.

Winters Putah Creek Nature Park

The historic Southern Pacific railroad bridge (P-48-955/P-57-642) would not be affected by Project maintenance activities in this reach. All other restoration improvements proposed for this reach have already been implemented as part of the Winters Putah Creek Project.

East of 505

There are no known cultural resources sites in this reach. Mitigation Measures 3.11-2 and 3.11-3 would reduce impacts to any unknown cultural resources in this reach to a **less-than-significant** level.

Warren

There are no known cultural resources sites in this reach. Mitigation Measures 3.11-2 and 3.11-3 would reduce impacts to any unknown cultural resources in this reach to a **less-than-significant** level.

Upper McNamara

There are no known cultural resources sites in this reach. Mitigation Measures 3.11-2 and 3.11-3 would reduce impacts to any unknown cultural resources in this reach to a **less-than-significant** level.

Lower McNamara

There are no known cultural resources sites in this reach. Mitigation Measures 3.11-2 and 3.11-3 would reduce impacts to any unknown cultural resources in this reach to a **less-than-significant** level.

MacQuiddy (Lester)

If archaeological site P-48-678 was disturbed or destroyed by Project-related ground-disturbing activities, a significant impact would occur. Mitigation Measure 3.11-1 would reduce this impact to a less-than-significant level. Impacts to unknown cultural resources in this reach would be reduced to **less than significant** by Mitigation Measures 3.11-2 and 3.11-3.

Russell Ranch

There are no known cultural resources sites in this reach. Mitigation Measures 3.11-2 and 3.11-3 would reduce impacts to any unknown cultural resources in this reach to a **less-than-significant** level.

Stevenson Bridge

Although the historic Stevenson Bridge is located within the Project Area, no potential ground-disturbing activities would have any effect on this bridge. Consequently, there would be no impacts on this historic resource. Mitigation Measures 3.11-2 and 3.11-3 would reduce impacts to any unknown cultural resources in this reach to a **less-than-significant** level.

Glide Ranch

There are no known cultural resources sites in this reach. Mitigation Measures 3.11-2 and 3.11-3 would reduce impacts to any unknown cultural resources in this reach to a **less-than-significant** level.

Nishikawa

There are no known cultural resources sites in this reach. Mitigation Measures 3.11-2 and 3.11-3 would reduce impacts to any unknown cultural resources in this reach to a **less-than-significant** level.

Olmo-Hammond-UCD

If archaeological site P-48-112 was disturbed or destroyed by Project-related ground-disturbing activities, a significant impact would occur. Mitigation Measure 3.11-1would reduce this impact to a less-than-significant level. Impacts to unknown cultural resources in this reach would be reduced to **less than significant** by Mitigation Measures 3.11-2 and 3.11-3.

I-80 to Old Davis Road

Although the historic Southern Pacific Railroad bridge is located within the Project Area, no potential ground-disturbing activities would have any effect on this bridge. Consequently, there would be no impacts on this resource and no mitigation is required. Impacts to unknown cultural resources in this reach would be reduced to **less than significant** by Mitigation Measures 3.11-2 and 3.11-3.

Old Davis Road to Mace

There are no known cultural resources sites in this reach. Mitigation Measures 3.11-2 and 3.11-3 would reduce impacts to any unknown cultural resources in this reach to a **less-than-significant** level.

Mace to Road 106A

There are no known cultural resources sites in this reach. Mitigation Measures 3.11-2 and 3.11-3 would reduce impacts to any unknown cultural resources in this reach to a **less-than-significant** level.

Road 106A to Yolo Bypass Wildlife Area

There are no known cultural resources sites in this reach. Mitigation Measures 3.11-2 and 3.11-3 would reduce impacts to any unknown cultural resources in this reach to a **less-than-significant** level.

Table 3.11-2 Summary of Recreation Impacts and Mitigation Measures

Sites	Impact 3.11-1 Construction Impacts to Significant Cultural Resources	Impact 3.11-2 Construction Impacts to Human Remains	Applicable Mitigation Measures
NAWCA/Mariani	SM	SM	MM 3.11-1, 2, 3
Duncan-Giovannoni	SM	SM	MM 3.11-2, 3
Winters Putah Creek Nature Park	LTS	LTS	n/a
East of 505	SM	SM	MM 3.11-2, 3
Warren	SM	SM	MM 3.11-2, 3
Upper McNamara	SM	SM	MM 3.11-2, 3
Lower McNamara	SM	SM	MM 3.11-2, 3
MacQuiddy (Lester)	SM	SM	MM 3.11-1, 2, 3
Russell Ranch	SM	SM	MM 3.11-2, 3
Stevenson Bridge	SM	SM	MM 3.11-2, 3
Glide Ranch	SM	SM	MM 3.11-2, 3
Nishikawa	SM	SM	MM 3.11-2, 3
Olmo-Hammond-UCD	SM	SM	MM 3.11-1, 2, 3
I-80 to Old Davis Road	SM	SM	MM 3.11-2, 3
Old Davis Road to Mace	SM	SM	MM 3.11-2, 3
Mace to Road 106A	SM	SM	MM 3.11-2, 3
Road 106A to YBWA	SM	SM	MM 3.11-2, 3

NI = no impact, LS = LTS = Less than Significant Impact, SM = Significant but mitigatable to less than significant with measures identified in this section, and SU = Significant and Unavoidable, even after mitigation.

3.12 TRANSPORTATION/TRAFFIC

This section of the Project EIR (PEIR) describes existing transportation conditions in the Putah Creek area, and examines how the proposed Project could affect transportation, traffic, and circulation along the Creek and in the surrounding area. Descriptions and analysis are based on sources including the Solano and Yolo County General Plans (and their associated Environmental Impact Reports) and the Yolo County Transportation Impact Study Guidelines (County of Yolo, 2010). For purposes of this PEIR, all public roadways intersecting or otherwise potentially impacted by the Project were reviewed. These roads are described in the Roadway Network section in the Environmental Setting. Roadways that showed a potential for significant impacts from the Project were assessed further.

The following California Environmental Quality Act (CEQA) Guidelines Appendix G transportation/traffic topic is not addressed in this PEIR because the Project has no potential to affect it:

1. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks.

3.12.1 Setting

Environmental Setting

General Transportation Setting

The Project Area is bordered to the south in many places by rural Putah Creek Road, various small farm roads to the south and north, and by more urban roadways in the cities of Winters and Davis to the north. Major arterials providing community circulation and connection to regional roadways in the Project vicinity include State Route 128 (SR 128) and the non-freeway portions of SR 113 south of Interstate 80 (I-80). Three freeways, I-80, I-505, and SR 113 serve as regional connectors in the Project Area.

<u>Roadway Network</u>

Roadway network classifications for municipalities in the Project Area are presented below, followed by descriptions of major roadways in the vicinity of the proposed Project. Roadways analyzed in this section are shown on **Figures 3.12-1A** through **3.12-1D**.

Figure 3.12-1A

Access to Project Worksites

Source: BSK Associates

Figure 3.12-1B

Access to Project Worksites

Source: BSK Associates

Figure 3.12-1C

Access to Project Worksites

Source: BSK Associates

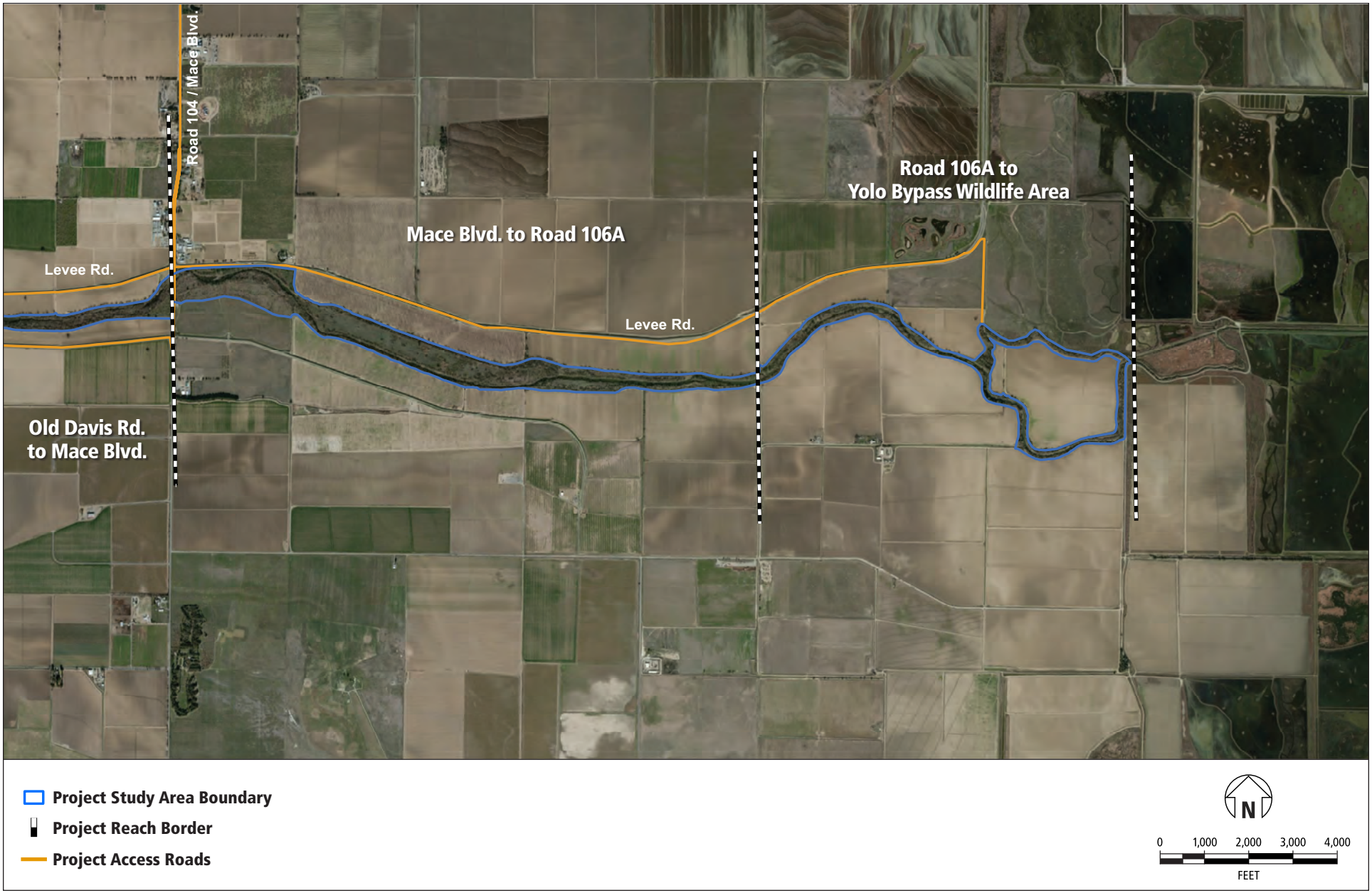


Figure 3.12-1D

Access to Project Worksites

Source: BSK Associates

Roadway Network Classifications: Solano County

Solano County's General Plan classifies the various roadway types as follows (County of Solano, 2008a, pp. TC-10 and 11):

- **Freeways:** "These facilities provide interregional connectivity and are designed for limited access operation without any signalized controls."
- **Major Arterial Roads:** "These roads, often with multiple lanes, provide the highest level of connectivity with local land uses. These facilities are usually controlled by signal operations with multiple phases."
- **Minor Arterial Roads: "**These roads provide a higher level of connectivity with the overall roadway system. They serve the same function as collectors but are intended to carry higher speeds of traffic. These typically will have signalized intersections with other minor arterials and more important roadways."
- **Collector Roads:** "These roads link local and collector roads with arterials, freeways, and other collector roads. They usually have moderate but not congested volume."
- **Local Roads:** "These roads are used primarily for access to residences, businesses, or other abutting properties. Ideally, these are paved roads with enough width to allow vehicles to operate in both directions. Local roads are identified on Figure TC-1."
- **Route of Regional Significance:** "A key roadway that meets most of the following criteria: it has significant traffic volume, it provides an important connection between cities and/or freeways and highways, it provides regional as well as local benefit, it serves as a frontage road or as a reliever route providing an alternative to the use of freeways and highways as a connection between cities, it provides access to significant job concentrations and transit centers in Solano County, it provides an improved emergency response route."

Roadway Network Classifications: Yolo County

Yolo County's General Plan classifies the various roadway types as follows (County of Yolo, 2009a, pp. CI-7, CI-12):

- **Freeway:** "Freeways are intended to serve both intra-regional and inter-regional travel. They provide no access to adjacent properties, but rather are fed traffic from county roadways by access ramps at interchanges. Freeways provide connections to other regional highways and are capable of carrying high traffic volumes. Examples include Interstate 5, Interstate 80, Interstate 505 and portions of State Route 113."
- **Arterial:** "Arterial roadways are fed by local and collector roads and provide intra-community circulation and connection to regional roadways. Arterials within the

unincorporated areas generally represent the "main street" of communities and are usually part of the regional highway system. Although their primary purpose is to move traffic, arterial roadways often provide access to adjacent properties."

- **Conventional Two-Lane Highway:** State-maintained highway facilities that "are used as primary connections between major traffic generators or as primary links in State and national highway networks. Such routes often have sections of many miles through rural environments without traffic control interruptions. Some local access to parcels may be provided, particularly in rural areas."
- **Major Two-Lane County Road:** Major two-lane county road is defined by Yolo County as "not a highway; it functions primarily as a collector facility. Major two-lane county roads serve travel that is primarily intra-county rather than of regional or statewide importance."
- **Minor Two-Lane County Road:** "By strict definition, such a facility is not a highway; it functions primarily as a collector facility. Minor two-lane county roads primarily provide access to adjacent land and travel over relatively short distances. Minor two-lane county roads primarily carry local traffic, as compared with major two-lane roads which carry intra-county traffic."
- **Local Roads:** These "provide service to adjacent land uses and connect with other local and county roads. Local roads are typically developed as two-lane undivided roadways. Local roads are only shown on the Circulation Element Diagram for orientation purposes and are not considered General Plan Roadways."

Roadway Network Classifications: City of Winters

The City of Winters General Plan classifies the various roadway types as follows (City of Winters, 1992, pp. I-4 to I-5):

- **Freeways:** These "are not considered part of the street system for classification purposes."
- **Arterial Streets:** "streets which serve major centers of activity, the highest traffic volume corridors, and longest trip desires; are integrated internally, and provide service between major rural connections."

Regional Access to Project Area

Three freeways provide regional connector access to the vicinity of the Project Area:

- I-505 provides access from the north and south and intersects the western side of the Project Area immediately east of the City of Winters;

- SR-113 provides access from the north and reaches the Project Area immediately west of the City of Davis in the eastern half of the Project Area; and
- I-80 provides access from the northeast and southwest and crosses the eastern half of the Project Area.

Regional access is also provided by non-freeway major arterials: SR 128 provides access from the east and runs to the north along the western side of the Project Area; the non-freeway segment of SR 113 (south of I-80) provides access from the south.

Roadway Network by Reach

NAWCA/Mariani

Solano County Roadways

Putah Creek Road runs east and west to the south of the southern border of the Project Area. This is a collector road (County of Solano, 2008a, Figure TC-1).

Yolo County Roadways

SR 128 runs east and west to the north of the Project Area through the City of Winters. The City of Winters classifies SR 128 as an arterial (City of Winters, 1992, pp. I-4). The Yolo County General Plan categorizes SR 128 as a conventional two-lane highway (County of Yolo, 2009a, Figure CI-1A).

Duncan-Giovannoni

Solano County Roadways

Putah Creek Road runs east and west to the south of the southern border of the Project Area.

Yolo County Roadways

SR 128 runs east and west to the north of the Project Area through the City of Winters.

Winters Putah Creek Nature Park

Solano County Roadways

Putah Creek Road runs east and west along the southern border of the Project area.

Yolo County Roadways

SR 128 runs east and west to the north of the Project area through the City of Winters.

Roadways within Both Solano and Yolo Counties

Railroad Avenue/Road 89 (Yolo County)/Winters Road (Solano County)

This road crosses the Project Area within the City of Winters. This is an arterial road in Winters (City of Winters, 1992, Figure I-1) and a collector road in both Solano and Yolo Counties (County of Solano, 2008a, Figure TC-1; County of Yolo, 2009a, Figure CI-1A).

I-505 (Reach: Winters Putah Creek Nature Park)

This road crosses the Project Area on the eastern boundary of the City of Winters and forms the boundary between this reach and the east of I-505 reach. This road has two lanes in each direction as it crosses the Project Area. It is categorized as a freeway by Solano and Yolo Counties, and the City of Winters (County of Solano, 2008a, Figure TC-1; County of Yolo, 2009a, p. CI-7; City of Winters, 1992, Figure I-1).

East of 505

Solano County Roadways

Putah Creek Road runs east and west along the southern border of the Project Area in the upstream two-thirds of the reach. In the downstream one-third of the reach, Putah Creek turns to the north, and thereafter, Putah Creek Road runs parallel to the southern border of the Project Area.

Roadways within Both Solano and Yolo Counties

I-505 (Reach: Winters Putah Creek Nature Park)

This road crosses the Project Area on the eastern boundary of the City of Winters and forms the boundary between this reach and Winters Putah Creek Nature Park Reach. This road has two lanes in each direction as it crosses the Project Area. It is categorized as a freeway by Solano and Yolo Counties, and the City of Winters (County of Solano, 2008a, Figure TC-1; County of Yolo, 2009a, p. CI-7; City of Winters, 1992, Figure I-1).

Warren

Solano County Roadways

Putah Creek Road runs east and west to the south of the southern border of the Project area.

Upper McNamara

Solano County Roadways

Putah Creek Road runs east and west along the southern border of the Project Area in the upstream half of the reach. In the downstream half of the reach, Putah Creek Road turns to the southwest and runs to the south of the southern border of the Project Area.

Lower McNamara

Solano County Roadways

Putah Creek Road runs east and west to the south of the southern border of the Project Area.

MacQuiddy (Lester)

Solano County Roadways

Putah Creek Road runs east and west to the south of the southern border of the Project Area.

Russell Ranch

Solano County Roadways

Putah Creek Road runs east and west to the south of the southern border of the Project area. Martinez Lane, a local, rural two-lane road, runs east and west approximately 0.59 miles on the southern border of the Project Area.

Yolo County Roadways

Creeksedge Road (also known as Road 8306) is a local, rural two-lane road west of Road 95A that runs east and west, on the northern boundary of the Project area.

Stevenson Bridge

Solano County Roadways

Putah Creek Road runs east and west to the south of the southern border of the Project Area. Strathgordon Lane is a local, rural two-lane road that runs east-west to the south of the southern boundary of the Project Area, in the downstream portion of the reach.

Yolo County Roadways

Creeksedge Road/Road 8306 is a local, rural two-lane road that runs east and west on the northern boundary of the Project Area.

Roadways within Both Solano and Yolo Counties

Stevenson Bridge Road/Road 95A crosses the Project Area approximately 6.04 miles west of the City of Davis. This road is categorized as a collector road in the Solano County General Plan (County of Solano, 2008a, Figure TC-1). The Yolo County General Plan defines Stevenson Bridge Road as a minor two-lane county road (County of Yolo, 2009a, Figure CI-1B).

Glide Ranch

Solano County Roadways

Strathgordon Lane is a local, rural two-lane road that runs east and west to the south of the southern boundary of the Project Area. Currey Road is a local, rural two-lane road located to the south of the southern boundary of the Project Area.

Nishikawa

Roadways within Both Solano and Yolo Counties

Pedrick Road (Lincoln Highway, Road E7) crosses the Project Area approximately 3.63 miles south-southwest of the City of Davis and forms the boundary between this reach and Olmo-Hammond-UCD Reach. This road is categorized as both a collector road and as a County Route of Regional Significance by Solano County (County of Solano, 2008a, Figure TC-1). Yolo County classifies Pedrick Road as a Major Two-Lane County Road (County of Yolo, 2009a, Figure CI-1B).

Olmo-Hammond-UCD

Solano County Roadways

Vineyard Lane is a local, rural two-lane road that runs east and west to the south of the southern boundary of the upstream one-third of this reach. Thereafter, in the downstream two-thirds of the reach, Vineyard Lane runs along the southern boundary of this reach.

I-80 crosses this reach approximately 2.5 miles southwest of the City of Davis. Although I-80 crosses through both Solano and Yolo counties, within this reach, I-80 is only in

Solano County. This road has four lanes in each direction where it crosses the Project Area. It is categorized as a freeway (County of Solano, 2008a, Figure TC-1; County of Yolo, 2009a, Figure CI-1B).

SR 113 merges with I-80 as it crosses this reach approximately 2.5 miles southwest of the City of Davis. Although SR 113 crosses through both Solano and Yolo Counties, only the Solano County portion of this road lies within this reach. This road is categorized as a major arterial by Solano County (County of Solano, 2008a, Figure TC-1).

Roadways within Both Solano and Yolo Counties

I-80 crosses the Olmo-Hammond-UCD reach approximately 2.5 miles southwest of the City of Davis. Although I-80 passes through both Solano and Yolo counties, only the Solano County portion of this highway lies within this reach.

SR 113 merges with I-80 as it crosses the Project Area, approximately 2.5 miles southwest of the City of Davis. Although SR 113 crosses through both Solano and Yolo counties, only the Solano County portion of this road lies within this reach.

Pedrick Road (Lincoln Highway, Road E7) crosses the Project Area approximately 3.6 miles south, southwest of the City of Davis and forms the boundary between this reach and Nishikawa Reach.

Levee Road runs east and west on the northern boundary of this reach. Within this reach, Levee Road is located mostly within Yolo County, with a small portion of the road located within Solano County on the downstream edge of the reach, southeast of the University Airport.

I-80 to Old Davis Road

This reach is located entirely within Solano County. In this reach, SR 113 merges with I-80 as it crosses the Project Area approximately 2.5 miles southwest of the City of Davis. Although SR 113 crosses through both Solano and Yolo Counties, only the Solano County portion of this road lies within the Project Area.

Levee Road, a two-lane rural road, runs east and west on the northern boundary of this reach. Vineyard Lane, a two-lane rural road, runs east and west on the southern boundary of this reach

Old Davis Road to Mace

This reach is located entirely within Solano County. Roadways within this reach include:

Drummond Lane, a local, rural two-lane road, runs north and south and ends at the northern boundary of this reach, approximately 2.4 miles southeast of the City of Davis.

Road 104/Mace Boulevard runs east and west along the eastern edge of this reach, approximately 3.05 miles southeast of the City of Davis. In the Project Area, this roadway forms the border between Solano and Yolo Counties, as well as between this reach and the Mace to Road 106A reach. This road is categorized as a collector road by Solano County (County of Solano, 2008a, Figure TC-1).

Levee Road, a two-lane rural road, runs east and west on the northern boundary of this reach. Another Levee Road runs east and west on the southern boundary of this reach (and has the same name as the Levee Road on the north side of the creek). It also is a two-lane rural road.

Mace to Road 106A

This reach is located entirely within Yolo County. Road 104/Mace Boulevard runs east and west along the western edge of the reach, approximately 3 miles southeast of the City of Davis. In this reach, this roadway forms the border between Solano and Yolo Counties, as well as between this reach and the Old Davis Road to Mace reach.

Road 106A, a two-lane, local, rural road, crosses this reach approximately 5.4 miles southeast of the City of Davis. Another two-lane, local, rural road, Levee Road, runs east and west on the northern boundary of this reach.

Road 106A to Yolo Bypass Wildlife Area

This reach is located entirely within Yolo County. Roadways within this reach include Levee Road, which runs east and west on the northern boundary of the reach.

<u>Roadway Level of Service Definitions</u>

The term “level of service” (LOS) is typically used to characterize traffic conditions and identify areas of congestion and highway deficiencies (County of Solano, 2008a, p. TC-12). The Transportation Research Board Highway Capacity Manual, 2000, defines six LOS using an “A” through “F” letter rating system to describe travel delay and congestion, with LOS A representing the best operating conditions, and LOS F the most

congested. **Table 3.12-1** presents the Solano County General Plan definition of LOS. The Yolo County General Plan contains similar descriptions of LOS (County of Yolo General Plan, 2009, pp. CI-3 and CI-4).

Solano County Existing Roadway Conditions

According to traffic count data presented in the Solano County 2008 Draft General Plan EIR, LOS on roads in the Solano County portion of the Project Area have an LOS ranging between A-C (County of Solano, 2008b, Table 4.4-2). **Table 3.12-2** summarizes the LOS on roadways in the vicinity of the Project Area.

Yolo County Existing Traffic Conditions

Like Solano County, LOS on roads in the Yolo County portion of the Project vicinity range between A-C (County of Yolo, 2009c, Appendix C). **Table 3.12-3** summarizes the existing traffic conditions on Yolo County roadways in the vicinity of the Project Area.

Public Transit

Yolobus is the public transit bus system serving Yolo County. Yolobus also serves a small portion of Sacramento County and Solano County in the City of Vacaville. Yolobus is the primary source of public transit near the Project Area and has multiple routes that cross the Project Area at the I-80 and SR 113 junction and at I-505. There is no bus service or bus stops within the Project Area (County of Yolo, 2009b p. 220; Yolobus, 2013).

Solano Express is the Solano Transit Authority public transit trip planning website that provides an interactive map of various transit services available in and adjacent to Solano County. Solano Express lists no transit services that stop within the Project Area (STA, 2015).

Amtrak commuter rail service is available in the City of Davis through Amtrak's Capital Corridor Line, but there is no other rail service available in the vicinity and none in the Project Area (County of Yolo, 2009a, Figure CI-4B; Capital Corridor JPA, 2015).

Bicycles and Pedestrians

The road network in the immediate vicinity of the Project Area is characterized by rural, two-lane roads. Higher capacity roadways, I-80 and I-505, pass over the Project Area, but do not provide direct access to the Project Area. There are no pedestrian facilities such as sidewalks or crosswalks, which is typical of the pedestrian network in unincorporated areas in the region (County of Solano, 2008b, p. 4.4-26).

Table 3.12-1 Solano County Definitions of Levels of Service (LOS)

LOS	Definition
A	Free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian is excellent.
B	In the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within the traffic stream from LOS A. The level of comfort and convenience provided is somewhat less than at LOS A, because the presence of others in the traffic stream begins to affect individual behavior.
C	In the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.
D	High-density, but stable, flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.
E	Operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to “give way” to accommodate such maneuvers. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable, because even small increases in flow or minor perturbations within the traffic stream will cause breakdowns.
F	Forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount that can traverse it and queues begin to form. Operations within the queue are characterized by stopping and starting. Over and over, vehicles may progress at reasonable speeds for several hundred feet or more, and then be required to stop. LOS F is used to describe operating conditions within the queue especially at the point of the breakdown, although it is noted that traffic may resume to normal conditions quite rapidly once free of the queue.

Note: See Table 4.4-3 (County of Solano, 2008b) for details regarding specific LOS traffic volumes for each roadway category and number of lanes.
Source: County of Solano. 2008b. Solano County 2008 Draft General Plan EIR, Table 4.4-2.

The following bicycle lanes occur in the Project Area:

- The Dixon-Davis Bikeway, which is approximately 6.9 miles in length and travels from I-80 in Davis to the City of Dixon (STA, 2012, pp. 21; County of Yolo, 2013, p. 8). This bikeway crosses the Project Area via Old Davis Road. This road borders the I-80 to Old Davis Road reach and the Old Davis Road to Mace Reach.
- A separated bicycle lane crosses the Project area at Stevenson Bridge Road/ Road 95A, in the Stevenson Bridge reach.

Table 3.12-2 Solano County - Existing Traffic Volume and LOS for Project Area Roads

Roadway	Direction	Location	Daily Traffic	Existing LOS
SR 128	Westbound	East of Junction SR 121 South	2,000	A-C
Road 89/Winters Road	Southbound	At Yolo County Line	1,000	A-C
I-505	Southbound	North of Allendale Road Interchange	8,000	A-C
Stevenson Bridge Road	Southbound	At Yolo County Line	<1,000	A-C
Pedrick Road/Road 98	Southbound	At Yolo County Line	1,000	A-C
SR 113	Southbound	North of I-80 (near Davis)	25,000	A-C
I-80/North Gateway	Westbound	At Yolo County Line	57,000	A-C
SR 128	Eastbound	East of Junction with SR 121 South	3,000	A-C
Road 89/Winters Road	Northbound		1,000	A-C
I-505 (North Gateway)	Northbound	North of Allendale Road Interchange	8,000	A-C
Stevenson Bridge Road	Southbound		<1,000	A-C
Pedrick Road-Road 98	Northbound		1,000	A-C
SR 113	Northbound	North of I-80 (near Davis)	26,000	A-C
I-80	Eastbound	Solano-Yolo County Line	58,000	A-C

Source: County of Yolo. 2009b. Adapted from *Solano County General Plan EIR*, Table 4.4-4, p. 4.4-8.

Table 3.12-3 Yolo County – Existing Traffic Volume and LOS for Project Area Roads

Street	Direction	Location	AM/PM Peak	Existing LOS AM/PM Peak
I-505	Northbound	Solano County Line to SR 128	330/710	A/A
I-505	Southbound	Solano County Line to SR 128	570/560	A/A
I-80	Eastbound	Solano County Line to Mace Blvd.	4,110/4,320	C/C
I-80	Westbound	Solano County Line to Mace Blvd.	4,120/4,420	C/C
SR 113	Northbound	Solano County Line to Covell Blvd.	1,030/2,270	A/C
SR 113	Southbound	Solano County Line to Covell Blvd.	2,140/1,280	C/B
Mace Blvd.		County Road 35 to County Road 32B	150*	B*
Railroad Ave.		SR 128 to Winters City Limits	470*	C*
SR 128		Railroad Avenue to I-505	930*	C*

*Daily peak hour.
Source: County of Yolo. 2009c. *Yolo County General Plan EIR*, Appendix C.

Planned Bicycle Lanes

Solano County

The Solano County Wide Bicycle Transportation Plan proposes five new bicycle lanes. These bicycle lanes are identified in **Table 3.12-4.**

Table 3.12-4 Proposed Solano County Bicycle Lane Projects

Street	From	To	Class	Length (Miles)
Pedrick Road	Solano-Yolo County Line	Sievers Road	II	2.5
Stevenson Bridge Road	County Road 95A	Sievers Road	II or III	3.5
Boyce Road	Putah Creek Road	Wolfskill Road	II	1.9
Putah Creek Road	Pleasant Valley Road	Pleasant Valley Road	II or III	12
Winters Road	Putah Creek Road	Wolfskill Road	II	1.7

Source: STA. 2012. Proposed Solano County Bikeway Network, Table 3-5B, pp. 49-67.

Yolo County

The Yolo County General Plan proposes two new bicycle lanes that would intersect the Project Area:

- A Class II bicycle lane is proposed to cross the Project Area at Stevenson Bridge Road/Road 95A (County of Yolo, 2009a, p. CI-16, Figure CI-3B).
- A Class II bicycle lane is proposed to cross the Project Area at Mace Boulevard/ County Road 104 (County of Yolo, 2009a, p. CI-16, Figure CI-3B).

Air Transportation

The closest airport to the Project Area is the Davis University Airport, located approximately 0.45 miles northeast. Other nearby airports include the Yolo County Airport (approximately 2.85 miles north), Blake Sky Park (approximately 3.36 miles south), the Nut Tree Airport in Vacaville (approximately 8.49 miles southeast), and the Watts-Woodland Airport (approximately 9.25 miles north).

Rail

An active railroad line crosses the Project area approximately 2.19 miles southwest of the City of Davis, in the I-80 to Old Davis Road reach.

Project Area Roadway Safety

None of the roadways within the Project Area have been identified as high-accident roadways by Solano or Yolo County (STA, 2005, p. 4, Figure 1; County of Yolo, 2009b, p. 218, Figure IV.C-5).

Regulatory Setting

Regional Transportation Planning

Solano County Regional Transportation Planning

The Metropolitan Transportation Commission (MTC) is the transportation planning, coordinating and financing agency for Solano County and the eight other San Francisco Bay Area Counties. Pursuant to California law (Government Code Section 66500 et seq.), the MTC is the designated Regional Transportation Planning Agency (RTPA) for the Bay Area region. Acting in this capacity, the MTC is responsible for developing and adopting regional transportation planning documents and studies, including the Regional Transportation Plan (RTP), a 20-year general plan for the region's transportation network. MTC also acts as the federally designated Metropolitan Planning Organization (MPO) for the region (MTC, 2014).

Additional county-level planning is performed by the Solano Transportation Authority, which was created in 1990 through a Joint Powers Agreement between the cities of Benicia, Dixon, Fairfield, Rio Vista, Suisun City, Vacaville, Vallejo, and the County of Solano to serve as the Congestion Management Agency (CMA) for the Solano region (STA, 2010). The STA is responsible for countywide transportation planning, programming transportation funds, managing and providing transportation programs and services, delivering projects, and setting priorities.

Yolo County Regional Transportation Planning

Regional transportation planning in Yolo County is the responsibility of the Sacramento Area Council of Governments (SACOG), an association of local governments in the six-county Sacramento region (County of Yolo, 2009a, p. CI-6; SACOG, 2015c, p. 1). SACOG is the state RTPA and the federal MPO for transportation planning in Yolo County and the greater Sacramento region (SACOG, 2015c, p. 2).

County-level transportation planning is performed by Yolo County, local cities, and the Yolo County Transportation District (County of Yolo, 2009a, p. CI-6).

Local Regulations

Solano County General Plan

Traffic and circulation issues are addressed in the Transportation and Circulation Element of the General Plan (County of Solano, 2008a, Chapter 7, pp. TC-6 and TC-7). The Element contains the following policies regarding traffic and circulation impacts that are relevant to the proposed Project.

> Policy TC.P-1: Maintain and improve current transportation systems to remedy safety and congestion issues, and establish specific actions to address these issues when they occur.
>
> Policy TC.P-4: Evaluate proposals for new development for their compatibility with and potential effects on transportation systems.
>
> Policy TC.P-9: Plan, fund, build, and improve roadways that support agriculture by providing increased connectivity across Interstate 80, including the intersection at Pedrick Road, for farmers and their equipment, and by grading and paving unimproved rural roads.
>
> Policy TC.P-10: Anticipate increases in vehicular traffic on rural roads that serve agricultural-tourist centers, value-added agricultural uses in the interior valleys, and other unique land uses; complete related roadway improvements that support the viability of such uses.

Yolo County General Plan

Traffic and circulation issues are addressed in the Circulation Element of the 2030 Countywide General Plan (County of Yolo, 2009a, pp. CI-25 to CI-26). The element contains the following objectives, policies, and standards regarding traffic and circulation impacts that are relevant to the proposed Project.

> Policy CI-1.2: Preserve and continue to develop a fully connected grid-based circulation system that distributes traffic evenly and avoids excessive concentrations of traffic in any given area.
>
> Policy CI-1.7: Coordinate with other local governments to maintain jointly owned infrastructure (e.g., County Line Road, Freeport Bridge, Putah Creek bridges).

Policy CI-1.8: Work with adjoining landowners to reduce roadway flooding.

Policy CI-1.10: Coordinate with appropriate entities to maintain the following as primary routes for emergency evacuation from Yolo County:

- Interstate 5 – North towards Redding and east into Sacramento.
- Interstate 80 – East into Sacramento and west toward Solano County and the San Francisco Bay Area.
- Interstate 505 – South to the junction of E/WB Interstate 80.
- State Route 16 – West from Woodland into the Capay Valley and then north into Colusa County.
- State Route 45 – North from Knights Landing into Colusa County.
- State Route 84 – South from West Sacramento into Solano County with one crossing east into Sacramento County across the Sacramento River.
- State Route 113/County Road 102 – North from Woodland into Sutter County and south from Davis into Solano County.
- State Route 128 – West from Winters into Napa County.
- County Road 22 – East from Woodland into West Sacramento and then into Sacramento at two locations across the Sacramento River.
- County Road 98 – South from Woodland into Solano County.

Policy CI-3.1: Maintain Level of Service (LOS) C or better for roadways and intersections in the unincorporated county. In no case shall land use be approved that would either result in worse than LOS C conditions, or require additional improvements to maintain the required level of service, except as specified below. The intent of this policy is to consider level of service as a limit on the planned capacity of the County's roadways.
(County of Yolo, 2009a, p. CI-28)

The General Plan allows a LOS worse than LOS C on certain specified roadways listed on page CI-28 to CI-30 of the Plan. General Plan maps indicate that the LOS C is the threshold for roadways in the Project Area (County of Yolo, 2010, Figure 1 (West) and Figure 1 (East) Level of Service Threshold). One exception to this is SR 128, on which LOS D is acceptable (County of Yolo, 2009a, p. CI-29).

3.12.2 Significance Criteria

CEQA Guidelines Criteria

The following thresholds for measuring a project's environmental impacts are based on CEQA Guidelines Appendix G (OPR, 2013). For the purposes of this PEIR, impacts are considered significant if the following would result from implementation of the proposed Project:

1. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit.
2. Conflict with an applicable congestion management program, including, but not limited to LOS and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways.
3. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., obstructions to and by farm equipment).
4. Result in inadequate emergency access.
5. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

Other Significance Criteria

Solano County does not have its own set of thresholds for transportation impact analysis; it follows the Appendix G CEQA Criteria listed above (County of Solano, 2014).

Yolo County Traffic Impact Study Guidelines

In 2010, Yolo County established Transportation Impact Study Guidelines (Yolo TIS Guidelines) to assess potential traffic impacts of proposed projects. The Guidelines identify specific project parameters or conditions that may trigger the need for a formal Traffic Impact Study (TIS) for a project (County of Yolo, 2010, pp. 1, 4).

Under the Yolo TIS Guidelines, the following project conditions would trigger the need for a TIS and are evaluated in this PEIR:

- If the proposed project has the potential to generate 100 new passenger vehicle trips per day or an equivalent number of truck trips (50 trips per day for 2-axle/6-tire trucks; 20 trips per day for 3- and 4-axle trucks, 5 trips per day for trucks with 5 or more axles) (County of Yolo, 2010, p. 4).
- If the proposed project has the potential to create a significant environmental impact under CEQA, including the following:
  - A proposed project fails to provide safe accommodation of forecast truck traffic or temporary construction-related truck traffic.
  - The construction of a proposed project creates a temporary but prolonged impact due to lane closures, need for temporary signals, emergency vehicles access, traffic hazards to bikes/pedestrians, damage to roadbed, truck traffic on roadways not designated as truck routes, etc.

County of Yolo, 2010, pp. 30 to 31.

LOS Thresholds

For the purposes of this PEIR, transportation impacts on LOS are considered significant under either of the following two conditions:

1. If project vehicle trips would place a roadway into a more congested LOS category than its current LOS. For example, if a roadway is currently operating at LOS C and project traffic would move the roadway to LOS D; that would be considered a significant impact.
2. If project vehicle trips would place a roadway into a lower LOS than the policy expressed in the county transportation planning documents. For Solano County, the minimum LOS standard throughout the system is LOS E (STA, 2013, p. 14). In Yolo County, the minimum standard is LOS C in most unincorporated areas, including the Project Area (see County of Yolo, 2009a, p. CI-28; County of Yolo, 2010, Figure 1 (West) and Figure 1 (East) Level of Service Threshold). The only exception to this standard within the immediate Project Area is SR 128, on which LOS D is acceptable (County of Yolo, 2009a, p. CI-29).

3.12.3 Impacts and Mitigation Measures

Project Activities and Equipment Overview

Project activities would consist of a series of short-term construction phases followed by long-term maintenance activities.

Project construction activities would typically entail the use of trucks, excavators, and rubber-tired loaders. Construction materials, including any needed ~~soil and~~ aggregate, would be hauled from a permitted quarry or borrow site located within a maximum of 30 miles of the Project Area. Fill soils would come from either the reach being constructed or adjacent reaches, and would not be imported. ~~Typically 4 to 8 trucks would be used at one time, with a maximum of six trucks being used at one time in the Project Area. Typically the trucks typically would line up and be filled as a group and run back and forth from the haul/backhaul site as a group.~~ Project construction activities would usually involve the use of 3- and 4-axle trucks, primarily standard 10-yard, 3-axle trucks, but may also involve incidental use of larger end-dump trucks or full-size semis where suitable access exists.

For ease of access and for most efficient transport of gravel and other fill material, Project activities would preferentially use Solano County roadways. In the Solano County portion of the Project Area, the maximum expected number of one-way 3- and 4-axle-truck trips would be 42 per day. This number was calculated based on experience with previous Solano County Water Agency (SCWA) stream restoration projects in the vicinity. In the Yolo County portion of the Project Area, daily 3- and 4-axle-truck trips would not exceed 19 one-way trips. Fewer trips would be needed in the Yolo County portion of the Project because most of the Project Area is more easily accessed from Solano County. For prior SCWA stream restoration projects in the vicinity, all vehicle traffic was to and from Solano County, with the possible exception of workers commuting to project sites. These maximum daily truck trip figures include both on-site off-road trucks, and trucks transporting materials to and from a material site.

Traffic impacts would be further minimized through limits on the annual scope of activities, as described in Chapter 2.0, *Project Description*. These limits cap annual Project activities at a *combined* total maximum of 640 acres per calendar year, with a typical range from 20 to 60 acres/year, with a maximum total project length of five stream miles, and a typical distance of 2 miles/year.

Access to Project Work Sites

The roadways providing the most direct access to Project work areas are located on the Solano County side of the creek; therefore, Project activities would preferentially use Solano County roadways, both for ease of access to the creek and for the transport of gravel and other fill material. The following roadway segments are anticipated to be used for access to Project work sites, and are further evaluated for potential Project impacts in this section:

Solano County

- **Putah Creek Road** from Olive School Lane to eastern end of road (dead end past Stevenson Bridge Road)
- **Vineyard Lane** from Pedrick Road to Road 104/Mace Boulevard
- **Martinez Lane** from western entrance on Putah Creek Road to Putah Creek/county line
- **Strathgordon Lane** from Stevenson Bridge Road/Road 95A to Putah Creek Road
- **Currey Road** from western end of road (dead end) to Pedrick Road

Yolo County

- **Railroad Avenue/Road 89** (Yolo County)/Winters Road (Solano County) from SR 128 to Putah Creek/county line
- **Creeksedge Road/Road 8036** (Yolo County) from western end of road to Stevenson Bridge Road/Road 95A

Yolo and Solano Counties

- **Stevenson Bridge Road/Road 95A**
  - Yolo County: from Russell Boulevard to Putah Creek/county line
  - Solano County: from Putah Creek/county line to Putah Creek Road
- **Pedrick Road** (Lincoln Hwy, Road E7)
  - Yolo County: from Russell Boulevard to Putah Creek/county line
  - Solano County: from Putah Creek/county line to SR 113
- **Road 104/Mace Boulevard**
  - Yolo County: from I-80 to Putah Creek/county line
  - Solano County: from Putah Creek/county line to Vineyard Lane
- **Levee Road** (east of SR 113)
  - Solano County: from Old Davis Road to Road 104/Mace Boulevard
  - Yolo County: Road 104/Mace Boulevard to eastern end of road (dead end at western boundary of Yolo Basin Wildlife area)
- **I-505** may be used for incidental access to the Project Area by individual haul contractors and commuting workers, but it not expected to be used for primary access to the Project Area.

General Impacts and Mitigation Measures

Impact 3.12-1: Conflict with Yolo County Transportation Planning Policies Significance Criteria.

As described above, traffic during the construction phase of the Project would be from two sources: workers in passenger vehicles driving to Project Area work sites, and trucks engaged in Project construction activities. As described above, in the Solano County portion of the Project Area, the expected maximum number of 3- and 4-axle one-way truck trips would be 42 per day during the construction period. In the Yolo County portion of the Project Area, daily 3- and 4-axle-truck trips would not exceed 19 one-way trips during construction.

Worker commute trips generated by the Project would be minimal. During both Project construction activities and operational maintenance phase activities, typically only 2 to 4 workers would access the Project Area at a time, with a maximum of six workers traveling to the Project Area per day. This would result in a maximum of 12 one-way passenger vehicle trips per day attributable to the Project.

Solano County

Based on the LOS standard (LOS E) articulated in the Solano County Congestion Management Plan¸ the Project would not have a significant impact on county roadways (STA, 2013, p. 14). The Solano County roadways anticipated to be primarily used for Project access (see list above under Access to Project Worksites/Area Detail) are two-lane rural roadway segments. Use of highways in the Project vicinity would be minimized because construction materials, including ~~any needed soil and~~ aggregate, would be hauled from sources located within 30 miles of the Project Area, <u>and fill soils would come from either the reach being constructed or adjacent reaches, and would not be imported</u>. Regardless, given that the Project's construction phase would contribute an expected daily maximum of 42 one-way 3- and 4-axle-truck trips and 12 one-way passenger vehicle trips, impacts on local highways would likely have no impact. I-505 may be used for incidental access to the Project Area by individual contractors and commuting workers, but it not expected to be used for primary access to the Project Area.

Regarding the two-lane rural roadway segments expected to be used for primary access to the Project Area during construction, in order to reach LOS E, traffic volumes on these roads would have to be greater than or equal to 27,100 average daily trips. To reach

LOS D, traffic would have to be greater than or equal to 21,300 average daily trips (County of Solano, 2008b, p. 4.4-7, Table 4.4-3). The existing estimated daily roadway volume is less than 1,000 trips (current LOS A-C) on Stevenson Bridge Road/Road 95A and 1,000 trips (current LOS A-C) on Pedrick Road (County of Solano, 2008b, p. 4.4-8). In Solano County, the Project would add no more than 12 daily one-way passenger vehicle trips during construction and operations and no more than 42 daily one-way truck trips during construction; therefore, the addition of Project trips to these roads would not exceed the County threshold.

Traffic counts are unavailable for the remaining Solano County roadways that may be used for Project access. However, given the example of the two roadways above, and given that the Project would add no more than 12 daily one-way passenger vehicle trips during construction and operations and no more than 42 daily one-way truck trips during construction, the Project trips would not cause traffic to exceed the County LOS standard.

Yolo County

Based on the LOS standard (LOS C) articulated in the Yolo County General Plan¸ the Project would not have a significant impact on county roadways (County of Yolo, 2009a, p. CI-28; County of Yolo, 2010, Figure 1 (West) and Figure 1 (East) Level of Service Threshold).

In Yolo County, the Project would add up to 12 daily passenger one-way vehicle trips during construction and operations, and no more than 19 daily one-way truck trips during construction.

Traffic counts for nearby segments of two minor two-lane highways that may be used for Project access are summarized below:

- On Mace Boulevard/Road 104 between County Road 35 and County Road 32D, the existing peak hour traffic volume is 150, with a LOS at B (County of Yolo, 2009c). To move the roadway to LOS C and have a significant impact, a project would have to bring the peak hour traffic volume to 680. Assuming traffic volumes in the Project Area are roughly equivalent, the proposed Project would not have a significant impact, because it would add no more than 12 daily passenger one-way vehicle trips during construction and operations, and no more than 19 truck trips during construction.

- On Railroad Avenue/County Road 89 between SR 128 to Winters City Limits, the existing peak hour traffic volume is 470 with a LOS at C (County of Yolo, 2009c). To move the roadway to LOS D and have a significant impact, a project would have to bring the peak hour traffic volume to 1,410. Here again, assuming traffic volumes in the Project Area are roughly equivalent, the proposed Project would not have a significant impact because it would add no more than 12 daily one-way passenger vehicle trips during construction and operations, and no more than 19 one-way truck trips during construction.

Traffic counts are unavailable for the remaining Solano County roadways that may be used for Project access. These are minor two-lane roadways, and in order to reach LOS C, these roadways would need to reach a peak hour traffic volume of 680 trips. Given the example of the two roadways above and that the Project would add no more than 12 daily passenger vehicle trips during construction and operations and no more than 42 daily truck trips during construction, trips generated by the Project would not cause these roadways to exceed the County LOS standard for significance.

The Project would not result in a significant impact according the standards articulated in the Yolo County Traffic Impact Study Guidelines (County of Yolo, 2010, pp. 4 and 30-31.):

1. The Project would generate fewer than 100 new passenger vehicle trips per day. Typically, only 2 to 4 workers would access the Project Area per day, with an expected maximum of six workers accessing the site in one day, resulting in a maximum of 12 one-way passenger vehicle trips per day.
2. The Project would generate less than 20 3- and 4-axle one-way truck trips per day within Yolo County. As stated in Chapter 2, *Project Description*, no more than 19 one-way 3-and 4-axle-truck trips per day would occur in Yolo County. Project activities would preferentially use Solano County roadways, ~~both~~ for ease of access to the creek~~, and for the transport of aggregate and other fill material~~.
3. The Project would provide safe accommodation of temporary construction-related truck traffic: If line of sight is obstructed, construction signs would be posted along the haul routes in the immediate vicinity of the Project Area, and warning signage, traffic cones, and/or flaggers may be used to minimize traffic problems and ensure public safety during construction.

The Project would not result in a significant impact according the standards articulated in the Solano County Congestion Management Plan and the Yolo County General Plan

because the Project is consistent with the LOS standards of both plans (STA, 2013, p. 14; County of Yolo, 2009a, p. CI-28; County of Yolo, 2010, Figure 1 (West) and Figure 1 (East) Level of Service Threshold). See Impact 3.12-2 below for analysis of the Project's effects related to LOS.

Impact 3.12-2: Substantially Increase Roadway Hazards.

The Project involves stream restoration activities and would not alter the roadway network or build structures or impediments on or near the roadway network or create significant roadway hazards. As described above under Project Activities and Equipment in the General Setting, during the most intensive construction activities, groups of trucks would haul aggregate or fill material to the work site with 4 to 8 trucks typically being used at one time, up to a maximum of six trucks being used at one time in the Project Area. As detailed in Chapter 2, *Project Description* safety precautions would be taken to avoid any safety hazards related to truck use: if line of sight is obstructed, construction signs would be posted along the haul routes in the immediate vicinity of the Project Area, and warning signage, traffic cones, and/or flaggers would be used to minimize traffic problems and ensure public safety during construction. Construction activities would be short-term and maintenance activities would involve only 2 to 4 workers accessing any given location within the Project Area. Consequently, Project activities would not create obstructions that would interfere with the circulation of vehicles or farm equipment; therefore, the Project would have a **less-than-significant** impact related to an increase in hazards due to a design feature or incompatible uses.

Impact 3.12-3: Adversely Affect Emergency Access.

The Project involves stream restoration activities and would not alter the roadway network or build structures or impediments on or near the roadway network or create significant roadway hazards. The Project would add no more than 12 daily passenger vehicle trips during construction and operations, and no more than 42 daily truck trips during construction (with no more than 19 in Yolo County). Consequently, Project activities would not create substantially increase traffic volumes at an intensity that would interfere with the emergency access to and from the Project Area; therefore, the Project would have **no impact** related to emergency access. No mitigation is required.

Impact 3.12-4: Adversely Affect Public Transit, Bicycle, or Pedestrian Facilities.

As described above, there are no pedestrian facilities and few bicycle facilities in the Project Area. The Project involves stream restoration activities and would not alter the roadway network. Construction activities would be short-term and maintenance

activities would involve only 2 to 4 workers accessing any given location within the Project Area. Consequently, Project activities would not prevent the development of pedestrian and bicycle facilities or interfere with the functioning of facilities; therefore, the Project would have **no impact** related to conflicts with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, and no impact on the performance or safety of such facilities. No mitigation is required.

Site-Specific Impacts and Mitigation Measures

NAWCA/Mariani

County Planning Policies and Congestion Management Program

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.12-1 above and Project-related traffic would be no higher in this reach compared to other reaches; therefore, the proposed Project would have **no impact** related to conflicts with traffic plans.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access; therefore, the Project would have a **less-than-significant** impact related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

There are no significant transit, bicycle, or pedestrian facilities located in this reach and Project activities would not prevent the development of future transit, bicycle, or pedestrian facilities; therefore, the Project would have **no impact**.

Duncan-Giovannoni

County Planning Policies and Congestion Management Program

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.12-1 above and Project-related traffic would be no higher in this reach compared to other reaches; therefore, the proposed Project would have **no impact** related to conflicts with traffic plans.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access;

therefore, the Project would have a **less-than-significant** impact related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

There are no significant transit, bicycle, or pedestrian facilities located in this reach and Project activities would not prevent the development of future transit, bicycle, or pedestrian facilities; therefore, the Project would have **no impact**.

Winters Putah Creek Nature Park

County Planning Policies and Congestion Management Program

I-505, which crosses this reach, may be used for incidental access to the Project Area by individual contractors and commuting workers, but it not expected to be a primary access route to the Project Area. Railroad Avenue/County Road 89 is a minor two-lane highway in this reach that is anticipated to be a primary Project access route. As was analyzed in Impact 3.12-1 above, on the segment of this roadway between SR 128 to the Winters City Limit, the existing peak hour traffic volume is 470 with a LOS at C (County of Yolo, 2009c). To move the roadway to LOS D and have a significant impact, a project would have to bring the peak hour traffic volume to 1,410. Assuming traffic volumes in the Project Area are roughly equivalent to those between SR 128 to the Winters City Limit, the proposed Project would not have a significant impact, given that it would add no more than 12 daily passenger one-way vehicle trips during construction and operations, and no more than 19 one-way truck trips during construction.

Additionally, except for a small portion of the reach far upstream, restoration activities have already been completed for this reach, so the only activities anticipated in this reach are maintenance, including weed control. This means that no traffic related to Project construction would occur in this reach and the only sources of Project-generated traffic would be from maintenance activities. As discussed in Impact 3.12-1, during maintenance typically only 2 to 4 workers would access the Project Area at a time, with a maximum of six (non-trucking) workers traveling to the Project Area per day. Project activities would have **no impact** related to conflicts with traffic plans.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access; therefore, the Project would have a **less-than-significant** impact related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

There are no significant transit, bicycle, or pedestrian facilities located in this reach and Project activities would not prevent the development of future transit, bicycle, or pedestrian facilities; therefore, the Project would have **no impact**.

East of 505

County Planning Policies and Congestion Management Program

I-505, which crosses this reach, may be used for incidental access to the Project Area by individual contractors and commuting workers, but it not expected to be used for primary access to the Project Area. There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impacts 3.12-1 above and Project-related traffic would be no higher in this reach compared to other reaches; therefore, the proposed Project would have **no impact** related to conflicts with traffic plans.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach, and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access, therefore; the Project would have **no impact** related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

There are no significant transit, bicycle, or pedestrian facilities located in this reach and Project activities would not prevent the development of future transit, bicycle, or pedestrian facilities; therefore, the Project would have **no impact**.

Warren

County Planning Policies and Congestion Management Program

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.12-1 above and Project-related traffic would be no higher in this reach compared to other reaches; therefore, the proposed Project would have **no impact** related to conflicts with traffic plans.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access;

therefore, the Project would have a **less-than-significant** impact related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

There are no significant transit, bicycle, or pedestrian facilities located in this reach and Project activities would not prevent the development of future transit, bicycle, or pedestrian facilities; therefore, the Project would have **no impact**.

Upper McNamara

County Planning Policies and Congestion Management Program

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.12-1 above and Project-related traffic would be no higher in this reach compared to other reaches; therefore, the proposed Project would have **no impact** related to conflicts with traffic plans.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access; therefore, the Project would have a **less-than-significant** impact related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

There are no significant transit, bicycle, or pedestrian facilities located in this reach and Project activities would not prevent the development of future transit, bicycle, or pedestrian facilities; therefore, the Project would have **no impact**.

Lower McNamara

County Planning Policies and Congestion Management Program

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.12-1 above and Project-related traffic would be no higher in this reach compared to other reaches; therefore, the proposed Project would have **no impact** related to conflicts with traffic plans.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access;

therefore, the Project would have a **less-than-significant** impact related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

There are no significant transit, bicycle, or pedestrian facilities located in this reach and Project activities would not prevent the development of future transit, bicycle, or pedestrian facilities; therefore, the Project would have **no impact**.

MacQuiddy (Lester)

County Planning Policies and Congestion Management Program

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.12-1 above and Project-related traffic would be no higher in this reach compared to other reaches; therefore, the proposed Project would have **no impact** related to conflicts with traffic plans.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access; therefore, the Project would have a **less-than-significant** impact related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

There are no significant transit, bicycle, or pedestrian facilities located in this reach and Project activities would not prevent the development of future transit, bicycle, or pedestrian facilities; therefore, the Project would have **no impact**.

Russell Ranch

County Planning Policies and Congestion Management Program

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.12-1 above and Project-related traffic would be no higher in this reach compared to other reaches; therefore, the proposed Project would have **no impact** related to conflicts with traffic plans.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access;

therefore, the Project would have a **less-than-significant** impact related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

There are no significant transit, bicycle, or pedestrian facilities located in this reach and Project activities would not prevent the development of future transit, bicycle, or pedestrian facilities; therefore, the Project would have **no impact**.

Stevenson Bridge

County Planning Policies and Congestion Management Program

Stevenson Bridge Road/Road 95A is a minor two-lane highway that is anticipated to be used as primary access for Project construction. As was analyzed in Impact 3.12-2 above, in order to attain LOS E and exceed the level of significance, traffic counts on this road would have to be greater than or equal to 27,100 average daily trips. To reach LOS D, traffic counts would have to be greater than or equal to 21,300 average daily trips (County of Solano, 2008b, p. 4.4-7, Table 4.4-3). The existing estimated daily roadway volume on this road is less than 1,000 (current LOS A-C) (County of Solano, 2008b, p. 4.4-8). In Solano County, the Project would add no more than 12 daily one-way passenger vehicle trips during construction and operations, and no more than 42 daily one-way truck trips during construction; therefore, the addition of Project trips to this road would not exceed the County threshold.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access; therefore, the Project would have a **less-than-significant** impact related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

A separated bicycle lane crosses the Project Area in this reach at Stevenson Bridge Road/Road 95A. Project activities would not interfere with the function or use of this bicycle lane. There are no other significant transit, bicycle, or pedestrian facilities located in this reach and Project activities would not prevent the development of future transit, bicycle, or pedestrian facilities; therefore, the Project would have **no impact**.

Glide Ranch

County Planning Policies and Congestion Management Program

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.12-1 above and Project-related traffic would be no higher in this reach compared to other reaches; therefore, the proposed Project would have **no impact** related to conflicts with traffic plans.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach, and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access; therefore, the Project would have a **less-than-significant** impact related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

There are no significant transit, bicycle, or pedestrian facilities located in this reach, and Project activities would not prevent the development of future transit, bicycle, or pedestrian facilities; therefore, the Project would have **no impact**.

Nishikawa

County Planning Policies and Congestion Management Program

Pedrick Road is a minor two-lane highway in this reach that is anticipated to be a primary Project access during the construction period. As was analyzed in Impact 3.12-2 above, in order to reach LOS E and exceed the level of significance, traffic counts on this road would have to be greater than or equal to 27,100 average daily trips. To reach LOS D, traffic counts would have to be greater than or equal to 21,300 average daily trips (County of Solano, 2008b, p. 4.4-7, Table 4.4-3). The existing estimated daily roadway volume is 1,000 (current LOS A-C) on Pedrick Road (County of Solano, 2008b, p. 4.4-8). In Solano County, the Project would add no more than 12 daily one-way passenger vehicle trips during construction and operations and no more than 42 daily one-way truck trips during construction; therefore, the addition of Project trips to this road would not exceed the County threshold.

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.12-1 above and Project-related traffic would be no higher in this reach compared to other reaches; therefore, the proposed Project would have **no impact** related to conflicts with traffic plans.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access; therefore, the Project would have a **less-than-significant** impact related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

There are no significant transit, bicycle, or pedestrian facilities located in this reach and Project activities would not prevent the development of future transit, bicycle, or pedestrian facilities; therefore, the Project would have **no impact**.

Olmo-Hammond-UCD

County Planning Policies and Congestion Management Program

Pedrick Road is a minor two-lane highway in this reach that is anticipated to be a primary Project access during construction. As was analyzed in Impact 3.12-2 above, in order to reach LOS E, traffic counts on this road would have to be greater than or equal to 27,100 average daily trips. To reach LOS D, traffic counts would have to be greater than or equal to 21,300 average daily trips (County of Solano, 2008b, p. 4.4-7, Table 4.4-3). The existing estimated daily roadway volume is 1,000 (current LOS A-C) on Pedrick Road (County of Solano, 2008b, p. 4.4-8). In Solano County, the Project would add no more than 12 daily one-way passenger vehicle trips during construction and operations and no more than 42 daily one-way truck trips during construction; therefore, the addition of Project trips to this road would not exceed the County threshold.

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.12-1 and Project-related traffic would be no higher in this reach compared to other reaches; therefore, the proposed Project would have **no impact** related to conflicts with traffic plans.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access; therefore, the Project would have a **less-than-significant** impact related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

There are no significant transit, bicycle, or pedestrian facilities located in this reach and Project activities would not prevent the development of future transit, bicycle, or pedestrian facilities; therefore, the Project would have **no impact**.

I-80 to Old Davis Road

County Planning Policies and Congestion Management Program

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.12-1 above and Project-related traffic would be no higher in this reach compared to other reaches therefore, the proposed Project would have **no impact** related to conflicts with traffic plans.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access; therefore, the Project would have a **less-than-significant** impact related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

An active railroad line crosses the Project Area in this reach approximately 2.19 miles southwest of the City of Davis. The Dixon-Davis Bikeway crosses the Project Area in this reach at Old Davis Road (STA, 2012, pp. 21; County of Yolo, 2013, p. 8). Project activities would not interfere with the function or use of the railroad line or the bicycle lane. There are no other significant transit, bicycle, or pedestrian facilities located in this reach and Project activities would not prevent the development of future transit; bicycle, or pedestrian facilities, therefore, the Project would have **no impact**.

Old Davis Road to Mace

County Planning Policies and Congestion Management Program

Mace Boulevard/Road 104 is a minor two-lane highway in this reach that is anticipated to be a primary Project construction access. As was analyzed in Impact 3.12-2 above, on the segment of this roadway between County Road 35 and County Road 32D the existing peak hour traffic volume is 150 with a LOS at B (County of Yolo, 2009c). To move the roadway to LOS C and have a significant impact, a project would have to bring the peak hour traffic volume to 680. Assuming traffic volumes in the Project Area are roughly equivalent to the segment between County Road 35 and County Road 32D, the

proposed Project would not have a significant impact given that the Project would add no more than 12 daily passenger one-way vehicle trips during construction and operations and no more than 19 truck trips during construction.

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.12-1 and Project-related traffic would be no higher in this reach compared to other reaches; therefore, the proposed Project would have **no impact** related to conflicts with traffic plans.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access; therefore, the Project would have a **less-than-significant** impact related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

The Dixon-Davis Bikeway crosses the Project Area in this reach at Old Davis Road (STA, 2012, pp. 21; County of Yolo, 2013, p. 8). Project activities would not interfere with the function or use of this bicycle lane. There are no other significant transit, bicycle, or pedestrian facilities located in this reach and Project activities would not prevent the development of future transit, bicycle, or pedestrian facilities; therefore, the Project would have **no impact**.

Mace to Road 106A

County Planning Policies and Congestion Management Program

Mace Boulevard/Road 104 is a minor two-lane highway in this reach that is anticipated to be a primary Project construction access. As was analyzed in Impact 3.12-2 above, on the segment of this roadway between County Road 35 and County Road 32D the existing peak hour traffic volume is 150 with a LOS at B (County of Yolo, 2009c). To move the roadway to LOS C and have a significant impact, a project would have to bring the peak hour traffic volume to 680. Assuming traffic volumes in the Project Area are roughly equivalent to the segment between County Road 35 and County Road 32D, the proposed Project would not have a significant impact given that it would add no more than 12 daily passenger one-way vehicle trips during construction and operations, and no more than 19 truck trips during construction.

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.12-1 and Project-related traffic would be no higher

in this reach compared to other reaches; therefore, the proposed Project would have **no impact** related to conflicts with traffic plans.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access; therefore, the Project would have a **less-than-significant** impact related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

There are no significant transit, bicycle, or pedestrian facilities located in this reach and Project activities would not prevent the development of future transit, bicycle, or pedestrian facilities; therefore, the Project would have **no impact**.

Road 106A to Yolo Bypass Wildlife Area

County Planning Policies and Congestion Management Program

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.12-1 above and Project-related traffic would be no higher in this reach compared to other reaches; therefore, the proposed Project would have **no impact** related to conflicts with traffic plans.

Roadway Hazards and Emergency Access

There are no unusual conditions in this reach and no unusual aspects of Project activities that would result in increased roadway hazards or decreased emergency access; therefore, the Project would have a **less-than-significant** impact related to increased roadway hazards or adverse effects on emergency access.

Transit, Bicycle, and Pedestrian Facilities

There are no significant transit, bicycle, or pedestrian facilities located in this reach and Project activities would not prevent the development of future transit, bicycle, or pedestrian facilities; therefore, the Project would have **no impact**.

Table 3.12-5 Summary of Transportation/Traffic Impacts and Mitigation Measures

Reach	Impact 3.12-1 County Planning Policies	Impact 3.12-2 Roadway Hazards	Impact 3.12-3 Emergency Access	Impact 3.12-4 Transit, Bicycle, Pedestrian Facilities	Applicable Mitigation Measures
NAWCA/Mariani	NI	LTS	NI	NI	N/A
Duncan-Giovannoni	NI	LTS	NI	NI	N/A
Winters Putah Creek Nature Park	NI	LTS	NI	NI	N/A
East of I-505	NI	LTS	NI	NI	N/A
Warren	NI	LTS	NI	NI	N/A
Upper McNamara	NI	LTS	NI	NI	N/A
Lower McNamara	NI	LTS	NI	NI	N/A
MacQuiddy (Lester)	NI	LTS	NI	NI	N/A
Russell Ranch	NI	LTS	NI	NI	N/A
Stevenson Bridge	NI	LTS	NI	NI	N/A
Glide Ranch	NI	LTS	NI	NI	N/A
Nishikawa	NI	LTS	NI	NI	N/A
Olmo-Hammond-UCD	NI	LTS	NI	NI	N/A
I-80 to Old Davis Road	NI	LTS	NI	NI	N/A
Old Davis Road to Mace	NI	LTS	NI	NI	N/A
Mace to Road 106A	NI	LTS	NI	NI	N/A
Road 106A to YBWA	NI	LTS	NI	NI	N/A

Notes: NI = No Impact, LTS = Less than Significant Impact.

4. ALTERNATIVES TO THE PROJECT

This chapter describes the environmental impacts of three alternatives to the proposed Project, including the California Environmental Quality Act (CEQA) mandated No Project Alternative and two "build" alternatives. This chapter also compares each alternative with respect to meeting the Project objectives, and identifies the environmentally superior alternative.

4.1 GENERAL CEQA REQUIREMENTS

CEQA requires an Environmental Impact Report (EIR) to consider a reasonable range of alternatives to the proposed project. The alternatives considered should feasibly attain most of the basic objectives of the project, but will avoid or substantially lessen any of the identified significant environmental effects (CEQA Guidelines Section 15126.6(a)).

CEQA provides the following guidelines for discussing project alternatives:

- An EIR need not consider every conceivable alternative to a project. Rather, it must consider a reasonable range of potentially feasible alternatives that will foster informed decision-making and public participation (Section 15126.6(a)).
- An EIR is not required to consider alternatives that are infeasible (Section 15126.6(a)).
- The discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project (Section 15126.6(b)).
- The range of potential alternatives to the proposed project shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects (Section 15126.6(c)).
- The EIR should briefly describe the rationale for selecting the alternatives to be discussed (Section 15126.6(c)).
- The EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project (Section 15126.6(d)).
- The specific alternative of "no project" shall also be evaluated along with its impact. The purpose is to allow decision makers to compare the impacts of approving the

proposed project with the impacts of not approving the proposed project (Section 15126.6(e)(1)).

- If the environmentally superior alternative is the "No Project" Alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives (Section 15126.6(e)(2)).

4.2 RELATIONSHIP TO PROJECT OBJECTIVES

The principal objectives of the Putah Creek Restoration Projects – Upper Reach Program, are summarized in **Table 4-1**. These objectives provide benchmarks for the comparative alternatives analysis.

Table 4-1 Project Objectives

GOAL: ENHANCE HABITATS FOR DELTA NATIVE FISHES AND WILDLIFE WITHIN THE PUTAH CREEK RESTORATION PROJECT UPPER REACH PROGRAM	
Objective 1	Provide for effective fish passage for essential life history stages – i.e., structural passage and recruitment and emigration flows – on Putah Creek above the Yolo Bypass Wildlife Area (YBWA) to upstream spawning grounds below the Putah Diversion Dam (PDD)
Objective 2	Restore, enhance, and maintain spawning and rearing physical habitats and processes on Putah Creek below the PDD
Objective 3	Provide necessary flow regimes and water quality conditions to support anadromous and other native Delta fishes on Putah Creek
Objective 4	Incorporate natural planform and cross sectional geomorphology that supports structural habitat complexity and natural hydrologic, geomorphic, and ecological processes
Objective 5	Maintain and enhance native riparian vegetation communities along Putah Creek below the PDD
Objective 6	Maintain a balance of existing fish and wildlife habitats, hunting, fishing, wildlife viewing, and other public benefits, including water supply and agriculture, between the PDD and YBWA

4.3 ALTERNATIVES CONSIDERED BUT REJECTED FROM FURTHER EVALUATION

A broad range of alternatives was considered for the restoration of Putah Creek. Two of these alternatives (restoration of the pools only, and a reduced-restoration alternative) were carried forward for further review in this EIR. The following alternatives were considered and eliminated from further evaluation because of cost, feasibility, and/or lack of effectiveness in meeting the Project objectives.

- A full restoration alternative from Lake Berryessa to the YBWA was considered and eliminated because it would have required reconfiguration of the PDD and impacted

an existing high-value public park, Lake Solano County Park, rendering it very costly, as well as technically and politically challenging.

- **Bank Protection Only Alternative**: The most common means of channel rehabilitation and restoration is bank protection, typically performed with extended rock revetment (rip-rap). This approach has been used in several locations in California and the Sacramento River Watershed in particular. This alternative would be aimed at preventing erosion and flow problems and improving habitat water quality to fulfill Project Objective 2 (to restore, enhance, and maintain spawning and rearing physical habitats and processes in the Project Area).

  Under this alternative the stream would be mapped on an annual or semi-annual basis for locations where bank erosion is occurring and assessing the relative rate of bank loss over time, followed by implementation of appropriate bank stabilization measures (such as rock revetments) at identified problematic areas locations. A spot-repair maintenance program also would be established.

  The rock revetments would protect the stream bank from further erosion and would mostly follow the existing bank line. This work would require sloping (cutting back) the existing near-vertical eroding bank to a slope that would allow the stable placement of rock. The rock footing would be extended to a depth of at least 5 feet below the existing average thalweg (low point of the stream) to prevent undercutting during high flows. The average top of armor elevation would be 3 feet (above the Ordinary High Water Mark), and the minimum thickness would be 3 feet.

  This alternative would reduce, but not entirely avoid bank failures. It would not address the "underfit stream" impacts on fish habitat and water quality, nor would it remedy the adverse effects on habitat and water quality of the existing large, deep pools. In addition, extending the rock revetment beyond the limited minor bank protection proposed as part of the Project would incur significantly higher costs and result in the potential for significantly more environmental degradation than the alternatives being considered, and has not been demonstrated to be more effective than the proposed approach.

- **Reoperation of the Solano Project**: This alternative involves reoperation of the Solano Project to modify the flow regime in Putah Creek. It is aimed at improving flow, habitat, and water quality conditions to meet Objective 3 (to provide necessary flow regimes and water quality conditions to support anadromous and other native Delta fishes on Putah Creek). This alternative is legally infeasible because flows on Putah Creek are subject to the flow regime instituted under the legally binding Putah Creek Accord, which took several years to negotiate and would be extremely difficult to

modify in any reasonable time frame (see Section 3.1, *Hydrology,* and Chapter 2, *Project Description*, for additional information on the Putah Creek Accord).

- **Establish a Regional Park Associated with Restoration**: There are several existing parks and public access areas along the creek: Lake Solano County Park immediately upstream of the proposed Project, a large city park in the Creek's upper reaches in Winters, a large public restoration area at Mace Road, and a limited-access Wildlife Refuge at the downstream end of the Project Area. Additional land and waterway area could be added to this existing network of recreational and open space areas, completing a continuous or nearly continuous regional park. This alternative is aimed at fulfilling Objective 6 to maintain a balance of existing fish and wildlife habitats, hunting, fishing, wildlife viewing, and other public benefits, including water supply and agriculture, within the Project Area. However, no funding exists for the establishment of a park, no parties are likely to be willing to take the liability involved, and expanded public access may result in conflicts with adjacent land uses.

4.4 ALTERNATIVES EVALUATED IN THIS EIR

Because the Putah Creek Restoration Project Program EIR (PEIR) is a Program-level EIR, all alternatives are described and evaluated at a program level. The focus is on alternatives that avoid or minimize significant environmental impacts of the proposed Project. As detailed below, this EIR addresses the CEQA-mandated No Project Alternative, as well as two "build" alternatives; Pool Filling Only and Reduced-Project Alternative.

4.5 ALTERNATIVES ANALYSIS

4.5.1 Alternative 1 – No Project

Description

The No Project Alternative analyzes the environmental effects of the future conditions along the Project reach absent the Project. This alternative assumes that the Project Area would remain in its current condition as a degraded-habitat stream corridor. Unlike the proposed Project, the No Project Alternative would not catalyze funding by creating a series of "shovel-ready" projects. Although some restoration projects may occur in the proposed Project's absence, but the number of likely future restoration projects and their scale is dependent on episodic funding which is not predictable. This alternative assumes nominal restoration but ongoing implementation of existing maintenance activities such as irrigation to establish native vegetation, management of non-native vegetation (including manual and mechanical removal and chemical control), and maintenance of long-term access points (see Table 2-2 in Chapter 2).

Environmental Impacts

The following discussion analyzes potential effects of the No Project Alternative and compares them to impacts of the proposed Project.

Hydrology

Potentially significant short-term construction impacts to erosion and stormwater drainage systems would be avoided under this alternative. However, long-term bank stabilization proposed as part of the Project may not be implemented.

Water Quality

Potentially significant short-term water quality impacts (increased turbidity) from Project construction activities and post-restoration (until bank vegetation is re-established) would not occur under this alternative. Long-term Project benefits (including increased dissolved oxygen and decreased water temperature due to conversion of overly large pools to new riffles and runs) would either not occur, or would occur in a more limited, piecemeal fashion.

Geology and Soils, and Mineral Resources

As with the proposed Project, no impacts related to erosion, geologic or seismic hazards, or bank instability) would occur under this alternative because no restoration activities would occur.

Biological Resources

Potentially significant impacts to special status wildlife species associated with restoration would be eliminated under this alternative because the Project Area would not be subject to disturbance from restoration or maintenance activities. Under this alternative, existing habitat deterioration would continue to adversely affect biological resources in parts of the Project Area, depending on funding available for maintenance and periodic restoration activities.

Air Quality and Greenhouse Gas Emissions

This alternative would reduce or eliminate the Project's air pollutant and greenhouse gas (GHG) emissions associated with construction equipment and traffic, and soil disturbance, depending on funding available for maintenance and periodic restoration activities.

Noise

The short-term impacts of noise generated by restoration activities would not occur under this alternative. Therefore, this alternative would reduce or eliminate construction noise, depending on funding available for maintenance and periodic restoration activities.

Hazards and Hazardous Materials

The Project's potential short-term impacts associated with release of hazardous materials from construction equipment and other restoration activities and from fire hazards would be reduced or eliminated under this alternative, depending on funding available for maintenance and periodic restoration activities.

Land Use and Agricultural Resources

As with the proposed Project, the No Project Alternative would have **no impact** on land use, and no mitigation would be required.

The existing agricultural land adjacent to the creek would remain unaffected by construction activities under this alternative, resulting in **no impact** to agricultural resources.

Aesthetics

This alternative would eliminate or reduce impacts to visual resources compared to the Project, depending on funding available for maintenance and periodic restoration activities. However, the Project's long-term improvements to visual quality from the better-fit channel and associated new riparian vegetation in the channel would not occur, or be reduced, depending on funding available for maintenance and periodic restoration activities.

Recreation

This alternative would have reduced or no effects on formal or informal recreation, depending on funding available for maintenance and periodic restoration activities. The Project's construction-related impacts to recreation access in the Stevenson Bridge and UC Davis areas would be avoided. Existing recreation uses would continue.

Cultural Resources

Potentially significant but mitigable impacts to cultural or archaeological resources resulting from Project restoration activities would be eliminated or reduced under this alternative, depending on funding available for maintenance and periodic restoration activities.

Transportation/Traffic

Under Alternative 1, the Project's temporary construction traffic would be reduced or eliminated, depending on funding available for maintenance and periodic restoration activities.

Public Services

As with the proposed Project this alternative would not generate a need for new law enforcement facilities, fire protection facilities and equipment.

Utilities

The Project's potential impacts to stormwater drainage facilities and buried pipelines would not occur under this alternative, or would be reduced, depending on funding available for maintenance and periodic restoration activities.

Relationship of Alternative 1 to Project Objectives

This alternative would not fully meet any of the Project objectives. Degraded conditions associated with the deep pools would not be remedied, or may be partially remedied depending on funding available for maintenance and periodic restoration activities. Existing erosion and habitat degradation associated with non-native vegetation and invasive weeds would likely continue.

4.5.2 Alternative 2 – Pool Filling Only

Description

This alternative limits restoration activities to only re-contouring the channel to remove approximately 112.5 acres of wide, deep pools in the Project Area. These pools would be converted to stream or riparian habitat and are located in the Duncan-Giovannoni, Upper McNamara, Lower McNamara, Russell Ranch, Stevenson Bridge, Glide Ranch, Olmo-Hammond-UC Davis, Old Davis Road to Mace, Mace to Road 106A, and Road 106A to YBWA reaches. No Project-wide channel re-construction or restoration would occur. This alternative assumes nominal restoration but ongoing implementation of existing maintenance activities such as irrigation to establish native vegetation, management of non-native vegetation (including manual and mechanical removal and chemical control), and maintenance of long-term access points (see Table 2-2 in Chapter 2).

Alternative 2 could feasibly accomplish significant restoration of areas with the worst aquatic habitat and water quality effects. The pools degrade habitat and water quality by creating areas of shallow, low-flow water exposed to sunlight, which warms the water to

temperatures not conducive to native fishes, reduces the amount of dissolved oxygen in the water, and increases the amount of bioavailable mercury in the creek (see Section 3.2, *Water Quality*). Conversion of the pools to new stream riffles and runs would reverse these conditions, as well as increase the amount of spawning gravel available for salmonids, promote the growth of native fish species, and inhibit the spread of nonnative fish species (see Section 3.4, *Biological Resources*).

Environmental Impacts

The following discussion analyzes potential effects of **Alternative 2 – Pool Filling Only** compared to the proposed Project.

Hydrology

Alternative 2 would result in reduced, but still potentially significant, short-term construction impacts to hydrologic conditions, including erosion, siltation, and stormwater drainage systems compared with the proposed Project. These impacts would be similarly mitigated for both this alternative and the proposed Project, reducing this Alternative's impacts on hydrology to a **less-than-significant** level with mitigation, as with the proposed Project..

Water Quality

Alternative 2 would result in reduced, but still potentially significant, short-term construction impacts to water quality conditions, including siltation, and introduction of other potential pollutants into the creek. Mitigation related to erosion and sediment, mercury methylation, and herbicide use would still be required, reducing this Alternative's impacts on water quality to a **less-than-significant** level with mitigation, as with the proposed Project.. As with the proposed Project, filling the pools would improve water quality by increasing the amount of dissolved oxygen in the water, lowering water temperature, and decreasing the amount of bioavailable mercury in the creek. However, enhanced stream shading along non-pool reaches associated with the reduced stream channel and new riparian vegetation would not be achieved.

Geology and Soils, and Mineral Resources

Reduced construction activities under this alternative compared with the proposed Project would reduce erosion. Erosion control mitigation would still be required, reducing this Alternative's impacts on Geology and Soils to a **less-than-significant** level with mitigation, as with the proposed Project. As with the proposed Project, Alternative 2 would have **no impact** on Mineral Resources.

Biological Resources

Similar to the proposed Project, Alternative 2 would subject the Project Area to in-channel disturbance and restoration activities, leading to potentially significant impacts to several special status wildlife species including: song sparrow (Modesto Population), the Valley elderberry longhorn beetle (VELB), Swainson's hawk, western pond turtle, giant garter snake, pacific lamprey, and the white-tailed kite. Given the emphasis of this alternative on eliminating deep pools, the relative long-term aquatic impacts would be the same as the proposed Project: for instance, both would increase spawning gravels for salmonids and decrease water temperatures to promote native fish species. However, limiting restoration to the pool areas would not create as much improved fish-spawning habitat as would the proposed Project. In addition, the underfit creek's adverse effects on fish habitat and spawning access would not be improved outside of the pool areas. The proposed Project's temporary construction-related impacts to riparian habitat would be lessened, because less area would be subject to construction activities. Under the proposed Project, all biological impacts would be reduced to a less-than-significant level through the application of mitigation measures. Under Alternative 2, similar mitigation would also be required, resulting in a **less-than-significant** impact after mitigation.

Air Quality and Greenhouse Gas Emissions

The reduced construction activities from Alternative 2 would reduce emissions from mobile sources because fewer haul truck and worker commuter trips would be required, and in-channel construction equipment operations would be reduced. The reduced emissions from mobile sources and construction equipment with this alternative reduce generation of dust (particulate matter), other criteria pollutant emissions, and GHG emissions compared with the proposed Project. However, since construction activities would still occur, Best Management Practices (Mitigation 3.3-1) would still need to be implemented. Alternative 2 would result in a **less-than-significant** impact after mitigation.

Noise

Alternative 2 would result in the same construction noise levels as the proposed Project, but would reduce the number of noise receptors because construction areas would be more limited. Temporary construction noise increases would remain significant and unavoidable when construction is within 400 feet of residences, and construction noise would exceed Solano County noise standards if construction occurs within 150 feet of homes in Solano County. Thus, Alternative 2 would result in a **significant and unavoidable** noise impact during construction.

Hazards and Hazardous Materials

Potential short-term impacts associated with release of hazardous materials from construction equipment and other restoration activities, and from fire hazards would remain under this alternative, but would be reduced compared with the proposed Project because of the reduced level of construction activity. As with the proposed Project, all impacts related to hazards and hazardous materials would be reduced to a l**ess-than-significant** level through the application of the same mitigation measures identified in the DEIR.

Land Use and Agricultural Resources

This alternative would have similar but reduced impact associated with conflicts with adjacent land uses compared with the proposed Project.

Alternative 2 would result in a reduced, but still potentially **significant but mitigable** impact to agricultural resources, as with the proposed Project.

Aesthetics

This alternative would substantially reduce the amount of vegetation removal compared with the proposed Project, which would result in reduced aesthetic impacts from restoration activities than with the proposed project. Similar mitigation would likely be required to address potential aesthetic impacts in areas proposed for construction. As with the proposed Project, Alternative 2 would have a **less-than-significant** impact after mitigation.

Recreation

This alternative would have similar but reduced effects on formal and informal recreation compared with the Project. Construction-related impacts to recreation access in the Stevenson Bridge and UC Davis areas would still occur, as with the proposed Project. This Alternative's impacts on Recreation resources would be reduced to a **less-than-significant** level with mitigation, as with the proposed Project..

Cultural Resources

Similar to the proposed Project, construction of Alternative 2 would subject the Project Area could result in significant impacts to any cultural or archaeological resources near the pool sites. However, because the area that would be disturbed would be less under this alternative than with the proposed Project, this impact would be less than with the proposed Project. As with the proposed Project, mitigation would result in a **less-than-significant** cultural resources impact.

Transportation/Traffic

Under both Alternative 2 and the proposed Project, all potential impacts related to transportation and traffic would be **less than significant**, and no mitigation measures would be required. However, Alternative 2 would reduce impacts related from temporary construction traffic and associated roadway hazards because it would reduce haul-truck trips, and be geographically more limited than the proposed Project.

Public Services

As with the proposed Project, Alternative 2 would have minimal impacts to police, fire and other public services providers.

Utilities

As with to the proposed Project, potential impacts to stormwater drainage facilities and to buried pipelines could occur under this alternative, but would it is likely that fewer facilities may be affected because this Alternative would have a reduced footprint. As with the proposed Project, all potentially significant impacts related to utilities would be mitigated to a **less-than-significant** level.

Relationship of Alternative 2 to Project Objectives

The alternative would meet a number of the Project's objectives: it would fulfill Objective 2 (restore, enhance, and maintain spawning and rearing physical habitats in the Project Area) by improving water quality and promoting much better habitat conditions for most, but not all of the native aquatic species.

However, Alternative 2 would not fully meet Objective 4 throughout the Project length (Incorporate natural channel morphology that supports structural habitat complexity and natural hydrologic, geomorphic, and ecological processes) because non-pool areas with excessively wide channels would not be restored. In addition, this alternative would not provide as much floodplain habitat expansion as the proposed Project.

This alternative also would not fully fulfill Objective 5 (Maintain and enhance native riparian vegetation communities along the Project Area) because restoration areas would be reduced and the expanded weed control associated with the Project would not be implemented.

Additionally, this alternative would not meet the integrative restoration needs of the creek system as a whole. Therefore, Alternative 2 would be less consistent with project objectives than the proposed Project.

4.5.3 Alternative 3 – Reduced Project Alternative

Description

This alternative focuses all of the proposed potential restoration activities in the four reaches from PDD to the Interstate 505 (I-505) bridge (NAWCA/Mariani, Duncan-Giovannoni, Winters Putah Creek Nature Park, and East of I-505), a distance of approximately 4 miles. Alternative 3 construction activities would be completed over a 2-year period, 2 miles per year to accomplish the channel reconfiguration and vegetation management to cover essentially the entire footprint of the creek. The two-year time frame would allow for the most efficient use of equipment, time, and funding.

This alternative was selected instead of a downstream Reduced Project Alternative because upstream areas of the creek contain colder water and higher quality fisheries habitat than downstream, resulting in better project results with respect to fishery enhancement, and the most efficient use of funding. In addition, it is generally the best ecological practice to work upstream to downstream rather than vice-versa, where possible. This alternative would provide very high value aquatic and riparian habitat for the colder water species and a contiguous corridor for movement of terrestrial species, linking to the existing high quality PDD habitat to the Berryessa riparian corridor. This alternative could feasibly accomplish a number of Project Objectives while reducing the proposed Project's significant and unavoidable noise impacts.

Environmental Impacts

The following discussion analyzes potential effects of **Alternative 3 – Reduced Project Alternative** compared to the proposed Project.

Hydrology

Compared to the proposed Project, Alternative 3 would substantially reduce the area of grading and fill but would still require erosion-control mitigation. As with the proposed Project, impacts to hydrology from Alternative 3 would be **less than significant** after mitigation.

Water Quality

Compared to the proposed Project, Alternative 3 would reduce the total area where grading and fill would occur. However, it would still require mitigation related to erosion and sediment, mercury methylation, and herbicide use. As with the proposed Project, impacts on water quality from Alternative 3 would be **less than significant** after mitigation and, in the long-term, improved compared with existing conditions.

Geology and Soils, and Mineral Resources

Compared to the proposed Project, Alternative 3 would have greater short-term impacts on erosion and siltation because it concentrates all of the short-term project impacts in a narrower area over a shorter two-year timeframe. This could lead to cumulative sediment impacts. Similar erosion control mitigation would still be required, reducing this Alternative's impacts on Geology and Soils to a **less-than-significant** level with mitigation, as with the proposed Project. As with the proposed Project, Alternative 3 would have **no impact** on Mineral Resources.

Biological Resources

Similar to the proposed Project, Alternative 3 would subject the Project Area to in-channel disturbance and restoration activities, leading to potentially significant impacts to several special status wildlife species including: song sparrow (Modesto population), the Valley elderberry longhorn beetle (VELB), Swainson's hawk, western pond turtle, and the white-tailed kite. However, a smaller area than the proposed Project (4 acres rather than 24.2 miles) would be potentially affected under Alternative 3.

This alternative also would eliminate the deep pools in the restored reaches and have positive long-term aquatic impacts such as increasing spawning gravels for salmonids and decreasing water temperatures to promote native fish species, but these positive effects would also be limited to a smaller area.

As with the proposed Project, all biological impacts would be reduced to a less-than-significant level through the application of mitigation measures. Under Alternative 3, similar mitigation would also be required, resulting in a **less-than-significant** impact after mitigation.

Air Quality and Greenhouse Gas Emissions

The reduced construction activities from Alternative 3 would reduce emissions from mobile sources because fewer haul truck trips and worker commuter trips would be required. This alternative would also reduce emissions from construction equipment because less equipment would be needed and the needed equipment would be used for a shorter duration compared with the proposed Project. However, since construction activities would still occur, Best Management Practices (Mitigation Measure 3.3-1) would still need to be implemented. Alternative 3 would result in a **less-than-significant** impact after mitigation, as would the proposed Project.

Noise

Alternative 3 would result in the same construction noise levels as the proposed Project, but the reduced construction corridor would substantially reduce the number of receptors at which impacts would occur. Temporary construction noise increases would remain significant and unavoidable when construction is within 400 feet of residences, and construction noise would exceed Solano County noise standards if construction occurs within 150 feet of homes in Solano County. Thus, Alternative 3 would result in a **significant and unavoidable** noise impact, as would the proposed Project.

Hazards and Hazardous Materials

Potential short-term impacts on the Project Area associated with release of hazardous materials from construction equipment and other restoration activities and from fire hazards would remain under this alternative. As with the proposed Project, all impacts related to hazards and hazardous materials would be reduced to a less-than-significant level through the application of mitigation measures.

Land Use and Agricultural Resources

This alternative would have similar but reduced impact associated with conflicts with adjacent land uses compared with the proposed Project.

Alternative 3 would result in a **significant but mitigable** impact to agricultural resources, as with the proposed Project, but the acreage that could be affected by this alternative would be reduced compared with the Project.

Aesthetics

This alternative would remove less vegetation than the proposed Project, which would result in reduced temporary aesthetic impacts from restoration activities than with the proposed Project. Similar mitigation would likely be required to address potential aesthetic impacts. Long-term aesthetic improvements to the non-restored areas would not occur. As with the proposed Project, Alternative 3 would have a **less-than-significant** impact after mitigation.

Recreation

This alternative would have reduced effects on formal and informal recreation compared with the Project. The Project's construction-related impacts to recreation access upstream would be limited to areas upstream of the I-505 bridge. Impacts to recreation would be s**ignificant but mitigable**, as with the proposed Project.

Cultural Resources

Because the area that would be disturbed would be reduced compared with the proposed Project, impacts to potential cultural resources would be less than with the proposed Project, and limited to the upper 4 miles of the Project Area. As with the proposed Project, mitigation also would reduce this impact to a **less-than-significant** level.

Transportation/Traffic

Similar to the proposed Project, Alternative 3 would result in temporary construction traffic and potential short-term increases in roadway hazards. However, under this alternative, these impacts would be less than the proposed Project because Alternative 3 would limit project impacts to the upper 4 miles of the Project Area. As with the proposed Project, all potential impacts related to transportation and traffic would be **less than significant**, and no mitigation measures would be required.

Public Services

As with the proposed Project, Alternative 3 would have **less-than-significant** impacts to police, fire and other public services providers.

Utilities

As with to the proposed Project, potential impacts to stormwater drainage facilities and to buried pipelines could occur under this alternative, but would be lessened because this Alternative would perform activities over a smaller area. As with proposed Project, all potential adverse impacts related to utilities would be reduced to a **less-than-significant** level through the application of mitigation measures.

Relationship of Alternative 3 to Project Objectives

The alternative would meet a number of project objectives: it would fulfill Objective 2 (restore, enhance, and maintain spawning and rearing physical habitats in the Project Area) by improving water quality and promoting much better habitat conditions for native aquatic species, but it would do so over a much more limited area (4 miles) than the proposed Project (24.2 miles), focusing all of the proposed potential restoration activities in the reaches from PDD to the I-505 bridge. This alternative would provide very high value aquatic and riparian habitat to the colder water species and a contiguous corridor for movement of terrestrial species, linking to the existing high quality PDD to Berryessa riparian corridor.

This alternative would meet Objective 4 (Incorporate natural planform and cross sectional geomorphology that supports structural habitat complexity and natural hydrologic, geomorphic, and ecological processes). This alternative has the disadvantage that it would not provide as much restored floodplain riparian habitat expansion as the proposed Project. It also would not fill pools or otherwise improve habitat downstream of the I-505 bridge.

This alternative would fulfill Objective 5 (Maintain and enhance native riparian vegetation communities along the Project Area) because, like the proposed Project, it would implement a suite of vegetation management activities that would reduce the invasive weeds along and in the creek. However, it would do so over a much more limited area than the proposed Project.

Alternative 3 would not meet Objective 6 (Maintain a balance of existing fish and wildlife habitats, hunting, fishing, wildlife viewing, and other public benefits, including water supply and agriculture, between the PDD and YBWA) because it would not perform activities along Putah Creek all the way to the YBWA, and instead would stop at I-505 near the City of Winters. For this reason, Alternative 3 fails to meet the integrative restoration needs of the Creek system as a whole. Therefore, Alternative 3 would be less consistent with project objectives than the proposed Project.

4.6 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA Guidelines Section 15126.6(e)(2) requires that the Environmentally Superior Alternative be identified. If the environmentally superior alternative is the No Project/No Development Alternative, the EIR shall also identify an Environmentally Superior Alternative among other alternatives. CEQA also requires public agencies to mitigate or avoid significant effects of a project whenever it is feasible to do so (Public Resources Code Section 21002.1).

The alternatives provide a range of feasible options for implementing the proposed Project, and the impacts of one or more alternatives on some resource topics would result in less significant impacts when compared with the other alternatives. As a result, it is possible for the lead and responsible agencies to select an alternative that would result in the least environmental impacts without carrying forward an action that would have unavoidable impacts.

Based on the analysis of the alternatives in Chapter 4, the No Project Alternative (Alternative 1) would have the least short-term adverse impacts, but would result in

continued dominance of non-native and invasive plants in the Project Area and continued erosion and channel destabilization of Putah Creek, reducing the quality of wildlife habitat. In addition, as shown in **Table 4-2**, this alternative would not meet the Project objectives.

Alternative 3, the Reduced Project Alternative, would achieve many of the water quality and habitat benefits of the proposed Project but over a much more limited area (4-5 acres improved habitat over 4 miles) than the proposed Project (24.2 miles). In terms of gross acres of improved habitat (approximately 112.5 acres), Alternative 2 would have more ecological benefits for the full range of native species; however, for cold-water fisheries, Alternative 3 would provide a shorter corridor of enhanced aquatic and riparian habitat compared with the Project.

The Environmentally Superior Alternative is Alternative 2, Pool Filling Only, which achieves some of the water quality and habitat benefits of the proposed Project but with lessened short-term construction-related impacts. However, this alternative is less consistent with the Project objectives than the proposed Project.

Table 4-2 Comparison of Project Alternatives to the Proposed Project

Environmental Category	Proposed Project	Alternative 1 No Project	Alternative 2 Pool Filling Only	Alternative 3 Reduced Project
Aesthetics	LS/MM	NI	LS/MM	LS/MM-
Air Quality & Greenhouse Gas Emissions	LS/MM	NI	LS/MM-	LS/MM-
Biological Resources	LS/MM	NI	LS/MM-	LS/MM-
Cultural Resources	LS/MM	NI	LS/MM-	LS/MM-
Geology and Soils, Mineral Resources	LS/MM	NI	LS/MM-	LS/MM-
Hazards	LS/MM-	NI	LS/MM-	LS/MM-
Hydrology	LS/MM-	NI	LS/MM-	LS/MM-
Land Use	LS	NI	LS	LS/MM-
Noise	SU/MM	NI	SU-	SU-
Public Services	NI	NI	NI	NI
Recreation	LS	NI	LS-	LS-
Transportation/Traffic	LS	NI	LS/MM-	LS/MM-
Utilities	LS/MM	NI	LS/MM-	LS/MM-
Water Quality	LS/MM	NI	LS/MM-	LS/MM-
Consistency with Project Objectives	*Consistent*	*Inconsistent*	*Less Consistent*	*Less Consistent*

Notes:
NI = No impact would occur.
LS = All impacts would be less than significant, no mitigation required.
LS/MM = All impacts would be less than significant after mitigation.
SU = One or more impacts would be significant and unavoidable, even after mitigation.
- = Alternative impacts are less severe than the Proposed Project.
+ = Alternative impacts are more severe than the Proposed Project.
Where no **+** or **-** is indicated, impacts of the Proposed Project and the Alternative are identical or very similar.

5. CEQA TOPICAL ANALYSES

5.1 GROWTH INDUCEMENT

California Environmental Quality Act (CEQA) requirements for evaluation of growth-inducing impacts are set forth in Section 15126.2 (d) of CEQA Guidelines (California Code of Regulations (CCR), Title 14, Division 6, Chapter 3, Sections 15000-15387). CEQA requires that both direct and indirect impacts of all phases of a proposed project be considered. Growth-inducement is typically considered to be a direct or indirect effect of an action that either directly fosters growth or removes an obstacle to economic or population growth, or the construction of new housing. CEQA Guidelines also require evaluation of new infrastructure and service facilities needed to serve growth-induced by a project. The Guidelines note that "it must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment;" therefore, the nature of the effects of any induced growth also must be considered to determine if the impacts of that growth are potentially significant.

Some projects may be considered growth inducing while others may be growth accommodating (i.e., they are intended to accommodate planned growth, but do not induce that growth). The distinction here is primarily whether or not a project removes an obstacle to growth. It is sometimes argued that, if growth is already planned for in a jurisdiction's General Plan, then infrastructure supporting that development is growth accommodating rather than growth inducing. However, CEQA is concerned with on-the-ground impacts to the environment. Therefore, if planned development cannot move forward absent a particular infrastructure project, or the development is substantially encouraged by that infrastructure, that project is generally considered growth inducing.

CEQA Guidelines also state (Section 16064 (d)(3)) that an indirect physical change is to be considered only if that change is "a reasonably foreseeable impact which may be caused by the project. A change which is speculative or unlikely to occur is not reasonably foreseeable."

The Putah Creek Restoration – Upper Reach Project (Project) includes channel reconfiguration, habitat restoration, and maintenance components. The Project components would not have any effect on growth, as they would not provide any new

housing, infrastructure, or substantial economic activity. In addition, it would not remove any obstacles to growth, expand infrastructure, or develop housing or economic activity.

The Project also would not induce growth. Although it would work in concert with the proposed Yolo Bypass Wildlife Area (YBWA) restoration downstream, the proposed Project would not induce the implementation of that project, which is being carried out independently by the California Department of Fish and Wildlife (CDFW) (funded under the same grant as this Project). Neither the proposed Project nor the YBWA project is expected to substantially induce demand for new residences or businesses in the adjacent areas, although the restored stream would provide a more aesthetically pleasing environment that could slightly increase desirability of adjacent parcels; therefore, this impact would be less than significant.

5.2 UNAVOIDABLE SIGNIFICANT ADVERSE IMPACTS

Under each resource topic, any unavoidable significant adverse impacts identified are analyzed in detail. The only potentially significant and unavoidable impact from the Project would be temporary construction noise impacts.

5.3 SUMMARY OF CUMULATIVE IMPACTS/MITIGATION MEASURES

The proposed Project would be located primarily in agricultural areas of Yolo and Solano Counties, although portions of the Project would be adjacent to more urbanized City of Winters and University of California, Davis (UC Davis) lands. A cumulative impact refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects. The cumulative impact from several projects is the change in the environment, which results from incremental impacts of the project when added to other closely related past, present, and reasonably foreseeable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period.

5.3.1 Yolo County Projects

A review of the Yolo County current projects list (http://www.yolocounty.org/community-services/planning-public-works/planning-division/current-projects (viewed May 3, 2016) indicated no County projects that may have impacts overlapping those of the proposed Project.

5.3.2 Solano County Projects

In March 2015 the Solano County Board of Supervisors approved funding for the following projects in the Project area, to be conducted in 2015-17:

- The Midway-Sievers safety improvement project, which will construct paved shoulder improvements on Midway Road from Interstate 80 to Porter Road, and on Sievers Road from Halley Road to Stevenson Bridge Road.
- The 2015 paving project, which will provide paved shoulder improvements on Winters Road from Allendale Road to Wolfskill Road, and on Midway Road from Timm Road to the Vacaville city limit. The improvement work to Midway Road is included in the English Hills Transportation Impact Fee.
- The culvert repair project, which will make significant repairs to dilapidated culverts under Steiger Hill Road and Cantelow Road, according to a staff report. These are large culverts that do not qualify for federal funding as bridges and must be maintained by the county, the report said.
- A bridge design contract was awarded on March 17, 2016 for the Stevenson Road Bridge rehabilitation project. Significant structural design work is anticipated to rehabilitate the existing deficient structure.

A review of Solano County active projects (May 2016) indicate no County projects that may have impacts overlapping those of the proposed Project.

5.3.3 University of California, Davis Project

UC Davis has a large number of "current projects" listed on its website, however many of these are old and have already been constructed (http://sustainability.ucdavis.edu/progress/commitment/environmental_review/current_projects.html, accessed May 3, 2016). Current UC Davis projects in the Project area include:

- The Shrem Museum of Art building, currently scheduled to open in November 2016, which would include approximately 30,000 square feet of space and would be located on 1.6 undeveloped acres in the southern portion of the Central Campus at UC Davis in Yolo County.
- The UC Davis Large Solar Power Plant (LSPP) project which is planned for up to 70 acres and would help the campus meet demand for electricity and achieve goals for reducing greenhouse gas (GHG) emissions. The site is along just north of Putah Creek Levee Road, the north levee of Putah Creek, approximately ½-mile east of Old

Davis Road on land used for agricultural production. Project construction was completed in nearly 2016.

- The Orchard Park Student Housing redevelopment which proposes to consolidate the Solano Park and Orchard Park student housing areas by redeveloping Orchard Park at a higher density and suspending housing operations at the Solano Park housing area, just south of the old mill race on the UC Davis campus. At Orchard Park, the approximately 20-acre site would undergo a demolition and redevelopment process from 2014 through 2016 to provide housing for a total of 1,410 people in 550 dwelling units.
- UC Davis proposes to construct and occupy a two-story lecture hall of approximately 17,500 square feet within the UC Davis core campus. The project site at the southwest intersection of Kleiber Hall Drive and California Avenue would provide 550 to 600 seats for campus lectures and would help to better serve the increasing demand for lecture space on the campus.
- The Veterinary Medicine Student Services Development which would consist of two new buildings: 1) the Veterinary Medicine Student Services and Administration Center, and 2) the Scrubs Café building. The project construction site is approximately 2 acres at the southeast corner of where Garrod Drive makes a 90-degree bend near the Veterinary Medicine 3B building. Construction is planned for completion in 2016.
- UC Davis proposes to renovate Walker Hall, a building of approximately 45,000 square feet on a site of approximately two acres, in the core area of the UC Davis main campus. The building is currently vacant and after construction, the proposed project would provide classroom seating for approximately 390 students and office space for approximately 50 employees. The CEQA review for this project is currently (May 2016) in progress.

5.3.4 City of Winters Projects

The City of Winters is currently implementing the following projects:

- Railroad Ave over Dry Slough 0.37 miles north of County Road 33, bridge replacement. The work generally consists of, but not limited to, the following: clearing, grubbing, temporary detour, bridge removal, bridge and roadway construction, temporary detour removal, signing and striping. Work is scheduled for completion in 2015-2016.
- The Putah Creek River Parkways project narrowed the low-flow channel along about 1 mile of creek. The project cut fill from steep banks, and moved it into a form such that the creek now has a walkable riparian area, and improved wildlife habitat. The

project was completed with the completion of the Winters Road Bridge Replacement in early 2016 (see below).

- The Winters Road Bridge Replacement project, a joint effort between Solano County and the City of Winters, involves the replacement of a 420-foot-long, three-span, earth-filled concrete arch bridge that was constructed in 1907, and is eligible for inclusion in the National Register of Historic Places. The replacement structure consists of a 453-foot-long, three-span cast-in-place reinforced concrete box girder superstructure simulated arched spans. Construction began in 2013 and was completed in early 2016.

5.3.5 California Department of Fish and Wildlife Projects

YBWA Putah Creek Restoration

The Restoration Plan would route a new stream channel through irrigated pasture, row crop or fallow ground within the YBWA. The new channel would bypass the last 2.3 miles of stream channel (a constructed irrigation canal) through which Putah Creek currently flows. Channel design will include additional shallow water smolt-rearing habitat that is relatively free of non-native predatory fish. The channel would be designed in a manner that will create a series of shallow, seasonal wetlands that would provide high quality rearing habitat.

The Restoration Plan also would include a new water-control structure to divert water into the new channel alignment while also allowing continuation of the existing water supply operation along Lower Putah Creek. The water control structure would be a concrete structure with interlocking aluminum stop logs to control flow into the new channel. The water control structure would be operated using the same schedule currently in place for the Los Rios check dam. The new water control structure would be closed from mid-March to mid-November, allowing water to pool within Lower Putah Creek and to be diverted for agricultural and wildlife management purposes. The new water control structure would be open from mid-November to mid-March and water would flow from Lower Putah Creek into the new channel. The water control structure would also provide a crossing over the connection point, aligned with the existing north-south access road. The crossing would be sized to accommodate agricultural equipment up to 16 feet wide.

5.3.6 Cumulative Impacts

Each resource topic analyzed in this EIR includes an analysis of the cumulative impacts and identifies mitigation measures. The cumulative impacts identified in this EIR include

issues regarding: hydrology and geomorphology, water quality, geology and soils, air quality, noise, aesthetics, land use, recreation, transportation/traffic, public services, utilities and service systems, and hazardous materials.

Hydrology

As is described in detail in Section 3.1, Hydrology, the proposed Project, after mitigation, would have no adverse long-term effects on hydrology within the project area or the vicinity. The proposed project could result in short-term impacts on erosion and siltation, and on stormwater drainage systems. These potential impacts would be reduced below significance through regulatory compliance with permitting processes and through the implementation of Mitigation Measures 3.1-1, 3.1-2, 3.14-1, and 3.14-3 In order for the Project to contribute to a significant cumulative impact, it would have to create an impact that would exist long enough to combine with other projects to create that significant effect. The absence of residual impacts eliminates the potential for the Project to create overlapping or interactive impacts with other projects or make a substantial incremental contribution to cumulative conditions to result in cumulative impacts related to hydrology. Consequently, the proposed Project would not incrementally contribute to a significant cumulative effect on hydrology.

Water Quality

As is described in detail in Section 3.2 Water Quality, the proposed Project would have no adverse short- or long-term effects on water quality within the Project Area or the vicinity. The only potential impacts of the proposed Project would be impacts related to herbicide use and short-term impacts related to Water Quality Standards or Waste Discharge Requirements. These potential impacts would be reduced below significance through regulatory compliance with permitting processes and through the implementation of Mitigation Measures 3.1-1 and 3.4-6. Therefore, the Project would not incrementally contribute to any significant cumulative impacts related to water quality.

Geology, Soils, and Mineral Resources

As is described in detail in Section 3.3 Geology and Soils, and Mineral Resources, the proposed Project would have a less than significant impact on geology and soils. The only potential impacts of the proposed project would be short-term impacts on erosion, and these potential impacts would be reduced below significance through regulatory compliance with permitting processes and through the implementation of Mitigation Measure 3.1-1. Implementation of this mitigation measure also would ensure that Project-related activities would not incrementally contribute to any significant cumulative impacts related to geology and soils.

The proposed restoration Project would have no impact on mineral resources. As described in the Setting section, neither the Solano County General Plan nor the Yolo County General Plan identifies the Putah Creek area among the County's Mineral Resource Zones. The Yolo County General Plan identifies natural gas fields are located in the area (the Winters Gas and Putah Sink Gas fields and the abandoned Dixon Gas and Davis Southeast Gas fields). The Project would not prevent future use or development of these natural gas resources because the Project would not involve deep subsurface activities and would not construct any human habitation or commercial or industrial development that would place people or large structures along the creek. Therefore the project would not contribute to any cumulative impacts to mineral resources.

Biological Resources

As is described in detail in Section 3.4 Biological Resources, the proposed Project would have significant but mitigable effects on biological resources within the Project Area or the vicinity. Impacts to special-status species (including the song sparrow [Modesto Population], Valley elderberry longhorn beetle, Swainson's hawk, western pond turtle, and the white-tailed kite); to migratory birds; to riparian, aquatic, and wetland habitat; to species movement; and to water quality for fish within the Project Area would be either less than significant or mitigated to that level. These potential impacts would be reduced below significance through the implementation of Mitigation Measures 3.4-1 through 3.4-6.

Air Quality and Greenhouse Gas Emissions

Per the Yolo-Solano Air Quality Management District (YSAQMD) CEQA Handbook for Assessing and Mitigating Air Quality Impacts, any proposed project that would individually have a significant air quality impact (exceed YSAQMD CEQA Significance Thresholds) would also be considered to have a significant cumulative impact (YSAQMD, 2007). All air quality and GHG impacts would be less than significant for the proposed Project; therefore, the proposed project would have a less-than-significant contribution to cumulative impacts.

Noise

Potential project-related noise impacts would not result in any potentially significant cumulative impacts. Construction-related noise impacts are short-term and would cease upon completion of construction. No long-term noise would be generated as a result of the Project, which would result in the restoration of Putah Creek, and no concurrent

major construction projects have been identified in the vicinity of Putah Creek; therefore, the Project would not contribute to cumulative noise impacts.

Hazards and Hazardous Materials

As is described in detail in Section 3.7, *Hazards and Hazardous Materials*, the proposed Project would have no adverse short- or long-term impacts related to hazards or hazardous materials within the Project Area or the vicinity. The only potential impacts of the proposed Project would be potential impacts related to unexpected discovery of hazardous materials during excavation; minor contamination from drips and leaks from construction vehicles and equipment; or the misapplication of herbicides during activities to reduce invasive species and weeds. These potential impacts would be localized and reduced a less-than-significant level through the implementation of Mitigation Measures 3.7-1, 3.7-2, and 3.4-6; therefore, the Project would not contribute to any cumulative impacts to hazards or hazardous materials.

Land Use and Agricultural Resources

The Project could have temporary impacts to access to agricultural lands during construction. These impacts would be fully mitigated by measures identified in Section 3.8, *Land Use and Agricultural Resources*, of this EIR; therefore the project's contribution to any cumulative impacts of the other projects listed in this section would not be considerable.

Aesthetics

The project could have temporary impacts to views of the creek and associated vegetation during construction and until new vegetation becomes established. These impacts would be localized and not overlap visual impacts of any of the other cumulative projects with the exception of work at the connection of this Project with the YBWA project, where there are no sensitive receptors (i.e., residents or recreational users) to visual changes. The new Winters Putah Creek Road Bridge should be completed prior to implementation of the Project. Further, mitigated by measures identified in Section 3.8, *Land Use,* of this EIR would reduce the project's cumulative impacts to less than significant; therefore, the Project's contribution cumulative impacts would not be considerable.

Recreation

The Project could have temporary impacts on access to recreational areas. These would be minimized by measures identified in Section 3.10, *Recreation,* of this EIR. It is unlikely that any of the Project's impacts to recreational resources would overlap with impacts of

the other cumulative projects and, if any overlap were to occur, it would be of short duration; therefore, the project's contribution to any cumulative impacts on recreational resources would not be considerable.

Cultural Resources

Cultural resources in the Project Area and surrounding region generally consist of early Native American habitation and resource processing sites, and buildings and structures associated with late 19th and early 20th century agricultural and transportation activities. Particularly from the latter half of the 20th century to the present, prehistoric sites and historic-era buildings and structures have been destroyed, disturbed, and modified. During this period, the creation and enforcement of various regulations such as CEQA protecting cultural resources have substantially reduced the rate and intensity of these impacts; however, even with these regulations, cultural resources are still degraded or destroyed as cumulative development in the Davis and Winters area proceeds.

Research conducted for the Project indicates that the Project Area contains prehistoric cultural resources that are considered significant as defined by CEQA. As-yet undiscovered cultural resources might also be present in the Project Area. The cultural resources mitigation measures discussed above would reduce impacts on prehistoric and historic-era resources and human interments to less-than-significant levels. Implementing these mitigation measures also would ensure that Project-related activities would not incrementally contribute to any significant cumulative impacts on important cultural resources in the Project. These measures ensure compliance with CEQA guidance. Consequently, the proposed Project would not incrementally contribute to a significant cumulative effect on cultural resources.

Transportation/Traffic

As described in detail in Section 3.12, *Transportation/Traffic*, the proposed Project would have no impact on transportation and traffic. The Project would not conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system. The Project would contribute a small number of vehicle trips during short-term construction; no more than 42 daily one-way 3- and 4-axle-truck trips to haul materials, and an expected maximum of 12 daily one-way passenger vehicle trips per day for commuting workers, but these trips do not create a significant impact. Post-construction Project traffic would be minimal. Cumulative impacts would be further minimized through limits on the annual scope of activities, as described in Chapter 2, *Project Description*. Activities would be conducted in a

discontinuous pattern to further avoid or minimize any potential construction-related effects, including traffic impacts.

In order for the Project to contribute to a significant cumulative impact on transportation and traffic, it would have to create an impact that would combine with other projects to create that significant effect. The Project would involve low traffic-generating activities in mostly rural areas with light traffic. Other cumulative projects may overlap Project traffic generation for short periods, but the overlap is very unlikely to significantly affect local or regional traffic conditions. Mitigation measures identified in this EIR would further limit the Project's contribution to these temporary traffic effects; therefore, the proposed Project would have a less than cumulatively considerable impact on transportation and traffic and no mitigation is required.

Public Services

The proposed Project would not provide new public access or otherwise substantially increase public use of the creek so no substantial new demand on police or fire services would occur. It is possible that additional boaters may use the creek and existing recreation areas, but overall increased numbers would be low and conditions for boaters would be safer than at present, so any increase in emergency calls would be minimal. Additionally, the Project's removal of weedy and non-native vegetation would reduce fire risks compared with existing conditions; therefore, the Project would not contribute to any potential cumulative impacts on public services from other nearby projects.

Utilities and Service Systems

As is described in detail in Section 3.14, *Utilities*, the proposed Project would have no adverse long-term effects on utilities within the Project Area or the vicinity. The only potential impacts of the proposed Project would be potential short-term impacts on small roadway or agricultural storm drains, and potential long-term and short-term impacts in the event of inadvertent damage to underground pipelines during excavation. It is unlikely that any of these Project impacts would overlap with impacts of the other cumulative projects and, if any overlap were to occur, it would be of short duration. Moreover, these potential impacts would be reduced below significance through regulatory compliance with permitting processes and through the implementation of Mitigation Measures 3.1-2, 3.1-2, and 3.14-1; therefore, the Project would have no impact on cumulative conditions.

5.4 IRREVERSIBLE/IRRETRIEVABLE IMPACTS

As described above, the proposed Project would permanently convert large pool areas to flowing stream areas. The Project also would irreversibly alter the stream's degraded habitat to a more ecologically productive natural habitat. Construction of the Project would result in the irretrievable use of natural resources including fuels and rock materials.

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7. REFERENCES

PROJECT DESCRIPTION

EDAW. 2005. *Lower Putah Creek Watershed Management Action Plan Phase I – Resource Assessments.* Prepared for Lower Putah Creek Coordinating Committee, December. Available at http://www.cityofwinters.org/pdf/putahcreek/Lower%20Putah%20WMAP%20Vol%20I%2012-05.pdf, accessed April 9, 2014.

EDAW/AECOM. 2008. *Lower Putah Creek Watershed Management Action Plan – Proposed Projects.* Prepared for Lower Putah Creek Coordinating Committee, January.

Environmental Science Associates (ESA). 2014. *Dry Creek Habitat Enhancement, Mile Three Reaches 2, 4, & 5 Concept Designs*. Prepared for Sonoma County Water Agency.

Fischenich, J.C. and J.V. Morrow. 2000. *Reconnection of Floodplains with Incised Channels.* EMRRP Technical Notes Collection (ERDC TN-EMRRP-SR-09), U.S. Army Engineer Research and Development Center, Vicksburg, MS. Available at www.wes.army.mil/el/emrrp, accessed October 9, 2014.

Hill, C., Rosgen, and NRCS. 2007. *Common In-Stream Structures.* Available from University of Minnesota St. Anthony Falls Laboratory. Available at http://www.safl.umn.edu/featured-story/modeling-success, accessed October 9, 2014.

Hough, M. 1993. Sharing Common Experiences. Hydropolis: The Role of Water in Urban Planning. Conference Proceedings of the UNESCO-IHP International Workshop, pp. 68-81.

Lower Putah Creek Coordinating Committee (LPCCC). 2015.

Southerland, W.B., 2003. *Stream Morphology and Classification on Glacial-Fluvial Valleys of the North Cascade Mountain Range in Washington State.* Ph.D. Dissertation, Washington State University.

The Stormwater Manager's Resource Center. *Bank Restoration: Bank Protection Practices.* Available at http://stormwatercenter.net/, accessed October 9, 2014.

U.S. Army Corps of Engineers (USACE). 2007. Institute for Water Resources Management Measures Digital Library. Available at http://www.pmcl.com/mmdl/MM_Description.asp?ID=70#, accessed February 28, 2015.

Wallace-Kuhl & Associates Inc. 2008. *Initial Study and Mitigated Negative Declaration for Winters Putah Creek Nature Park/Floodplain Restoration and Recreational Access Project.* Prepared for and reviewed by City of Winters. Available at http://www.cityofwinters.org/community_dev/pdf/WPNP%20IS-MND.pdf, accessed April 8, 2014.

HYDROLOGY

BSK Associates. 2014. Draft Ordinary High Water Mark Determination and Preliminary Wetland Delineation.

California Department of Fish and Wildlife (CDFW). 2015. Comments on Putah Creek Restoration Project – Upper Reach Program, Notice of Preparation of a Draft Programmatic Environmental Impact Report, SCH #2015022022, Solano County, March 2, 2015.

California State Water Resources Control Board (SWRCB). 2014. Dredge/Fill (401) and Wetlands Program webpage, last updated November 26, 2014. Available at http://www.waterboards.ca.gov/water_issues/programs/cwa401/, accessed January 30, 2015.

County of Solano. 2008. Solano County General Plan. Adopted November, 2008. Available at http://www.solanocounty.com/depts/rm/planning/general_plan.asp, accessed April 23, 2014.

County of Yolo. 2009. Yolo County General Plan. Adopted November, 2009. Available at http://www.yolocounty.org/general-government/general-government-departments/county-administrator/general-plan-update/adopted-general-plan, accessed April 23, 2014.

Central Valley Flood Protection Board (CVFPB). 2014. Regulations Granting the Board's Authority webpage, last modified September 12, 2014. Available at http://www.cvfpb.ca.gov/regulations/, accessed March 4, 2015.

EDAW. 2005. Lower Putah Creek Watershed Management Action Plan Phase I – Resource Assessments. Prepared for Lower Putah Creek Coordinating Committee, December 2005. Available at

http://www.cityofwinters.org/pdf/putahcreek/Lower%20Putah%20WMAP%20Vol%20I%2012-05.pdf, accessed April 9, 2014.

Federal Emergency Management Agency (FEMA). 2015. Federal Emergency Management Agency Community Status Book Report: California Communities Participating in the National Flood Program, January 27, 201. Available at https://www.fema.gov/cis/CA.pdf), accessed January 28, 2015.

Federal Emergency Management Agency (FEMA). 2014a. Flood Zones webpage, last updated July 24, 2014. Available at https://www.fema.gov/floodplain-management/flood-zones), accessed January 28, 2015.

Federal Emergency Management Agency (FEMA). 2014b. Zone AE and A1-30 webpage, last updated July 24, 201. Available at https://www.fema.gov/floodplain-management/zone-ae-and-a1-30), accessed January 28, 2015.

State of California, Governor's Office of Planning and Research (OPR). 2013. Guidelines for Implementation of the California Environmental Quality Act, as amended, Appendix G.

SCWA. 2015. Water Supply: Putah Creek webpage. Available at http://www.scwa2.com/water-supply/habitat/putah-creek, accessed February 17, 2015.

Stillwater Sciences. 2014. Soils, Sediment, and Geomorphology Assessment for the Lower Putah Creek Restoration Project. Prepared by Stillwater Sciences for Yolo Basin Foundation.

U.S. Geological Survey (USGS). 2015 National Water Information System: Mean Discharge Graph for USGS 11455400 Putah Creek from 1930 to 2015.

U.S. Geological Survey (USGS). 2014. National Water Information System: web interface. Available at http://waterdata.usgs.gov/nwis/nwisman/?site_no=11454210&agency_cd=USGS, accessed February 20, 2014.

U.S. Geological Survey (USGS). 2007. Water-Data Report 2007: 11453900 Lake Berryessa near Winters, CA. Available at http://wdr.water.usgs.gov/wy2007/pdfs/11453900.2007.pdf, accessed April 11, 2014.

WATER QUALITY

BSK Associates. 2015. Draft Ordinary High Water Mark Determination and Preliminary Wetland Delineation for the Lower Putah Creek Restoration Project. Prepared by BSK Associates for the Yolo Basin Foundation.

California Department of Fish and Wildlife (CDFW). 2015. Comments on Putah Creek Restoration Project – Upper Reach Program, Notice of Preparation of a Draft Programmatic Environmental Impact Report, SCH #2015022022, Solano County, March 2, 2015.

California Department of Water Resources (DWR). 2015a. Initial Groundwater Basin Prioritization under the SGM Act webpage. Available at http://www.water.ca.gov/groundwater/sgm/SGM_BasinPriority.cfm, accessed March 16, 2015.

California Department of Water Resources (DWR). 2015b. Sustainable Groundwater Management Program webpage. Available at http://www.water.ca.gov/groundwater/sgm/, accessed March 16, 2015.

California Department of Water Resources (DWR). 2015c. Sustainable Groundwater Management: GSA Notifications webpage. Available at http://www.water.ca.gov/groundwater/sgm/gsa_table.cfm, accessed March 16, 2015.

California Department of Water Resources (DWR). 2014. CASGEM Groundwater Basin Prioritization Results. Available at http://www.water.ca.gov/groundwater/casgem/pdfs/lists/StatewidePriority_Abridged_05262014.pdf, accessed March 16, 2015.

California Department of Water Resources (DWR). 2004. California's Groundwater Bulletin 118, Sacramento Valley Groundwater Basin Solano Subbasin County Subbasin, last updated January 27, 2004. Available at http://www.water.ca.gov/pubs/groundwater/bulletin_118/basindescriptions/5-21.66.pdf, accessed January 22, 2015.

California Office of Environmental Health Hazard Assessment (OEHHA). 2009. Safe Eating Guidelines for Fish and Shellfish from Putah Creek and Lake Solano Based on Mercury, updated March 18, 2009. Available at http://oehha.ca.gov/fish/so_cal/putahcreek.html, accessed March 19, 2015.

California State Water Resources Control Board (SWRCB). 2015a. UC Davis Main Waste Water Treatment Plant, Self-Monitoring Report, January 2015. Available at https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/PublicReportEsmrAtGlanceServlet?reportID=2&isDrilldown=true&documentID=1568866, accessed April 17, 2015.

California State Water Resources Control Board (SWRCB). 2015b. UC Davis Main Waste Water Treatment Plant, Self-Monitoring Report, February 2015. Available at https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/PublicReportEsmrAtGlanceServlet?inCommand=reset, accessed May 28, 2015.

California State Water Resources Control Board (SWRCB). 2014. Dredge/Fill (401) and Wetlands Program webpage, last updated November 26, 2014. Available at http://www.waterboards.ca.gov/water_issues/programs/cwa401/, accessed January 30, 2015.

California State Water Resources Control Board (SWRCB). 2013a. Construction Storm Water Program webpage, last updated September 26, 2014. Available at http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml, accessed January 23, 2015.

California State Water Resources Control Board (SWRCB). 2013b. National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order No. 2012-0006-DWQ, NPDES No. CAS 000002. Adopted and effective July 17, 2012. Available at http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/wqo_2009_0009_complete.pdf, accessed December 11, 2013.

California State Water Resources Control Board (SWRCB). 2013c. Impaired Water Bodies webpage, last updated August 5, 2013. Available at http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml, accessed January 22, 2015.

California State Water Resources Control Board (SWRCB). 2013d. 2010 Integrated Report webpage, last updated August 5, 2013. Available at http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.
shtml, accessed January 23, 2015.

California State Water Resources Control Board (SWRCB). 2010. 2010 California 303(d) List of Water Quality Limited Segments. Available at http://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/category5_report.shtml, accessed January 23, 2015.

California State Water Resources Control Board (SWRCB). 2004. Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List, Adopted September 30, 2014. Available at http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/ffed_303d_listingpolicy093004.pdf, accessed January 22, 2015.

California Stormwater Quality Association (CASQA). 2015a. BMP Handbooks webpage. Available at https://www.casqa.org/resources/bmp-handbooks, accessed February 2, 2015.

California Stormwater Quality Association (CASQA). 2015b. About CASQA webpage. Available at https://www.casqa.org/about, accessed February 2, 2015.

Central Valley Regional Water Quality Control Board (CVRWQCB). 2014. Waste Discharge Requirements for the University of California, Davis Main Wastewater Treatment Plant. Order R5-2014-0152. NPDES No. CA0077895. Available at http://www.waterboards.ca.gov/rwqcb5/board_decisions/adopted_orders/solano/r5-2014-0152.pdf, accessed May 8, 2015.

Central Valley Regional Water Quality Control Board (CVRWQCB). 2011. Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Methylmercury and Total Mercury in the Sacramento-San Joaquin River Delta Estuary (Attachment 1 to Resolution No. R5-2010-0043), effective October 20, 2011. Available at http://www.waterboards.ca.gov/rwqcb5/water_issues/tmdl/central_valley_projects/delta_hg/2011oct20/bpa_20oct2011_final.pdf, accessed March 19, 2015.

Central Valley Regional Water Quality Control Board (CVRWQCB). 2008. Sacramento – San Joaquin Delta Estuary TMDL for Methylmercury Public Draft Staff Report. Available at http://www.epa.gov/waters/tmdldocs/41415_delta-tmdl_full_rpt-.pdf, accessed May 6, 2015.

City of Davis. 2015. Boron Notification webpage. Available at http://water.cityofdavis.org/water-quality-information/boron-notification, accessed March 19, 2015.

County of Solano. 2008a. Solano County General Plan. Adopted November 2008. Available at http://www.solanocounty.com/depts/rm/planning/general_plan.asp), accessed April 23, 2014.

County of Solano. 2008b. Solano County 2008 Draft General Plan Draft Environmental Impact Report, prepared by EDAW, April 18, 2008. Available at http://www.solanocounty.com/civicax/filebank/blobdload.aspx?BlobID=15179, accessed December 10, 2014.

County of Yolo. 2009. Yolo County General Plan. Adopted November, 2009. Available at http://www.yolocounty.org/general-government/general-government-departments/county-administrator/general-plan-update/adopted-general-plan, accessed April 23, 2014.

EDAW. 2005. Lower Putah Creek Watershed Management Action Plan Phase I – Resource Assessments. Prepared for Lower Putah Creek Coordinating Committee, December 2005. Available at http://www.cityofwinters.org/pdf/putahcreek/Lower%20Putah%20WMAP%20Vol%20I%2012-05.pdf, accessed April 9, 2014.

State of California Governor's Office of Planning and Research (OPR). 2013. Guidelines for Implementation of the California Environmental Quality Act, as amended, Appendix G.

Robinson, Erik. 2014. "California Mandates Groundwater Regulation Through Local 'Sustainability Plans' Starting in 2020." *California Real Property Journal* 32 (4): 5-11.

Solano County Water Agency (SCWA). 2015a. Ground Water webpage. Available at http://www.scwa2.com/water-supply/habitat/ground-water, accessed January 23, 2015.

Solano County Water Agency (SCWA). 2015b. About Us webpage. Available at http://www.scwa2.com/about-us, accessed January 23, 2015.

Solano County Water Agency (SCWA). 2010. 2010 Solano County Water Agency Urban Water Management Plan – Final Draft. Available at http://www.water.ca.gov/urbanwatermanagement/2010uwmps/Solano%20County%20Water%20Agency/2010%2520UWMP%2520final%2520draft.pdf, accessed March 12, 2015.

Solano County Water Agency (SCWA). 2009. Solano County Water Agency Grading Policy. Adopted November 12, 2009.

Stillwater Sciences. 2015. Habitat assessment for the Lower Putah Creek Restoration Project—Upper Reach. Prepared by Stillwater Sciences for Yolo Basin Foundation.

University of California, Davis (UC Davis). 2015. UC Davis Safety Services LEHR History webpage. Available at http://safetyservices.ucdavis.edu/ps/ec/lehr/history, accessed March 13, 2015.

University of California, Davis (UC Davis). 2004. UC Davis Campus Wastewater Treatment Plant Expansion Focused Tiered Draft Environmental Impact Report, October 8, 2004. Available at http://sustainability.ucdavis.edu/local_resources/docs/onlinedocs/wwtp/wwtpdeir%201-3.pdf, accessed April 16, 2015.

University of California, Davis (UC Davis). 1995. Final Community Relations Plan, Laboratory for Energy-Related Health Research Environmental Restoration, April 1995. Available at http://safetyservices.ucdavis.edu/ps/ec/lehr/lehr_CIP.pdf/view, accessed March 13, 2015.

U.S. Environmental Protection Agency (US EPA). 2015. Lehr Old Campus Landfill webpage. Available at http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/ViewByEPAID/CA2890190000, accessed March 12, 2015.

U.S. Environmental Protection Agency (US EPA). 2014a. Pollution Prevention/Good Housekeeping for Municipal Operators webpage. Available at http://water.epa.gov/polwaste/npdes/swbmp/Pollution-Prevention-Good-Housekeeping-for-Municipal-Operatators.cfm, accessed March 13, 2015.

U.S. Environmental Protection Agency (US EPA). 2014b. List of Potential Pollutants Likely Associated with Municipal Facilities and Activities. Available at http://water.epa.gov/polwaste/npdes/swbmp/upload/potmunpoll.pdf, accessed March 13, 2015.

U.S. Environmental Protection Agency (US EPA). 2014c. Flooding webpage. Available at http://www.epa.gov/naturalevents/flooding.html, accessed March 13, 2015.

U.S. Environmental Protection Agency (US EPA). 2014d. Basic Information about Mercury (inorganic) in Drinking Water webpage. Available at http://water.epa.gov/drink/contaminants/basicinformation/mercury.cfm#four, accessed May 7, 2015.

U.S. Environmental Protection Agency (US EPA). 2013a. Mercury Compounds webpage. Available at http://www.epa.gov/ttnatw01/hlthef/mercury.html, accessed May 7, 2015.

U.S. Environmental Protection Agency (US EPA). 2013b. What is a TMDL? Webpage. Available at http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/overviewof tmdl.cfm, accessed May 7, 2015.

U.S. Environmental Protection Agency (US EPA). 2012a. Water: Total Maximum Daily Loads (303d) Glossary webpage. Available at http://water.epa.gov/lawsregs/ lawsguidance/cwa/tmdl/glossary.cfm#i, accessed May 9, 2015

U.S. Environmental Protection Agency (US EPA). 2012b. Turbidity Monitoring & Assessment webpage, last updated March 6, 2012. Available at http://water.epa.gov/ type/rsl/monitoring/vms55.cfm, accessed January 30, 2015.

U.S. Environmental Protection Agency (US EPA). 2012c. Dissolved Oxygen and Biochemical Oxygen Demand webpage. Available at http://water.epa.gov/type/rsl/monitoring/ vms52.cfm, accessed May 29, 2015.

U.S. Environmental Protection Agency (US EPA). 2009. National Primary Drinking Water Regulations Chart. EPA 816-F-09-004. Available at http://water.epa.gov/drink/ contaminants/upload/mcl-2.pdf, accessed May 7, 2015.

U.S. Environmental Protection Agency (US EPA). 2006. Reregistration Eligibility Decision for Imazapyr. EPA 738-R-06-007, OPP-2005-0495. Available at http://www.epa.gov/ pesticides/reregistration/REDs/imazapyr_red.pdf, accessed April 8, 2015.

U.S. Environmental Protection Agency (US EPA). 2005a. Pesticide Fact Sheet: Aminopyralid. Chemical Abstracts Service Number 150114-71-9.

U.S. Environmental Protection Agency (US EPA). 2005b. Reregistration Eligibility Decision Facts: Chlorsulfuron. EPA-738-F-05-002.

U.S. Environmental Protection Agency (US EPA). 1998. Reregistration Eligibility Decision Facts: Triclopyr. EPA-738-F-98-00.

U.S. Environmental Protection Agency (US EPA). 1993. Reregistration Eligibility Decision Facts: Glyphosate. EPA-738-F-93-011.

U.S. Environmental Protection Agency (US EPA). 1991. Pesticide Fact Sheet 223: Dithiopyr. 540/FS-91-137.

Washington State Department of Transportation (WSDOT). 2006. Roadside Vegetation Management Herbicide Fact Sheet: Isoxaben.

Water Resources Association of Yolo County (Yolo WRA). 2007. Integrated Regional Water Management Plan. Available at http://www.yolowra.org/irwmp_final/final_irwmp%20Document_5-10-07.pdf, accessed May 14, 2015.

GEOLOGY AND SOILS, AND MINERAL RESOURCES

Borchers, J.W., M. Carpenter. 2014. *Report of Findings, Land Subsidence from Groundwater Use in California*. Prepared by LSCE for the California Water Foundation, April 2014.

BSK Associates. 2014. *Draft Ordinary High Water Mark Determination and Preliminary Wetland Delineation Report,* November 21, 2014.

California Department of Conservation (DOC). 2015a. Search for SMARA Mineral Land Classification Maps webpage, http://www.quake.ca.gov/gmaps/WH/smara maps.htm), accessed February 6, 2015.

California Department of Conservation (DOC). 2015b. Division of Oil, Gas and Geothermal (DOGGR) Resources webpage, ftp://ftp.consrv.ca.gov/pub/oil/GIS/Shapefiles/CA_AdminBdry.zip, accessed January 2015.

California Department of Conservation (DOC). 2014. *California Geological Survey. Special Publication 42: Fault-Rupture Hazards Zones in California.* 2007 Interim Edition with Supplements through November 6. Available at ftp://ftp.consrv.ca.gov/pub/dmg/pubs/sp/Sp42.pdf, accessed January 15, 2015.

California Department of Conservation (DOC). 2013. SMARA FAQ webpage, http://www.conservation.ca.gov/omr/lawsandregulations/Pages/faq.aspx, accessed April 10, 2014.

California Department of Conservation (DOC). 2000. *Guidelines for Classification and Designation of Mineral Lands: California Surface Mining and Reclamation Policies and Procedures,* January. Available at http://www.consrv.ca.gov/SMGB/Guidelines/ClassDesig.pdf, accessed April 11, 2014.

California Department of Conservation (DOC). 1999. District 6 Oil and Gas Fields map, June 17, 1999. Available at ftp://ftp.consrv.ca.gov/pub/oil/maps/dist6/Dist6_fields.pdf , accessed January 8, 2015.

California Department of Conservation (DOC). 1988. *Special Report 156 Mineral Land Classification: Portland Cement Concrete Grade Aggregate in the Sacramento-Fairfield Production Consumption Region.* Available at ftp://ftp.consrv.ca.gov/pub/dmg/pubs/sr/SR_156/SR_156_Text.pdf, accessed February 6, 2015.

California State Water Resources Control Board (SWRCB). 2014. Dredge/Fill (401) and Wetlands Program webpage, last updated November 26, 2014. Available at http://www.waterboards.ca.gov/water_issues/programs/cwa401/), accessed January 30, 2015.

County of Solano. 2015. *Solano County Code.* Available at http://www.codepublishing.com/ca/solanocounty/; accessed January 16, 2015.

County of Solano, 2013. *Solano County Code.* Available at http://www.codepublishing.com/ca/solanocounty, accessed December 12, 2014.

County of Solano. 2008a. *Solano County General Plan,* November. Available at http://www.co.solano.ca.us/depts/rm/planning/general_plan.asp, accessed January 16, 2015.

County of Solano. 2008b. *Solano County 2008 Draft General Plan Draft Environmental Impact Report*, prepared by EDAW, April 18, 2008. Available at http://www.solanocounty.com/civicax/filebank/blobdload.aspx?BlobID=15179, accessed December 10, 2014.

County of Yolo. 2015. *Yolo County Code of Ordinances.* Available at http://www.amlegal.com/library/ca/yolocounty.shtml, accessed January 16, 2015.

County of Yolo. 2009a. *Adopted 2030 Countywide General Plan,* November 10. Available at http://www.yolocounty.org/general-government/general-government-departments/county-administrator/general-plan-update/adopted-general-plan, accessed January 15, 2015.

County of Yolo, 2009b. *Yolo County 2030 Countywide General Plan FEIR, Geology, Soils, Seismicity and Mineral Resources*. Prepared by LSA Associates, Inc., April. Aavailable at http://www.yolocounty.org/home/showdocument?id=9182, accessed December 10, 2014.

County of Yolo, 2005. *Yolo County Integrated Regional Water Management Plan, Background Data and Information Appendix*, May. Available at http://www.yolowra.org/tech_data_appendix/Chapter%206%20-%20 Environmental%20Water%20Resources.pdf, accessed April 10, 2014.

County of Yolo, 1996. *Yolo County Code of Ordinances, Title 10 Environment, Chapter 4 Off-Channel Surface Mining*, effective September 5. Available at http://www.amlegal.com/nxt/gateway.dll/California/yolocounty_ca/yolocounty cacodeofordinances?f=templates$fn=default.htm$3.0$vid=amlegal:yolocounty_ ca, accessed April 11, 2014.

Galloway, D., D.R. Jones, S.E. Ingebritsen. 1999. "Land Subsidence in the United States," *USGS Circular 1182.*

National Resources Conservation Service (NRCS)/State Water Resources Control Board (SWRCB). 2015. *Rusle K Values.* Available at http://www.waterboards.ca.gov/water _issues/programs/stormwater/docs/constpermits/guidance/k_factor_map.pdf), accessed February 4, 2015.

National Resources Conservation Service (NRCS). 2007. *United States Department of Agriculture (USDA) – National Resources Conservation Service, Part 360 Hydrology National Engineering Handbook: Chapter 7 Hydrologic Soil Groups.*

National Resources Conservation Service (NRCS). 2008. *USDA – National Resources Conservation Service, Soil Quality Indicators*, June.

National Resources Conservation Service (NRCS). *2014. USDA – National Resource Conservation Service, Part 618: Soil Properties and Qualities*. Available at

http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_054223, accessed April 8, 2014.

State of California Governor's Office of Planning and Research (OPR). 2013. *Guidelines for Implementation of the California Environmental Quality Act, as amended, Appendix G.*

Stillwater Sciences. 2014. *Soils, Sediment, and Geomorphology Assessment for the Lower Putah Creek Restoration Project.* Prepared by Stillwater Sciences for Yolo Basin Foundation.

U.S. Department of Agriculture (USDA). 2014. GIS Database Files ca095 and ca113.

U.S. Geological Survey (USGS). 2012a. Earthquake Glossary – Blind Thrust Fault webpage. Last modified July 24, 2012. Available at http://earthquake.usgs.gov/learn/glossary/?term=blind thrust fault), accessed January 29, 2015.

U.S. Geological Survey (USGS). 2012b. Earthquake Glossary – Magnitude webpage. Last modified July 24, 2012. Available at http://earthquake.usgs.gov/learn/glossary/?term=magnitude), accessed January 29, 2015.

U.S. Geological Survey (USGS). 2012c. Earthquake Glossary – Seismic Moment webpage. Last modified July 24, 2012. Available at http://earthquake.usgs.gov/learn/glossary/?term=seismic%20moment), accessed January 29, 2015.

Wagner. 1981. Geologic Map of the Sacramento Quadrangle, California, 1:250,000. Available at http://ngmdb.usgs.gov/Prodesc/proddesc_520.htm), accessed February 6, 2015.

BIOLOGICAL RESOURCES

Beedy, E.C. and W.J. Hamilton, III. 1997. Tricolored Blackbird Status Update and Management Guidelines. Prepared by Jones & Stokes Associates, Inc. and University of California, Davis for U.S. Fish and Wildlife Service, Migratory Birds, and Habitat Programs and California Department of Fish and Game, Bird and Mammal Conservation Program.

Bolster, B.C., Ed., 1998. Terrestrial Mammal Species of Special Concern in California; Pallid Bat, *Antrozous pallidus*. Available at http://www.dfg.ca.gov/wildlife/nongame/ssc/docs/mammal/species/08.pdf, accessed April 2, 2014.

BSK Associates. 2015a. *Draft Ordinary High Water Mark Determination and Preliminary Wetland Delineation.*

BSK Associates. 2014. *Screening Level Environmental Assessment, Approximately 24.2-Mile Stretch of Putah Creek.*

California Department of Fish and Game (CDFG). 1994. Staff Report Regarding Mitigation for Impacts to Swainson's Hawks in the Central Valley of California.

California Department of Fish and Game (CDFG). 2008. S*pecies Accounts of Modesto Song Sparrow* (*Melospiza melodia*). Editors: Shuford, W.D. and Gardali, T., 2008.

California Department of Fish and Game (CDFG). 2010. *List of Vegetation Alliances and Associations.* Vegetation Classification and Mapping Program. Sacramento, CA. September 2010. Available at http://www.dfg.ca.gov/biogeodata/vegcamp/natural_comm_list.asp, April 3, 2015.

California Department of Fish and Game (CDFG). 2011. *Special Animals List 898 Taxa.*

California Department of Fish and Wildlife (CDFW). 2014. California Mammal Hunting Regulations 2014-2015.

California Department of Fish and Wildlife (CDFW). 2015a. *California Natural Diversity Database.* Available at https://www.dfg.ca.gov/biogeodata/cnddb/mapsanddata.asp, accessed April 3, 2015.

California Department of Fish and Wildlife (CDFW). 2015b. Comments on Putah Creek Restoration Project – Upper Reach Program, *Notice of Preparation of a Draft Programmatic Environmental Impact Report,* SCH #2015022022, Solano County, March.

California Department of Fish and Wildlife (CDFW). 2016. *Natural Diversity Database. Special Animals List.* Periodic publication, 51 pp, July 2016.

California Native Plant Society (CNPS). 2001. *California Rare Plant Inventory,* 6th Edition.

California Native Plant Society (CNPS). 2007. Klein, A., J. Crawford, J. Evens, T. Keeler-Wolf, and D. Hickson. *Classification of the Vegetation Alliances and Associations of the Northern Sierra Nevada Foothills, California.* Report prepared for California Department of Fish and Game (CDFG).

California State Water Resources Control Board (SWRCB). 2010a. 2010 California 303(d) List of Water Quality Limited Segments. Available at http://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/category5_report.shtml), accessed January 23, 2015.

California State Water Resources Control Board (SWRCB). 2010b. *Final California 2010 Integrated Report (303(d) List/305(b) Report): Supporting Information.* Available at http://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/01145.shtml#13546, accessed June 23, 2015.

City of Winters. 2008. *Initial Study and Mitigated Negative Declaration Winters Putah Creek Nature Park/Floodplain Restoration and Recreational Access Project.*

County of Solano. 2008a. *Solano County General Plan,* Chapter 4: Resources.

County of Solano. 2008b. *Solano County General Plan*, Figure RS-1: Priority Habitat Areas. Available at http://www.co.solano.ca.us/civicax/filebank/blobdload.aspx?BlobID=10637, accessed January 2015.

County of Solano. 2008c. *Solano County 2008 Draft General Plan Draft Environmental Impact Report*. Prepared by EDAW, April 18. Available at http://www.solanocounty.com/civicax/filebank/blobdload.aspx?BlobID=15179, accessed December 10, 2014.

County of Yolo. 2009. *Yolo County General Plan*, adopted November. Available at http://www.yolocounty.org/general-government/general-government-departments/county-administrator/general-plan-update/adopted-general-plan), accessed April 23, 2014.

Central Valley Regional Water Quality Control Board (CVRWQCB). 2008. *Sacramento – San Joaquin Delta Estuary TMDL for Methylmercury Public Draft Staff Report.* Available at http://www.epa.gov/waters/tmdldocs/41415_delta-tmdl_full_rpt-.pdf), accessed May 6, 2015.

Central Valley Regional Water Quality Control Board (CVRWQCB). 2014. Waste Discharge Requirements for the University of California, Davis Main Wastewater Treatment Plant. Order R5-2014-0152. NPDES No. CA0077895. Available at http://www.waterboards.ca.gov/rwqcb5/board_decisions/adopted_orders/solano/r5-2014-0152.pdf, accessed May 8, 2015.

eBird. 2013: An online database of bird distribution and abundance. Website [Accessed January 2013]. eBird, Ithaca, New York.

EDAW. 2005. *Lower Putah Creek Watershed Management Action Plan Phase I – Resource Assessments.* Prepared for Lower Putah Creek Coordinating Committee, December. Available at http://www.cityofwinters.org/pdf/putahcreek/Lower%20Putah%20WMAP%20Vol%20I%2012-05.pdf), accessed April 9, 2014.

Eisler, Ronald. 1990. *Contaminant Hazard Reviews, Report 20: Boron Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review.* U.S. Fish and Wildlife Service (USFWS) Patuxent Wildlife Research Center, Laurel, MD. April. Available at http://pubs.er.usgs.gov/publication/5200086), accessed May 27, 2015.

Hamilton, W.J. 2004. Tricolored blackbird (*Agelaius tricolor*). The riparian bird conservation plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/htmldocs/riparian_v-2.html

National Oceanic and Atmospheric Administration (NOAA). 2014. Recovery Plan for the Evolutionary Significant Units of Sacramento River Winter-Run Chinook Salmon and Central Valley Spring-Run Chinook Salmon and the Distinct Population Segment of California Central Valley Steelhead. National Marine Fisheries Service, West Coast Region. Sacramento, California. July 2014.

National Pesticide Information Center (NPIC). 2015. Glyphosate Fact Sheet. Available at http://npic.orst.edu/factsheets/glyphotech.html), accessed July 22, 2015.

Pasternack. 2010. Estimate of the Number of Spring-Run Chinook Salmon that could be Supported by Spawning Habitat Rehabilitation at Sinoro Bar on the Lower Yuba River – Appendix H, July.

Pierson, E.D., W. Rainey, C. Corben. 2004. Distribution and Status of Western Red Bats (*Lasiurus blossevillii*) in California. Prepared for: Species Conservation and Recovery Program – Habitat Conservation Planning Branch. CDFG. Sacramento, Ca.

Shuford, W.D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: Modesto Song Sparrow Species Account. Prepared for California Department of Fish and Game.

State of California Governor's Office of Planning and Research (OPR). 2013. Guidelines for Implementation of the California Environmental Quality Act, as amended, Appendix G.

Stillwater Sciences and Vollmar Natural Lands Consulting. 2015. Habitat Assessment for the Lower Putah Creek Restoration Project—Upper Reach. Prepared for Yolo Basin Foundation.

Stillwater Sciences and Vollmar Natural Lands Consulting. 2014. Habitat Assessment for the Lower Putah Creek Restoration Project—Yolo Bypass Wildlife Area Reach. Prepared for Yolo Basin Foundation.

Swainson's Hawk Technical Advisory Committee. 2000. Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley.

Truan, M.L., A. Engilis Jr., and J.R. Trochet. 2010. Putah Creek Terrestrial Wildlife Monitoring Program: comprehensive report 1997-2009. Department of Widlife, Fish, and Conservation Biology, Museum of Wildlife and Fish Biology. University of California, Davis, California.

United States Army Corps of Engineers (USACE). 2006. *Special Status Species.* Available at http://corpslakes.usace.army.mil/employees/species/ssp.cfm), accessed May 27, 2015.

United States Fish and Wildlife Service (USFWS). 2015. Section 7 Consultation, Guidance for Preparing a Biological Assessment. Available at http://www.fws.gov/midwest/endangered/section7/ba_guide.html), accessed June 25, 2015.

United States Fish and Wildlife Service (USFWS). 2014. Critical Habitat for Threatened and Endangered Species Online Mapper. Available at http://ecos.fws.gov/crithab/), accessed September 24, 2014.

United States Fish and Wildlife Service (USFWS). 1999. Conservation Guidelines for the Valley Elderberry Longhorn Beetle, July 9.

University of California Division of Agriculture and Natural Resources (UCDANR). 2015. California Fish Species: Sacramento Blackfish, Sacramento Sucker, Largemouth

Bass, and Smallmouth Bass. Available at http://calfish.ucdavis.edu/species/, accessed July 22, 2015.

U.S. Environmental Protection Agency (US EPA). 1991. *Pesticide Fact Sheet 223: Dithiopyr.* 540/FS-91-137.

U.S. Environmental Protection Agency (US EPA). 1993. *Reregistration Eligibility Decision Facts: Glyphosate.* EPA-738-F-93-011.

U.S. Environmental Protection Agency (US EPA). 1998. *Reregistration Eligibility Decision Facts: Triclopyr.* EPA-738-F-98-00.

U.S. Environmental Protection Agency (US EPA). 2005a. *Pesticide Fact Sheet: Aminopyralid.* Chemical Abstracts Service Number 150114-71-9.

U.S. Environmental Protection Agency (US EPA). 2005b. *Reregistration Eligibility Decision Facts: Chlorsulfuron.* EPA-738-F-05-002.

U.S. Environmental Protection Agency (US EPA). 2006. Reregistration Eligibility Decision for Imazapyr. EPA 738-R-06-007, OPP-2005-0495. Available at http://www.epa.gov/pesticides/reregistration/REDs/imazapyr_red.pdf), accessed April 8, 2015.

U.S. Environmental Protection Agency (US EPA). 2012c. Dissolved Oxygen and Biochemical Oxygen Demand webpage. Available at http://water.epa.gov/type/rsl/monitoring/vms52.cfm, accessed May 29, 2015.

U.S. Environmental Protection Agency (US EPA). 2013. Trends in Blood Mercury Concentrations and Fish Consumption Among U.S. Women of Childbearing Age, July.

U.S. Environmental Protection Agency (US EPA). 2015. *Lehr Old Campus Landfill (USDOE) Superfund Site Overview*. Available at http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/ViewByEPAID/CA2890190000), accessed January 26, 2015.

U.S. Geological Survey (USGS). 2010. Methylmercury Cycling, Bioaccumulation, and Export from Agricultural and Non-agricultural Wetlands in the Yolo Bypass.

U.S. Geological Survey (USGS). 2000. Mercury in the Environment: Fact Sheet 146-00.

Washington State Department of Transportation (WSDOT). 2006. Roadside Vegetation Management Herbicide Fact Sheet: Isoxaben.

AIR QUALITY AND GREENHOUSE GAS EMISSIONS

California Air Resources Board (CARB). 2022. *Aerometric Data Analysis and Management (ADAM)*. Available at http://www.arb.ca.gov/adam/.

California Air Resources Board (CARB). 2008. *Climate Change Scoping Plan.* December.

California Air Resources Board (CARB). 2014. *Climate Change Scoping Plan First Update*. October.

California Air Resources Board (CARB). 2017. *California's 2017 Climate Change Scoping Plan*. November.

Sacramento Area Council of Governments (SACOG). 2011. *MTP/SCS 2035 Draft Environmental Impact Report.* November.

Yolo-Solano Air Quality Management District (YSAQMD). 2007. *Handbook for Assessing and Mitigating Air Quality Impacts*. July.

Yolo-Solano Air Quality Management District (YSAQMD). 2019. *The Triennial Assessment and Plan Update*. May.

U.S. Energy Information Administration (U.S. EIA), 2021). Frequently Asked Questions, and, Diesel Fuel Explained. https://www.eia.gov/tools/faqs/faq.php?id=23&t=10 and https://www.eia.gov/energyexplained/diesel-fuel/use-of-diesel.php#:~:text=Diesel%20fuel%20is%20important%20to%20the%20U.S.%20economy&text=In%202021%2C%20distillate%20fuel%20consumption,128%20million%20gallons%20per%20day. Accessed on July 28, 2022.

NOISE

California Department of Transportation (Caltrans). 1998. Technical Noise Supplement.

County of Solano. 2008. *Solano County Solano County General Plan, Public Health and Safety Element.*

County of Yolo. 2009. *2030 Countywide General Plan, Health and Safety Element.*

Federal Highway Administration (FHWA). 2006. *Roadway Construction Noise Model User's Guide*.

U.S. Environmental Protection Agency (U.S. EPA). 1978. *Protective Noise Levels. Condensed Version of US EPA Levels Document*. US EPA 550/9-79-100.

HAZARDS AND HAZARDOUS MATERIALS

BSK Associates (BSK). 2014. *Screening Level Environmental Assessment Approximately 24.2-Mile Stretch of Lower Putah Creek.*

California Air Resources Board (CARB). 2013. Yolo –Solano AQMD List of Current Rules. Available at http://www.arb.ca.gov/drdb/ys/cur.htm, accessed April 7, 2015.

California Department of Public Health (CDPH). 2012a. *Best Management Practices for Mosquito Control in California,* July. Available at http://www.cdph.ca.gov/HealthInfo/discond/Documents/BMPforMosquitoControl07-12.pdf, accessed October 15, 2013.

California Department of Toxic Substances Control (DTSC). 2011. *Health and Safety Code Section 25354.5 Emergency Removal Locations July 1995 – June 2011, July 29, 2011.* Available at http://dig.abclocal.go.com/kgo/PDF/DTSCRemovalLocations1995thru June2011.pdf, accessed January 11, 2015.

California Environmental Protection Agency (Cal/EPA). 2007. Background and History on "Cortese List" Statute webpage. Available at http://www.calepa.ca.gov/SiteCleanup/CorteseList/Background.htm, accessed April 7, 2015.

County of Solano. 2015a. Solano County Department of Resource Management, Environmental Health Services Division. Available at http://www.co.solano.ca.us/depts/rm/environmental_health/hazmat/, accessed January 15, 2015.

County of Solano. 2015b. *Solano County Code, Article III, Land Use Regulations.* Available at http://www.codepublishing.com/ca/solanocounty/, accessed April 6, 2015.

County of Solano. 2014. *Solano County Recycle Guide.* Available at http://www.solanocounty.com/civicax/filebank/blobdload.aspx?blobid=11475, accessed April 3, 2015.

County of Solano. 2008. *Solano County General Plan, Chapter 5: Public Health and Safety.*

County of Yolo. 2015. Hazardous Materials Business Plan and Inventory Program webpage. Available at http://www.yolocounty.org/community-

services/environmental-health-services/hazardous-materials/hazardous-materials-program, accessed April 7, 2015.

County of Yolo. 2009. *General Plan: Chapter 8: Health and Safety Element.*

Davis Enterprise. 2013. "Winters Pot Grow Busted; Two Arrested," by Cary Golden, July 21, 2013. Available at http://www.davisenterprise.com/local-news/crime-fire-courts/winters-pot-grow-busted-two-arrested/, accessed January 11, 2015.

EDAW. 2005. *Lower Putah Creek Watershed Management Action Plan Phase I – Resource Assessments.* Prepared for Lower Putah Creek Coordinating Committee, December 2005. Available at http://www.cityofwinters.org/pdf/putahcreek/Lower%20 Putah%20WMAP%20Vol%20I%2012-05.pdf, accessed April 9, 2014.

State of California, Governor's Office of Planning and Research. (OPR). 2013. *Guidelines for Implementation of the California Environmental Quality Act, as amended, Appendix G.*

Sacramento-Yolo Mosquito & Vector Control District. 2008. *Mosquito Reduction Best Management Practices*, p. 16.

Solano County Mosquito Abatement District. 2015a. *Mosquito Prevention Criteria.* Available at http://www.solanomosquito.com/prevention_drainage.html, accessed January 15, 2015.

University of California, Davis (UC Davis). 1995. *Final Community Relations Plan, Laboratory for Energy-Related Health Research Environmental Restoration, April 1995.* Available at http://safetyservices.ucdavis.edu/ps/ec/lehr/lehr_CIP.pdf/view, accessed March 13, 2015.

U.S. Environmental Protection Agency (US EPA). 2015. Lehr Old Campus Landfill webpage. Available at http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/ViewByEPAID/ CA2890190000, accessed March 12, 2015.

U.S. Environmental Protection Agency (US EPA). 2014. SW-846 webpage. Available at http://www.epa.gov/epawaste/hazard/testmethods/sw846/index.htm, accessed May 1, 2015.

U.S. Environmental Protection Agency (US EPA). 2013. SW-846 On-line webpage. Available at http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm, accessed May 1, 2015.

U.S. Environmental Protection Agency (US EPA). 2006. Reregistration Eligibility Decision for Imazapyr. EPA 738-R-06-007, OPP-2005-0495. Available at http://www.epa.gov/ pesticides/reregistration/REDs/imazapyr_red.pdf, accessed April 8, 2015.

U.S. Environmental Protection Agency (US EPA). 1998. *Reregistration Eligibility Decision Facts: Triclopyr.* EPA-738-F-98-00.

U.S. Environmental Protection Agency (US EPA). 1993. *Reregistration Eligibility Decision Facts: Glyphosate.* EPA-738-F-93-011.

U.S. Environmental Protection Agency (US EPA). 1991. *Pesticide Fact Sheet 223: Dithiopyr.* 540/FS-91-137.

Washington State Department of Transportation (WSDOT). 2006. *Roadside Vegetation Management Herbicide Fact Sheet: Isoxaben.*

Woodland Daily Democrat. 2013. "Winters Pot Grow Busted," July 20. Available at http://www.thereporter.com/general-news/20130720/winters-pot-grow-busted, accessed January 11, 2015.

Yolo-Solano Air Quality Management District (YSAQMD). 2015. All About Yolo-Solano AQMD webpage. Available at http://www.ysaqmd.org/district-about.php, accessed April 24, 2015.

LAND USE

County of Solano. 2008. *Solano County Solano County General Plan.* November.

County of Solano. 2003. *County Solano County General Plan, Park and Recreation Element.* June 24.

County of Yolo. 2009. *2030 Countywide General Plan*. November 10.

EDAW, Inc. 2005. *Lower Putah Creek Watershed Management Action Plan.* Prepared for Lower Putah Creek Coordinating Committee. December.

University of California, Davis (UC Davis). 2003. *Long Range Development Plan, Planning Areas and Objectives.*

AESTHETICS

City of Winters. 1992. General Plan Policy Document, Section VIII: Community Design. May 19.

EDAW. 2008. *Final Environmental Impact Report for the 2008 Solano County General Plan.* July 21.

Solano County. 2008. *Solano County General Plan*, page RS-5. November.

RECREATION

County of Solano. 2008. *Solano County Solano County General Plan.* November.

County of Solano. 2003. *Solano County General Plan, Park and Recreation Element.* June 24.

County of Yolo. 2009. *Adopted 2030 Countywide General Plan,* November 10.

EDAW, Inc. 2005. *Lower Putah Creek Watershed Management Action Plan*, prepared for Lower Putah Creek Coordinating Committee. December.

University of California, Davis (UC Davis). 2003. *Long Range Development Plan, Planning Areas and Objectives.*

CULTURAL RESOURCES

County of Solano. 2008. *Solano County Solano County General Plan*. November.

County of Solano. 2003. *Solano County General Plan, Park and Recreation Element.* June 24.

County of Yolo. 2009. *Adopted 2030 Countywide General Plan.* November 10.

EDAW, Inc. 2005. *Lower Putah Creek Watershed Management Action Plan*. Prepared for Lower Putah Creek Coordinating Committee. December.

University of California, Davis (UC Davis). 2003. *Long Range Development Plan, Planning Areas and Objectives.*

TRANSPORTATION/TRAFFIC

Caltrans. 2014. *2015 Airport Land Use Compatibility Plan Status,* December. Available at http://www.dot.ca.gov/hq/planning/aeronaut/documents/alucp/alucp_inventory.pdf, accessed January 6, 2015.

Capitol Corridor Joint Powers Authority (JPA). 2015. Capitol Corridor Route Map. Available at http://www.capitolcorridor.org/route_and_schedules/, accessed January 13, 2015.

City of Winters. 1992. *City of Winters General Plan Policy Document,* May 19. Available at http://www.cityofwinters.org/pdf/GeneralPlan.pdf, accessed January 5, 2015.

County of Solano. 2015a. Solano County Airport Land Use Commission. Webpage available at http://www.solanocounty.com/depts/rm/boardscommissions/solano_county_airport_land_use_commission/default.asp, accessed January 10, 2015.

County of Solano. 2015b. Solano County Airport Land Use Commission Documents webpage. Available at http://www.solanocounty.com/depts/rm/boardscommissions/solano_county_airport_land_use_commission/documents.asp, accessed January 10, 2015.

County of Solano. 2014. Personal communication between BSK Associates and Solano County Planning Department, June 26, 2014. On file with BSK Associates.

County of Solano. 2008a. *Solano County General Plan, Chapter 7: Transportation and Circulation.* Available at http://www.solanocounty.com/civicax/filebank/blobdload.aspx?BlobID=6497, accessed April 10, 2014.

County of Solano. 2008b. *Solano County 2008 Draft General Plan Draft Environmental Impact Report*. Prepared by EDAW. Available at http://www.solanocounty.com/civicax/filebank/blobdload.aspx?BlobID=15179, accessed December 10, 2014.

County of Yolo. 2013. *County of Yolo Bicycle Transportation Plan.* Available at http://www.yolocounty.org/home/showdocument?id=2538, accessed January 13, 2015.

County of Yolo. 2010. *Transportation Impact Study Guidelines.* Available at http://www.yolocounty.org/home/showdocument?id=11513, accessed December 1, 2014.

County of Yolo. 2009a. *Adopted 2030 Countywide General Plan, Circulation Element.* Available at http://www.yolocounty.org/home/showdocument?id=14467, accessed December 10, 2014.

County of Yolo. 2009b. *Yolo County 2030 Countywide General Plan EIR, Transportation and Circulation.* Prepared by LSA Associates, Inc. Available at http://www.yolocounty.org/home/showdocument?id=9182, accessed December 10, 2014.

County of Yolo. 2009c. *Yolo County 2030 Countywide General Plan EIR, Appendix C Transportation and Circulation Data.* Available at http://www.yolocounty.org/home/showdocument?id=9238, accessed December 10, 2014.

Governor's Office of Planning and Research, State of California (OPR). 2013. *Guidelines for Implementation of the California Environmental Quality Act, as amended.*

Metropolitan Transportation Commission (MTC). 2014. About the Metropolitan Transportation Commission. Web page available at http://www.mtc.ca.gov/about_mtc/about.htm, accessed January 8, 2015.

Sacramento Council Area of Governments (SACOG). 2015a. *Airport Land Use Planning Comprehensive Land Use Plans*. Available at http://www.sacog.org/airport/clups.cfm, accessed January 6, 2015.

Sacramento Council Area of Governments (SACOG). 2015b. *Airport Land Use Planning General Information.* Available at http://www.sacog.org/airport/index.cfm, accessed January 9, 2015.

Sacramento Council Area of Governments (SACOG). 2015c. *Sacramento Area Council of Governments Factsheet.* Available at http://www.sacog.org/about/advocacy/pdf/fact-sheets/FactSheet_SACOG.pdf, accessed January 9, 2015.

Sacramento Council Area of Governments (SACOG). 1999. *Yolo County Airport Comprehensive Land Use Plan.* Available at http://www.sacog.org/airport/clups/2008/Yolo%20County%20Airport%20CLUP%20Oct%201999%20-%2099-001.pdf, accessed January 6, 2015.

Solano County ALUC (Solano County). 2012. *Nut Tree Airport Master Plan.* Available at http://www.solanocounty.com/civicax/filebank/blobdload.aspx?BlobID=16151, accessed January 10, 2015.

Solano County ALUC (Solano County). 1988. *Airport/Land Use Compatibility Plan Nut Tree Airport.* Available at http://www.solanocounty.com/civicax/filebank/blobdload.aspx?BlobID=16151, accessed January 10, 2015.

Solano Transportation Authority (STA). 2015. Solano Express Interactive Map. Available at http://www.solanoexpress.com/, accessed January 13, 2015.

Solano Transportation Authority (STA). 2013. *Solano County Congestion Management Program*, adopted December 11. Available at http://www.sta.ca.gov/docManager/1000004382/FINAL%202013%20Solano%20CMP%2012-11-13.pdf, accessed January 14, 2015.

Solano Transportation Authority (STA). 2011. *Solano Countywide Bicycle Transportation Plan,* December 14. Available at http://www.sta.ca.gov/docs.php?oid=1000002942&ogid=1000000947, accessed January 14, 2015.

Solano Transportation Authority (STA). 2010. Who is the STA? Webpage available at http://www.sta.ca.gov/Content/10032/WhoistheSTA.html, accessed January 8, 2015.

Solano Transportation Authority (STA). 2005. *Solano Travel Safety Plan.* Available at http://www.sta.ca.gov/docManager/1000002505/Final%20STA%20Safety%20Plan%2007%2013%2005.pdf, accessed January 14, 2015.

Yolobus. 2013. System Overview Map. Available at http://www.yolobus.com/media/YolobusSystemOverviewMap03-13.pdf, accessed January 13, 2015.

PUBLIC SERVICES

County of Solano. 2008. *Solano County Solano County General Plan.*

County of Solano. 2003. *Solano County General Plan, Park and Recreation Element.*

County of Yolo, 2009. *Adopted 2030 Countywide General Plan.*

EDAW, Inc. 2005. *Lower Putah Creek Watershed Management Action Plan*. Prepared for Lower Putah Creek Coordinating Committee.

University of California, Davis (UC Davis). 2003. *Long Range Development Plan, Planning Areas and Objectives.*

UTILITIES AND SERVICE SYSTEMS

California Public Utilities Commission (CPUC). 2015. *Electric Transmission Fact Sheet.* Available at http://www.cpuc.ca.gov/Environment/info/aspen/cltp/Files_8_26_14/_2ElectricTransmissionFactSheet.pdf, accessed May 26, 2015.

California Public Utilities Commission (CPUC). 2012. *General Order 95, Section III Requirements for All Lines,* Table 1 Basic Minimum Allowable Vertical Clearance of Wires above Railroads, Thoroughfares, Ground or Water Surfaces. Available at http://www.cpuc.ca.gov/gos/GO95/go_95_table_1.html, accessed April 1, 2015.

CalRecycle. 2012. Local Government Central: Annual Reporting Requirements webpage. Llast updated June 16, 2014, http://www.calrecycle.ca.gov/LGCentral/AnnualReport/, accessed April 2, 2015.

City of Davis. 2012. *Sewer System Management Plan.* Available at http://public-works.cityofdavis.org/Media/PublicWorks/Documents/PDF/PW/Wastewater/Sewer-System-Management-Plan.pdf, accessed May 14, 2015.

City of Winters. 2006. *Water Master Plan.* Available at http://www.cityofwinters.org/public_works/pdf/WintersWaterMasterPlan_FINAL%2020070216.pdf, accessed May 11, 2015.

City of Winters. 1992. *General Plan.* Available at http://www.cityofwinters.org/pdf/GeneralPlan.pdf, accessed May 11, 2015.

City of Winters. 1991. *General Plan Draft Environmental Impact Report.* Available at http://www.cityofwinters.org/pdf/GeneralPlan.pdf, accessed May 11, 2015.

Common Ground Alliance. 2015. Call 811 State Specific Information webpage. Available at http://www.call811.com/state-specific.aspx, accessed April 2, 2015.

County of Solano. 2015. *Countywide Integrated Waste Management Plan.* Available at http://www.co.solano.ca.us/depts/rm/planning/garbage_and_recycling/ciwmp_planning_documents.asp, accessed April 3, 2015.

County of Solano. 2014. *Solano County Recycle Guide.* Available at http://www.solanocounty.com/civicax/filebank/blobdload.aspx?blobid=11475, accessed April 3, 2015.

County of Solano. 2008a. *Solano County General Plan.* Available at http://www.solanocounty.com/civicax/filebank/blobdload.aspx?BlobID=6498, accessed December 18, 2014.

County of Solano. 2008b. *Solano County 2008 Draft General Plan Draft Environmental Impact Report,* prepared by EDAW. Available at http://www.solanocounty.com/civicax/filebank/blobdload.aspx?BlobID=15179, accessed December 10, 2014.

County of Yolo. 2015. Countywide Integrated Waste Management Plan webpage. Available at http://www.yolocounty.org/community-services/planning-public-works/
integrated-waste-management-division/waste-advisory-committee/
ciwmp-5-year-review, accessed April 3, 2015.

County of Yolo. 2009a. Adopted 2030 Countywide General Plan. Available at http://www.yolocounty.org/home/showdocument?id=14466, accessed December 18, 2014.

County of Yolo. 2009b. *Yolo County 2030 Countywide General Plan EIR, Utilities and Energy; Public Services*. Prepared by LSA Associates, Inc. Available at http://www.yolocounty.org/home/showdocument?id=9182, accessed May 11, 2015.

Google Earth. 2014. Aerial Images of Project Site.

National Pipeline Mapping System. 2015. Yolo and Solano County. Available at https://www.npms.phmsa.dot.gov/PublicViewer/composite.jsf, accessed January 15, 2015.

State of California, Governor's Office of Planning and Research (OPR). 2013. *Guidelines for Implementation of the California Environmental Quality Act, As Amended, Appendix G.*

Underground Service Alert of Northern/Central California and Nevada 811 (USA North 811). 2015. Frequently Asked Questions webpage. Available at http://usanorth811.org/
excavators/#faq, accessed April 2, 2015.

U.S. Department of Transportation (US DOT). 2014a. Pipeline & Hazardous Materials Safety Administration Community Toolbox webpage. Available at http://primis.phmsa. dot.gov/comm/Index.htm?nocache=3785, accessed April 2, 2015.

U.S. Department of Transportation (US DOT). 2014b. Pipeline & Hazardous Materials Safety Administration Damage Prevention webpage. Available at http://primis.phmsa. dot.gov/comm/DamagePrevention.htm?nocache=4892, accessed April 2, 2015.

U.S. Department of Transportation (US DOT). 2014c. Pipeline Construction: Trenching webpage. Available at http://primis.phmsa.dot.gov/comm/construction/index.htm? nocache=3468#Trenching, accessed April 1, 2015.

CEQA TOPICAL ANALYSES

County of Yolo Current Projects List. Available at http://www.yolocounty.org/ community-services/planning-public-works/planning-division/current-projects, accessed June 11, 2015.

University of California, Davis (UC Davis). Current Projects List. Available at http://sustainability.ucdavis.edu/progress/commitment/environmental_review/ current_projects.html, accessed June 11, 2015.

Yolo-Solano Air Quality Management District (YSAQMD). 2007. *CEQA Handbook for Assessing and Mitigating Air Quality Impacts.*

APPENDIX A

Notice of Preparation

Notice of Preparation

To: State Clearinghouse
P.O. Box 3044
Sacramento, CA 95812
(Address)

From: Solano County Water Agency
810 Vaca Valley Parkway
Vacaville, CA 95688
(Address)

Subject: Notice of Preparation of a Draft Environmental Impact Report

Solano County Water Agency will be the Lead Agency and will prepare an environmental impact report for the project identified below. We need to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval for the project.

The project description, location, and the potential environmental effects are contained in the attached materials. A copy of the Initial Study (☐ is ☒ is not) attached.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date but not later than 30 days after receipt of this notice.

Please send your response to Chris Lee at the address shown above. We will need the name for a contact person in your agency.

Project Title: PEIR Putah Creek Restoration Project-Upper Reach Program

Project Applicant, if any: _____

Date 01/30/2015

Signature _____

Title Principal Water Resources Specialist

Telephone 707-455-1105

Reference: California Code of Regulations, Title 14, (CEQA Guidelines) Sections 15082(a), 15103, 15375.

Notice of Preparation of a Draft Programmatic Environmental Impact Report

Solano County Water Agency will be the Lead Agency and will prepare a Draft Programmatic Environmental Impact Report (DPEIR) to comprehensively address near-term and long-term activities planned for the Putah Creek Restoration Project-Upper Reach.

A programmatic EIR is an EIR that reviews the environmental impacts "of a series of actions that can be characterized as one large project" and that are related geographically, as logical parts in a chain of proposed actions, in connection with general criteria to govern the conduct of a continuing program, and/or "as individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways" (CEQA Guidelines, section 15168, subd. (a)). A program EIR offers several advantages, including providing for a more exhaustive consideration of effects and alternatives, avoiding duplicative consideration of policy issues, reducing paperwork, and allowing the lead agency to consider program-wide mitigation measures (CEQA Guidelines, section 15168, subd. (b)).

The DPEIR applies to restoration efforts proposed for the Upper Reach of the Putah Creek Restoration Project, planned by the Solano County Water Agency (SCWA) and the Lower Putah Creek Coordinating Committee (LPCCC). The Upper Reach Project Area includes the area just downstream of the Putah Diversion Dam (one mile west of Winters) to the Western edge of the Yolo Basin Wildlife Area (near Yolo County Road 106A).

The Project purpose is to restore and rehabilitate the creek channel, banks, and associated habitats to more natural, self-sustaining form and function, consistent with the current (post-Monticello Dam) hydrologic regime. The proposed program of projects and activities (collectively, the "Project") would be implemented to stop further degradation of the creek corridor and to "jump-start" natural geomorphic and ecological processes in site-specific locations.

Program Activities include:

- Channel reconfiguration
    - Create low-flow channel and floodplain
    - Create side channels
    - Reposition thalweg
    - Construct riffles
    - Increase channel sinuosity
    - Construct rock-cross-vane grade/flow control structures
    - Stabilize channel banks
        - Construct rock revetments
        - Construct log revetments
        - Install root wads
        - Install large woody debris
    - Improve fish spawning gravels
        - Gravel augmentation
        - Loosen embedded gravels by scarification
    - Fill abandoned gravel pits
- Vegetation management

    - Remove invasive plants
    - Plant native vegetation
- Maintenance
    - Irrigate native vegetation
    - Manage non-native vegetation
    - Maintain long-term access points

Environmental effects of the programmatic EIR are probable in the following areas: Aesthetics; Air Quality and Greenhouse Gases; Biological Resources; Cultural Resources; Geology and Soils; Hazards and Hazardous Materials; Hydrology and Geomorphology; Land Use, Population, and Agricultural Resources; Noise,; Public Services; Recreation; Transportation/Traffic; Utilities; and Water Quality.

The purpose of the NOP is to inform responsible agencies and the public that the Proposed Project could have significant effects on the environment and to solicit comments so that any concerns raised could be considered during the preparation of the DPEIR. Potential effects of the project could include disturbance to the bed and bank of Putah Creek, air and noise pollution during restoration activities, and impacts to water quality. The DPEIR will address these potential effects as well as any other potential impacts discussed during the scoping meeting and any associated mitigation.

A Public Scoping Meeting on the Proposed Project will occur on February 12, 2015, from 3:00-5:00 pm at Winters City Hall, located at:

Winters City Hall
318 1st Street
Winters, CA 95694

Lead Agency Contact:
Chris Lee-Principal Water Resources Specialist
(707) 455-1105 /clee@scwa2.com

Send written comments to the Lead Agency on the Scope of the programmatic EIR by March 15, 2015.

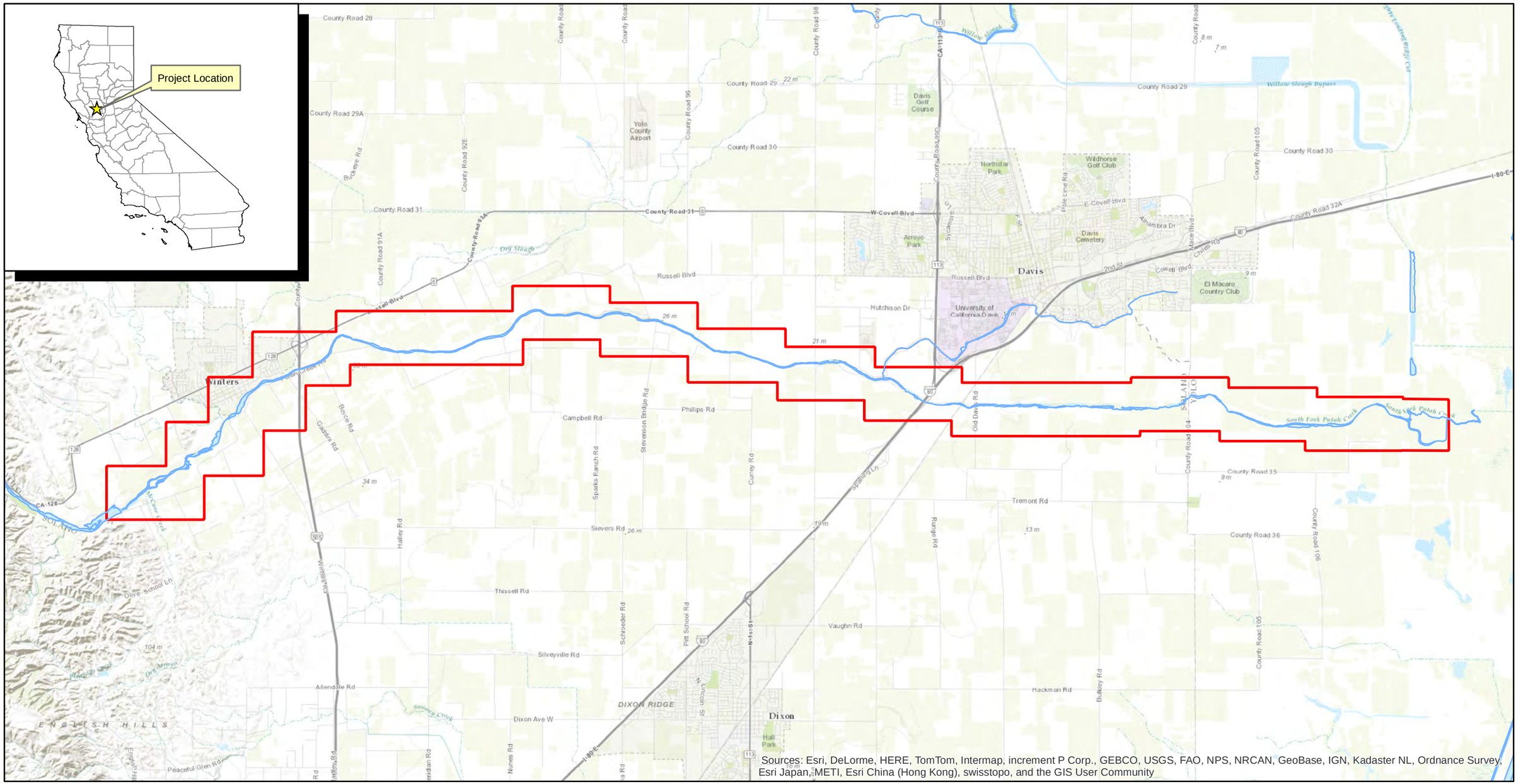
Document pertaining to this programmatic EIR can be viewed at:

https://files.stillwatersci.com

Please contact Stephanie Bishop for login information at:

SBishop@esassoc.com

Document Path: J:\GIS_Data_Files\Projects\E1203801S - Putah Creek Restoration EIR\ALL MAPS 10_15_14\Figure 1 Vicinity Map\Figure_1_vicinity-map-10_15_14_kg.mxd



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Legend

Map Sheet Area

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BSK Associates
Engineers & Laboratories

Lower Putah Creek Restoration Project - Upper Reach Program
Solano and Yolo County, California

Figure 1
Vicinity Map
BSK Project E1203801S

APPENDIX B

Responses to Notice of Preparation

SOLANO COUNTY WATER AGENCY

March 6, 2015

Yolo Basin Foundation
45211 County Road 32B (Chiles Road)
Davis, CA 95618
Attention: Robin Kulakow, Executive Director

Re: Putah Creek Upper Reach Program-Scoping Meeting Summary Report

Dear Ms. Kulakow:

The Solano County Water Agency held a Scoping Meeting for the Putah Creek Upper Reach Program on February 12, 2015, at City Hall in the City of Winters. I am submitting this Scoping Meeting Summary Report for your records (Grant Deliverable). The meeting was well attended and we received several verbal comments on the Upper Reach Program. We have subsequently received several written comments as well.

Included in this summary report are the following:

- Public Notice of Meeting
- Meeting Agenda
- Meeting Attendance Record
- Meeting Minutes
- Verbal Scoping Comments (optional deliverable)
- Written Scoping Comments (optional deliverable)

If you have any comments or questions, please call me at (707)455-1105, or send me a note at clee@scwa2.com.

Sincerely,

Chris Lee,
Principal Water Resources Specialist

L-210.Scoping Meeting Summary Report

810 Vaca Valley Parkway, Suite 203
Vacaville, California 95688
Phone (707) 451-6090 • FAX (707) 451-6099
www.scwa2.com

SOLANO WATER
SAVE BLUE

Notice of Preparation

To: State Clearinghouse
P.O. Box 3044
Sacramento, CA 95812
(Address)

From: Solano County Water Agency
810 Vaca Valley Parkway
Vacaville, CA 95688
(Address)

Subject: Notice of Preparation of a Draft Environmental Impact Report

Solano County Water Agency will be the Lead Agency and will prepare an environmental impact report for the project identified below. We need to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval for the project.

The project description, location, and the potential environmental effects are contained in the attached materials. A copy of the Initial Study (☐ is ☒ is not) attached.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date but not later than 30 days after receipt of this notice.

Please send your response to Chris Lee at the address shown above. We will need the name for a contact person in your agency.

Project Title: PEIR Putah Creek Restoration Project-Upper Reach Program

Project Applicant, if any: _____

Date 01/30/2015

Signature _____

Title Principal Water Resources Specialist

Telephone 707-455-1105

Reference: California Code of Regulations, Title 14, (CEQA Guidelines) Sections 15082(a), 15103, 15375.

Notice of Preparation of a Draft Programmatic Environmental Impact Report

Solano County Water Agency will be the Lead Agency and will prepare a Draft Programmatic Environmental Impact Report (DPEIR) to comprehensively address near-term and long-term activities planned for the Putah Creek Restoration Project-Upper Reach.

A programmatic EIR is an EIR that reviews the environmental impacts "of a series of actions that can be characterized as one large project" and that are related geographically, as logical parts in a chain of proposed actions, in connection with general criteria to govern the conduct of a continuing program, and/or "as individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways" (CEQA Guidelines, section 15168, subd. (a)). A program EIR offers several advantages, including providing for a more exhaustive consideration of effects and alternatives, avoiding duplicative consideration of policy issues, reducing paperwork, and allowing the lead agency to consider program-wide mitigation measures (CEQA Guidelines, section 15168, subd. (b)).

The DPEIR applies to restoration efforts proposed for the Upper Reach of the Putah Creek Restoration Project, planned by the Solano County Water Agency (SCWA) and the Lower Putah Creek Coordinating Committee (LPCCC). The Upper Reach Project Area includes the area just downstream of the Putah Diversion Dam (one mile west of Winters) to the Western edge of the Yolo Basin Wildlife Area (near Yolo County Road 106A).

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Program Activities include:

- Channel reconfiguration
    - Create low-flow channel and floodplain
    - Create side channels
    - Reposition thalweg
    - Construct riffles
    - Increase channel sinuosity
    - Construct rock-cross-vane grade/flow control structures
    - Stabilize channel banks
        - Construct rock revetments
        - Construct log revetments
        - Install root wads
        - Install large woody debris
    - Improve fish spawning gravels
        - Gravel augmentation
        - Loosen embedded gravels by scarification
    - Fill abandoned gravel pits
- Vegetation management

    - Remove invasive plants
    - Plant native vegetation
- Maintenance
    - Irrigate native vegetation
    - Manage non-native vegetation
    - Maintain long-term access points

Environmental effects of the programmatic EIR are probable in the following areas: Aesthetics; Air Quality and Greenhouse Gases; Biological Resources; Cultural Resources; Geology and Soils; Hazards and Hazardous Materials; Hydrology and Geomorphology; Land Use, Population, and Agricultural Resources; Noise,; Public Services; Recreation; Transportation/Traffic; Utilities; and Water Quality.

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A Public Scoping Meeting on the Proposed Project will occur on February 12, 2015, from 3:00-5:00 pm at Winters City Hall, located at:

Winters City Hall
318 1st Street
Winters, CA 95694

Lead Agency Contact:
Chris Lee-Principal Water Resources Specialist
(707) 455-1105 /clee@scwa2.com

Send written comments to the Lead Agency on the Scope of the programmatic EIR by March 15, 2015.

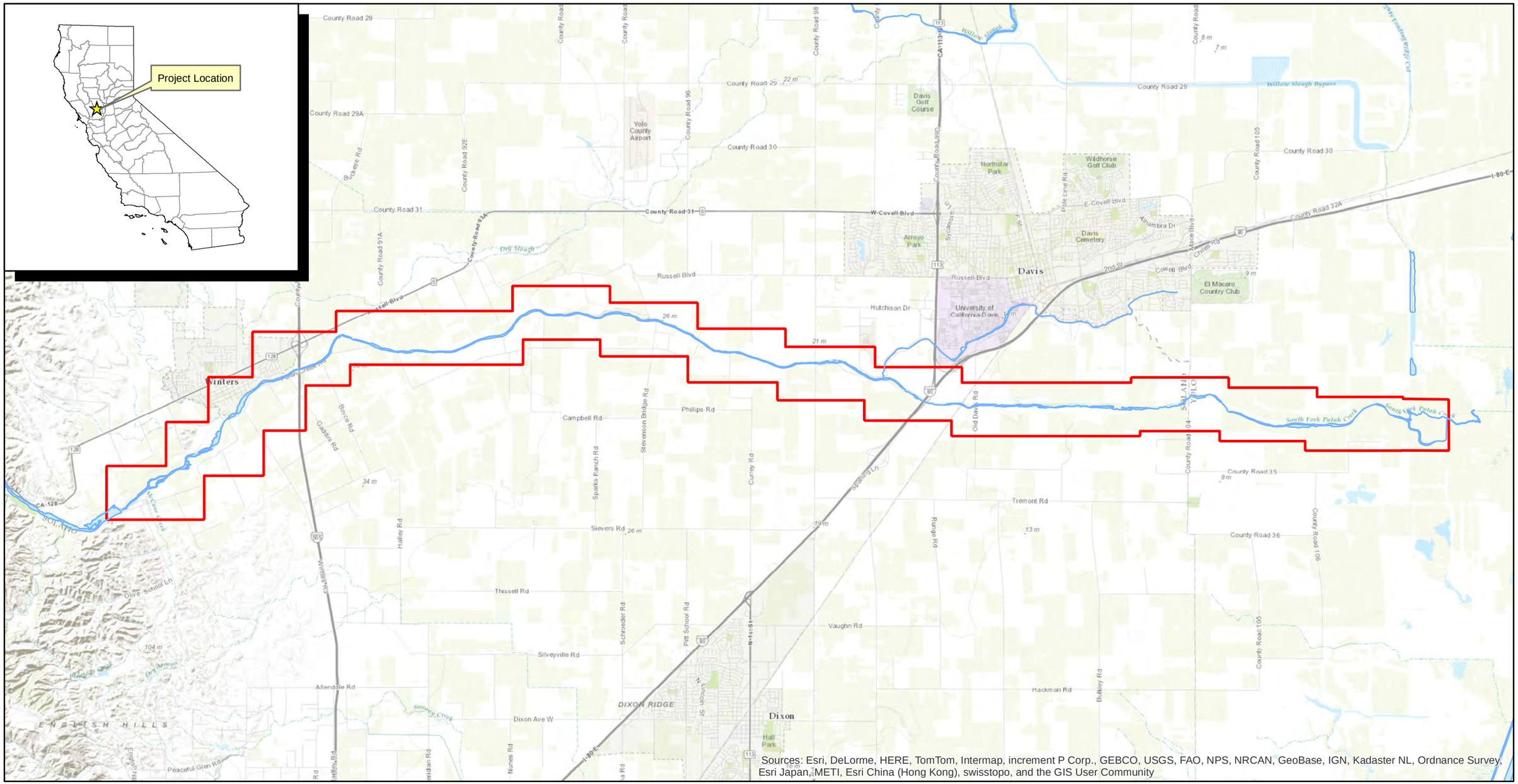
Document pertaining to this programmatic EIR can be viewed at:

https://files.stillwatersci.com

Please contact Stephanie Bishop for login information at:

SBishop@esassoc.com

Document Path: J:\GIS_Data_Files\Projects\E1203801S - Putah Creek Restoration EIR\ALL MAPS 10_15_14\Figure 1 Vicinity Map\Figure_1_vicinity-map-10_15_14_kg.mxd



Date Saved: 11/18/2014
By; KG

Legend

Map Sheet Area

N
W E
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0 0.75 1.5 3 Miles

BSK Associates
Engineers & Laboratories

Lower Putah Creek Restoration Project - Upper Reach Program
Solano and Yolo County, California

Figure 1
Vicinity Map
BSK Project E1203801S

Dixon Independent Voice

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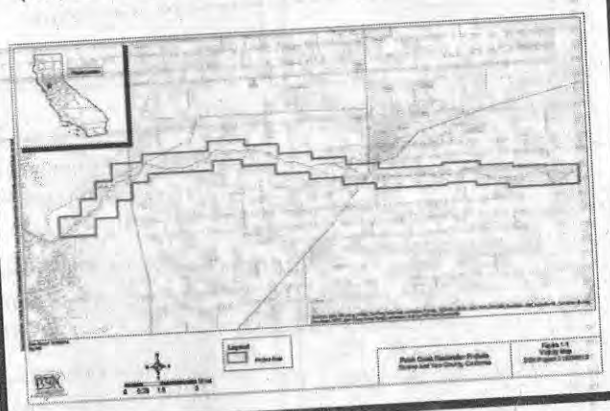

Dixon's Independent Voice

PO Box 1106
Dixon, CA 95620

Invoice

DATE	INVOICE NO.
1/1/2015	20150001

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Solano County Water Agency
810 Vaca Valley Pkwy, Suite 203
Vacaville, CA 95688

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Davis Enterprise

SOLANO COUNTY WATER AGENCY
810 Vaca Valley Parkway #203, Vacaville, CA 95688 / (707) 451-6090

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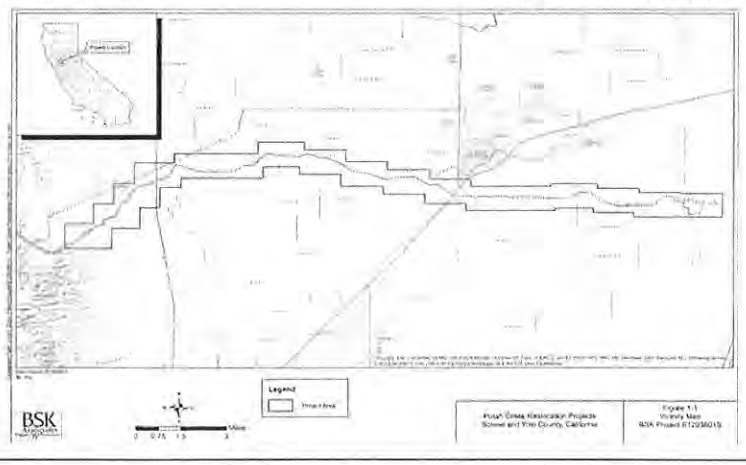


SCIENCE: Faculty reluctant to change

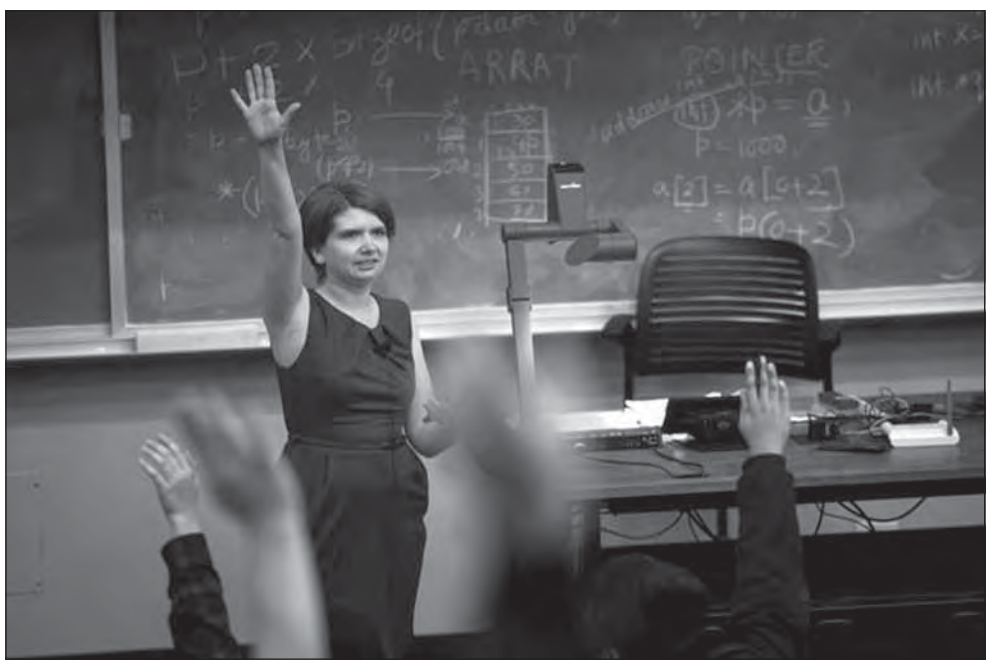
From Page A1

math," said Hunter R. Rawlings III, president of the Association of American Universities and a former president of Cornell University and the University of Iowa. "Teaching freshman- and sophomore-level classes has not had a high enough priority, and that has to change."

Multiple studies have shown that students fare better with a more active approach to learning, using some of the tools being adopted at UCD, while in traditional classes, students often learn less than their teachers think.

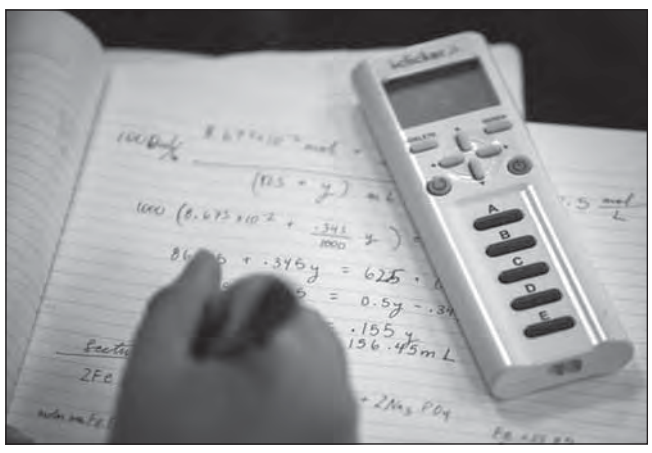
The University of Colorado, a national leader in the overhaul of teaching science, tested thousands of students over several years, before and after they each took an introductory physics class, and reported in 2008 that students in transformed classes had improved their scores by about 50 percent more than those in traditional classes.

At the University of North Carolina, researchers reported recently that an overhaul of introductory biology classes had increased student performance over all and yielded a particularly beneficial effect for black students and those whose parents did not go to college.



Max Whittaker for The New York Times

Catherine Uvarov, a chemistry instructor at UC Davis, has adopted an experimental approach to teaching an introductory course. Below, as part of the overhaul, students receive remote controls to answer questions in class.



Not a high priority

Given the strength of the research findings, it seems that universities would be desperately trying to get into the act. They are not. The norm in college classes — especially big introductory science and math classes, which have high failure rates — remains a lecture by a faculty member, often duplicating what is in the assigned reading.

There are many explanations, educators say, including the low value placed on teaching, tradition, pride and the belief that science should be the province of a select few.

"What drives advancement at universities is publishing research and winning grants," said Marc T. Facciotti, an associate professor who will teach a revamped biology course at UCD in the winter quarter. "Teaching isn't a very high priority."

Noah Finkelstein, a physics professor and the director of Colorado's overhaul efforts, added: "Faculty don't like being told what to do, and there are people who push back and say they can figure it out on their own and they know what works for them. There's plenty of data that says they're mistaken."

Employers and government officials have spent years complaining that there are too few people — and especially too few women and blacks — with degrees in math and science.

In fact, there is no shortage of interested students, but failure rates in the beginning classes are high. At four-year colleges, 28 percent of students set out as math, engineering and science majors, but only 16 percent of bachelor's degrees are awarded in those fields. The attrition rate is highest among women and blacks.

"A lot of science faculty have seen themselves as gatekeepers," said Marco Molinaro, an assistant vice provost at UCD and director of its effort to overhaul science courses.

The university has received grants from the Association of American Universities, the Bill & Melinda Gates Foundation and the Helmsley Charitable Trust.

Rather than try to help students who falter in introductory classes, he said, "they have seen it as their job to weed people out and limit access to upper-level courses."

The UCD project borrows elements from many sources, including more than a decade of work at the University of Colorado and other institutions; software from the Open Learning Initiative at Carnegie Mellon University; Carl E. Wieman, a Nobel Prize-winning physicist at Stanford who founded Colorado's project and a parallel effort at the University of British Columbia; Eric Mazur, a Harvard physicist and author of the book "Peer Instruction"; and Doug Lemov, a former teacher and author of "Teach Like a Champion."

Working in groups

Many of the ideas — like new uses of technology, requiring students to work in groups and having them do exercises in class rather than just listen to the teacher — have caught on, to varying degrees, in grade schools and high schools. But higher education has been slower to change, especially in giant courses with hundreds of students.

While teachers at lower levels receive training in educational theory and teaching methods, most college instructors acquire none.

"Higher education has this assumption that if you know your subject, you can teach it, and it's not true," Uvarov said. "I see so much that I was missing before, and that was missing in my own education."

Of course, telling experienced teachers that they need to learn how to teach does not always go over well, especially when they have tenure. So the project here began with graduate students who work as teaching assistants in biology and are required to have extensive training in teaching techniques.

For an introductory science course, in addition to giant classes taught by faculty members, there are twice-weekly discussion sessions with two dozen students, led by teaching assistants.

"Unlike the profs, we could tell the T.A.s what to do," said Christopher Pagliarulo, an associate director of Molinaro's team.

The team tested students' grasp of basic concepts before and after taking introductory classes, then it showed professors that their students were gaining much less than they had thought — results that convinced some professors of the need for change.

"There's some ego involved, and it's hard to hear that what you've been doing doesn't necessarily work," said Mitch Singer, the first professor on the Davis campus to teach a new-style introductory biology class, which is underway this quarter after months of preparation. "I think it's also dawned on some professors that their T.A.s are now better teachers than they are."

Faculty members say some colleagues are reluctant to jettison established lesson plans and accept a more unpredictable, boisterous classroom that puts students at center stage and forces professors to adapt. "It's more work, and you're not as in control," Singer said.

The transition at UCD has barely started — only the biology teaching assistants, plus a few faculty members in biology and chemistry, have undergone any retraining — but already the differences are plain. In their classes, Singer and Uvarov walk up to students, pace the aisles, and eavesdrop on working groups. They avoid simple yes-or-no questions and every query has a follow-up, or two or three.

Before each biology discussion session, students are supposed to go online to do some reading and answer questions. The teaching assistants then know who has done the reading, who has understood it and whether the group is weak in some spots, so they can tailor lessons accordingly.

Students complain about being unable to escape scrutiny, but they acknowledge that they learn more.

'You ... pay attention'

"I don't like getting called on like that," said Jasmine Do, a first-year student who was one of those singled out by Uvarov. "But it makes you participate and pay attention because there's always something new going on, and it makes the time go by really fast."

Faculty members have smartphone apps that let them call on students at random, rather than just on those who volunteer. When the instructors post multiple-choice questions on big screens, students answer with remote controls, providing instant feedback on how much information is sinking in and allowing faculty members to track each student's attendance and participation, even in a class of 500.

"It's already like night and day," Singer said. "In a few years, it'll be like day in the summer and night in the winter."

CABRAL: Veteran says trial work is suited to younger attorneys

From Page A1

Attorney's Office, where he'd worked for several years before moving up north.

The decision, he said, was a bittersweet one.

"I love the people here," Cabral said in a recent interview, during a break in tying up loose ends at his downtown Woodland office. "I truly have enjoyed working for Jeff (Reisig, Yolo County's district attorney) and think he's a fantastic DA. He cares about justice and making sure it's served at every turn."

Cabral said the move will bring him and his wife Margie, a substitute teacher, closer to two of their four grown children.

He prosecuted several high-profile cases during his Yolo County tenure, most notably the Daniel Marsh double-homicide trial, as well as a 2006 cold-case murder solved through DNA evidence and the U.S. Bank protesters from UC Davis.

But Cabral's also hailed for his work behind the scenes, such as strengthening the Yolo DA's fraud division and launching a conviction integrity unit in which attorneys review cases for possible exculpatory evidence. He also played a significant role in the review of students' and officers' actions during the infamous Nov. 18, 2011, pepper-spraying incident at UC Davis.

For those and other efforts, Cabral earned his office's Attorney of the Year award last month.

"I was truly honored. It's probably one of the biggest honors I've gotten as a prosecutor," he said.

Although Cabral knew from a young age he wanted to be a lawyer, he never saw himself becoming a prosecutor.

But he was offered a job with the Los Angeles County District Attorney's Office right after he graduated from Southwestern Law School, and he spent 20 years there before becoming a prosecutor in Riverside County.

His biggest cases have included the prosecution of arsonist John Orr, a onetime fire captain and arson investigator whose deliberately set fires killed four people before he was caught and sentenced to life without parole in 1998; and, in 2009, obtaining indictments against four members of the San Jacinto City Council for bribery and campaign money laundering crimes.

> *"It's probably one of the biggest honors I've gotten as a prosecutor."*
>
> **Michael Cabral** upon being chosen his office's Attorney of the Year

His connection to his cases has been evident at sentencing hearings, where he becomes visibly emotional as family members speak out about the impacts of their loved ones' deaths.

"I truly feel for the victims. That's why I continue to do trial work," Cabral said. "It hurts to lose someone precious to a crime. You don't expect somebody to murder them at their job or in their home."

Prior history in Northern California — he was raised in Fremont and attended undergraduate school at Chico State University (with a roommate from Winters) — and affinity for rural areas inspired Cabral to seek the assistant chief deputy DA's position in Yolo County in 2010.

"He's been great for Yolo. He brought a wealth of diverse experience," Reisig said. He noted that, in addition to Cabral's work with the fraud and conviction integrity units, he has worked closely with the Yolo County grand jury "on dozens of complex issues."

"He's leaving a lot of great programs that are going to serve Yolo County well," Reisig said.

Cabral said he expects to perform similar work while supervising 70 attorneys and staff under newly elected Riverside County District Attorney Mike Hestrin, though his courtroom battles may become a thing of the past.

"I'm sort of torn by it. I enjoy the trial work, but I've also learned how much of a toll it really takes on you," said Cabral, who during the Marsh trial arrived at work well before dawn and left long after the sun went down. "Trial work is really a young lawyer's job."

— Reach Lauren Keene at lkeene@davisenterprise.net or 530-747-8048.

Speaker examines obstacles to peace in Mideast

Special to The Enterprise

The prospects for a peaceful solution to the Israeli-Palestinian conflict seem as remote as ever. In particular, how have the actions and statements coming from the Palestinian Authority in Ramallah and Hamas in Palestinian Gaza dimmed the possibility of a two-state solution?

"Palestinian Incitement as an Obstacle to Peace" is a program scheduled for Sunday from 3 to 5 p.m. in the Social Hall of Congregation Bet Haverim, 1715 Anderson Road in Davis.

The speaker will be Sam Levine, executive director of the Zionist Organization of America's West Division.

Levine will address the question: How will peace ever be achieved when generations of Palestinians are taught to hate Israel? He will present numerous examples of this pattern, including the language of Palestinian textbooks and pronouncements by the Palestinian leadership.

Founded in 1897, the ZOA is the oldest pro-Israel organization in the nation. It focuses on promoting strong U.S.-Israel relations, and has more than 30,000 members and numerous chapters throughout the United States.

This program is sponsored by the Israel Matters Committee of CBH. For details, contact gmrooks3@gmail.com.

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Vacaville Reporter

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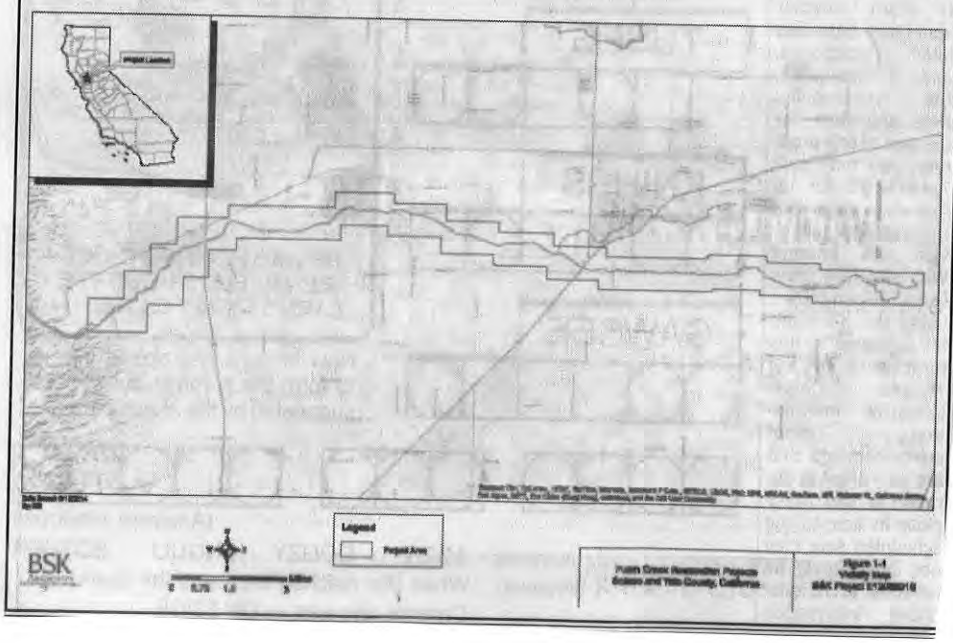


Vacaville Reporter
916 Cotting Lane
Vacaville, CA 95501
530-406-6223
legals@thereporter.com

Legal No. **0005386013**

SOLANO COUNTY WATER AGENCY
ATTN: ACCOUNTS PAYABLE,810 VACA
VALLEY ROAD,STE 203
VACAVILLE CA 95688-8834

PROOF OF PUBLICATION
(2015.5 C.C.P.)

STATE OF CALIFORNIA
COUNTY OF SOLANO, S.S.

FILE NO. Map/EIR

I am a citizen of the United States and a resident of the county of Solano. I am over the age of 18 years, and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of THE VACAVILLE REPORTER, a newspaper of general circulation, printed in the city of Vacaville and published dally in the cities of Vacaville and Dixon and throughout the county of Solano. The Reporter has been adjudged a newspaper of general circulation for the cities of Vacaville and Dixon, pursuant to Decree No. 25888 on June 30, 1952, and Decree No. 1006329 on March 20, 1996. The notice of which the attached is a printed copy (set in type not smaller than non-pareil), has been published in each regular and entire issue of THE VACAVILLE REPORTER. And not in any supplement thereof, on the following dates, to wit:

1/13/2015

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at Vacaville, California, this
13th day of January 2015

(Signature) Jill Teer

PROOF OF PUBLICATION
(2015.5 C.C.P.)

STATE OF CALIFORNIA
County of Solano

This Space For Filing Stamp

I am a citizen of the United States and a resident of Solano County. I am over the age of eighteen years and not a party to, or interested in, this Legal or Public Notice matter. I am the principal Legal Advertising Clerk for the

DAILY REPUBLIC
1250 Texas Street
P.O. Box 47
Fairfield, CA 94533

a newspaper of general circulation printed and published mornings, daily and Sunday, in the City of Fairfield, County of Solano, which has been adjudged a newspaper of general circulation by the Superior Court of the County of Solano, State of California, Case Number 25875, on June 30, 1952.

I certify under penalty of perjury that the attached Legal or Public Notice has been published in each regular and entire issue of the Daily Republic, and not in any supplement, on the following date(s):

January 5, 12, 19, 26

in the year: 2015

By: Stacy Willey

Stacy Willey, Legal Advertising Clerk

Date: January 26, 2015

Notice of Preparation of a Draft Programmatic Environmental Impact Report

Solano County Water Agency will be the Lead Agency and will prepare a Draft Programmatic Environmental Impact Report (DPEIR) to comprehensively address near-term and long-term activities planned for the Putah Creek Restoration Project-Upper Reach.

A programmatic EIR is an EIR that reviews the environmental impacts "of a series of actions that can be characterized as one large project" and that are related geographically, as logical parts in a chain of proposed actions, in connection with general criteria to govern the conduct of a continuing program, and/or "as individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways" (CEQA Guidelines, section 15168, subd. (a)). A program EIR offers several advantages, including providing for a more exhaustive consideration of effects and alternatives, avoiding duplicative consideration of policy issues, reducing paperwork, and allowing the lead agency to consider program-wide mitigation measures (CEQA Guidelines, section 15168, subd. (b)).

The DPEIR applies to restoration efforts proposed for the Upper Reach of the Putah Creek Restoration Project, planned by the Solano County Water Agency (SCWA) and the Lower Putah Creek Coordinating Committee (LPCCC). The Upper Reach Project Area includes the area just downstream of the Putah Diversion Dam (one mile west of Winters) to the Western edge of the Yolo Basin Wildlife Area (near Yolo County Road 106A).

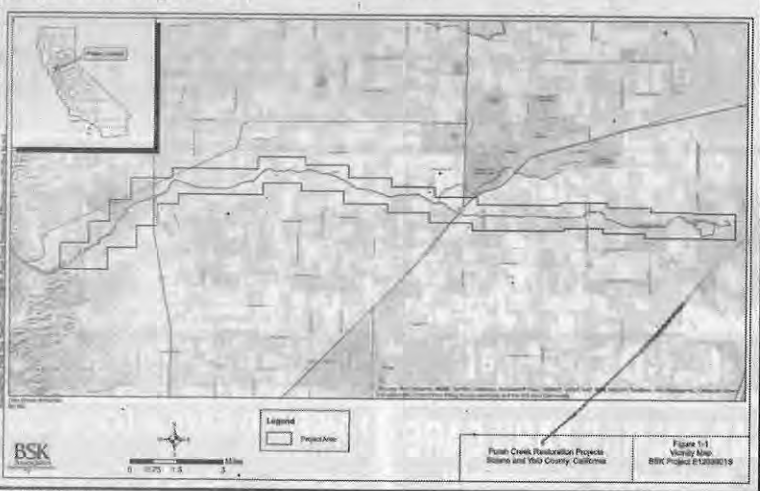
The Project purpose is to restore and rehabilitate the creek channel, banks, and associated habitats to more natural, self-sustaining form and function, consistent with the current (post-Monticello Dam) hydrologic regime. The proposed program of projects and activities (collectively, the "Project") would be implemented to stop further degradation of the creek corridor and to "jump-start" natural geomorphic and ecological processes in site-specific locations.

The purpose of the NOP is to inform responsible agencies and the public that the Proposed Project could have significant effects on the environment and to solicit comments so that any concerns raised could be considered during the preparation of the DPEIR. Potential effects of the project could include disturbance to the bed and bank of Putah Creek, air and noise pollution during restoration activities, and impacts to water quality. The DPEIR will address these potential effects as well as any other potential impacts discussed during the scoping meeting and any associated mitigation.

A Public Scoping Meeting on the Proposed Project will occur on February 12, 2015, from 3:00-5:00 pm at Winters City Hall, located at:

Winters City Hall
318 1st Street
Winters, CA 95694

Lead Agency Contact:
Chris Lee-Principal Water Resources Specialist
(707) 455-1105 /clee@scwa2.com



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Published: January 5, 12, 19, 26, 2015.

Winters Express

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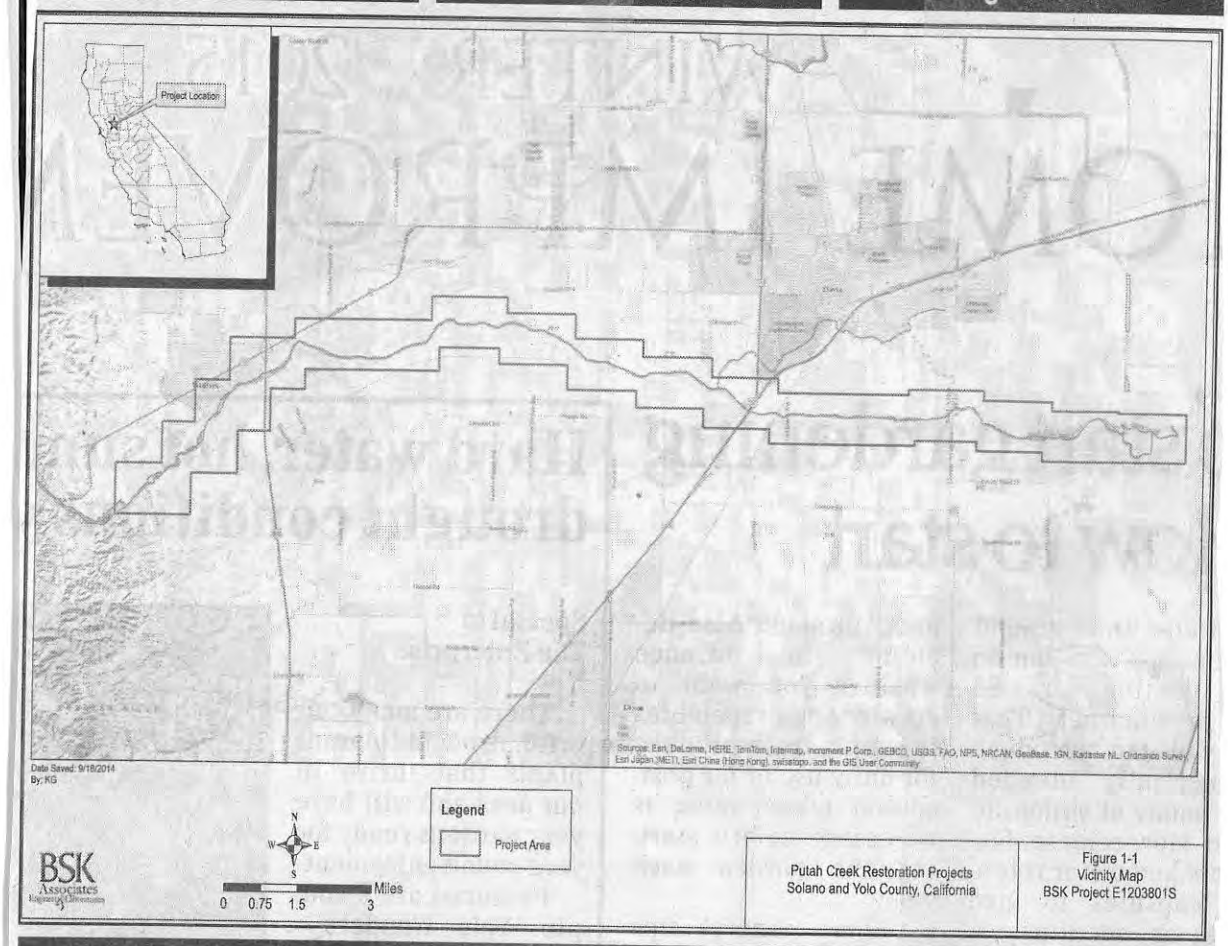

Legal Notice

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318 1st Street
Winters, CA 95694

Lead Agency Contact:
Chris Lee-Principal Water Resources Specialist
(707) 455-1105 /clee@scwa2.com

Published Jan. 8, 15, 22, 29, 2015

PROOF OF PUBLICATION
(2015.5 C.C.P.)

STATE OF CALIFORNIA
COUNTY OF YOLO

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of THE WINTERS EXPRESS, a newspaper of general circulation, printed and published in the City of Winters, County of Yolo, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Yolo, State of California, under the date of December 24, 1951, Case Number 12461; that the notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit: January 8,15, 22,29, 2015
.

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at Winters, California, this 30th day of January, 2015.

.....
Signature

Charles R. Wallace
Publisher

This space is for the County Clerk's Filing Stamp

Legal Notice

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SOLANO COUNTY WATER AGENCY

Programmatic Environmental Impact Report
For Putah Creek Restoration Project
Upper Reach Program-Scoping Meeting

February 12, 2015
3:00-5:00 PM

Winters City Hall
318 1st Street
Winters, CA

Agenda

1. Introduction of Upper Reach Program
2. California Environmental Quality Act
3. Program EIR Topics of Study
4. Proposed Program Activities
5. Stakeholder Input Opportunities

810 Vaca Valley Parkway, Suite 203
Vacaville, California 95688
Phone (707) 451-6090 • FAX (707) 451-6099
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SCWA/LPCCC
Programmatic Environmental Impact Report for Putah Creek Restoration Project
Upper Reach Program-Scoping Meeting
February 12, 2015

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Felix Riesenberg	City of Fairfield	
Mark Snyder	SCWA	
Kerrie Shaw	PCC	
DAVID OKITA	SCWA	dokita@scwa2.com
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Dan Jones	RCH	DJones@theRCHgroup.com
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SCWA/LPCCC
Programmatic Environmental Impact Report for Putah Creek Restoration Project
Upper Reach Program-Scoping Meeting
February 12, 2015

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Carol Scianna	City of Winters	carol.scianna@cityofwinters.org

Programmatic Environmental Impact Report
Putah Creek Restoration Project
Upper Reach Program
Scoping Meeting-February 12, 2015

Meeting Notes

Chris Lee, Solano County Water Agency, made introductions and started the presentation on the Upper Reach Program.

The Primary Purpose of this meeting is to let stakeholders know what we are proposing and to solicit input now and in the next couple of months as we progress towards a Public Draft EIR.

Both verbal and written comments on the scoping of the PEIR will be accepted today and through March 15, 2015.

The Yolo Basin Foundation is the lead for the grant agreement with the California Department of Fish and Wildlife.

This restoration effort is divided into two independent projects-The lower reach which CDFW is taking the lead on, and The Upper Reach, which the Water Agency is taking the lead on.

Upper Reach Program location map was displayed-showing distinction between the two reaches.

The Water Agency and the Lower Putah Creek Coordinating Committee are proposing to do a number of activities or actions to restore values and functions to Putah Creek in various locations from the Diversion Dam down to the western edge of the Yolo Wildlife area-hence the need for a Program Level Environmental Impact Report.

These restoration actions only happens with the help of willing landowners, as this is almost all private property. The LPCCC has developed some very collaborative relationships with landowners in the past and we hope to continue those relationships as we move forward with these restoration activities.

The California Environmental Quality Act was discussed.

With very limited exceptions, CEQA requires all state and local government agencies to consider environmental consequences of projects or programs over which they have discretionary authority before taking actions on those projects or programs.

Although not required, Scoping meeting are a good way for lead agencies to identify key issues to be examined in EIRs from local input.

This PEIR is intended to meet CEQA requirements and to integrate CEQA review with related consultations and anticipated permit requirements for future actions on the Upper Reach.

CEQA compliance and process was discussed with the group.

The Upper Reach PEIR is a public information document that assesses potential environmental effects of the proposed program as well as identify mitigation measures and alternatives to the Program that could reduce or avoid adverse environmental impacts.

A programmatic EIR is an EIR that reviews the environmental impacts of a series of actions that can be characterized as one large project that are related geographically, as logical parts in a chain of proposed action or of a continuing program and generally have similar environmental effects.

This is the highest level of study when looking at environmental impacts for a proposed program.

As the lead agency, the Water Agency has determined that a program level EIR is the appropriate CEQA document to comprehensively address near-term and long-term activities planned for the Upper Reach of Putah Creek.

The proposed schedule for the Upper Reach Program was displayed and discussed.

The Water Agency has been working closely with the LPCCC on restoration projects since 2002. That is mainly the reason we have started drafting a document already-we have a pretty good grasp of the environmental resources on Putah Creek and anticipated effects of certain actions.

When the PEIR is ready for Public Review, there would be a 45 day public comment period. Another public meeting would be held about half way through the comment period to garner stakeholder input.

The list of potential areas of focus for study in the PEIR was displayed and discussed. Verbal comments arising from that discussion are attached at the end of the meeting notes. (Verbal comments were recorded on flip charts during the meeting.)

Specific Program Activities were introduced by Rich Marovich of the Lower Putah Creek Coordinating Committee:

- Provide Fish Passage
- Restore, Enhance, and Maintain Spawning and rearing Habitat
- Incorporate Natural Geomorphology
- Maintain and Enhance Native Riparian Vegetation
- Maintain a Balance of Exiting Fish and Wildlife Habitats with Recreation, Hunting, Fishing, and Other Public Benefits

Several examples of typical enhancement features, log revetments, rock weirs, and cross veins were displayed and discussed as potential future actions.

Historic photographs of Putah Creek were displayed to give context to the need for restoration projects on the Upper Reach.

Information was displayed as to where Stakeholders could provide comments on the PEIR.

The Scoping Meeting ended.

Programmatic Environmental Impact Report
Putah Creek Restoration Project
Upper Reach Program
Scoping Meeting-February 12, 2015

Verbal Comments

- Fire risk (does this fit under Hazard and Hazardous Material)?
- Are we planning on creating recreation?
- Categories different for private versus public land?
- Access to private land?
- Private property rights-what if they don't want you there?
- Sounds like program is administrative level-setting up framework for projects to go forward when a landowner wants to do something.
- What is going to protect landowners or project work if the Glory Hole spills?
- Invasive fish species-does cold water affect them?
- Are there native salmon?
- Do salmon have a different need than trout?
- How many projects have you done so far?
- How many native species of fish live in Putah Creek?
- What are the non-native fish?
- Has there been a biological survey of endangered species on Putah Creek?
- Are these categories (EIR areas of study list) required under CEQA?
- Are any categories left off?
- Projects should address needs for future maintenance-access.
- Who is responsible for this maintenance?
- What is found under cultural resources?
- Categories looking at current condition, are you looking at the future changes?
- Climate change?

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

Central Valley Regional Water Quality Control Board

27 February 2015

Chris Lee
Solano County Water Agency
810 Vaca Valley Parkway
Vacaville, CA 95688

CERTIFIED MAIL
7014 2120 0001 3978 0223

COMMENTS TO REQUEST FOR REVIEW FOR THE PROGRAMMATIC ENVIRONMENTAL IMPACT REPORT, PUTAH CREEK RESTORATION PROJECT – UPPER REACH PROGRAM PROJECT, SCH# 2015022022, SOLANO COUNTY

Pursuant to the State Clearinghouse's 4 February 2015 request, the Central Valley Regional Water Quality Control Board (Central Valley Water Board) has reviewed the *Request for Review for the Programmatic Environment Impact Report* for the Putah Creek Restoration Project – Upper Reach Program Project, located in Solano County.

Our agency is delegated with the responsibility of protecting the quality of surface and groundwaters of the state; therefore our comments will address concerns surrounding those issues.

Construction Storm Water General Permit

Dischargers whose project disturb one or more acres of soil or where projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres, are required to obtain coverage under the General Permit for Storm Water Discharges Associated with Construction Activities (Construction General Permit), Construction General Permit Order No. 2009-009-DWQ. Construction activity subject to this permit includes clearing, grading, grubbing, disturbances to the ground, such as stockpiling, or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP).

For more information on the Construction General Permit, visit the State Water Resources Control Board website at:
http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml.

Phase I and II Municipal Separate Storm Sewer System (MS4) Permits[1]

The Phase I and II MS4 permits require the Permittees reduce pollutants and runoff flows from new development and redevelopment using Best Management Practices (BMPs) to the maximum extent practicable (MEP). MS4 Permittees have their own development standards, also known as Low Impact Development (LID)/post-construction standards that include a hydromodification component. The MS4 permits also require specific design concepts for LID/post-construction BMPs in the early stages of a project during the entitlement and CEQA process and the development plan review process.

For more information on which Phase I MS4 Permit this project applies to, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/water_issues/storm_water/municipal_permits/.

For more information on the Phase II MS4 permit and who it applies to, visit the State Water Resources Control Board at:
http://www.waterboards.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml

Industrial Storm Water General Permit

Storm water discharges associated with industrial sites must comply with the regulations contained in the Industrial Storm Water General Permit Order No. 97-03-DWQ.

For more information on the Industrial Storm Water General Permit, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/water_issues/storm_water/industrial_general_permits/index.shtml.

Clean Water Act Section 404 Permit

If the project will involve the discharge of dredged or fill material in navigable waters or wetlands, a permit pursuant to Section 404 of the Clean Water Act may be needed from the United States Army Corps of Engineers (USACOE). If a Section 404 permit is required by the USACOE, the Central Valley Water Board will review the permit application to ensure that discharge will not violate water quality standards. If the project requires surface water drainage realignment, the applicant is advised to contact the Department of Fish and Game for information on Streambed Alteration Permit requirements.

If you have any questions regarding the Clean Water Act Section 404 permits, please contact the Regulatory Division of the Sacramento District of USACOE at (916) 557-5250.

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[1] Municipal Permits = The Phase I Municipal Separate Storm Water System (MS4) Permit covers medium sized Municipalities (serving between 100,000 and 250,000 people) and large sized municipalities (serving over 250,000 people). The Phase II MS4 provides coverage for small municipalities, including non-traditional Small MS4s, which include military bases, public campuses, prisons and hospitals.

Clean Water Act Section 401 Permit – Water Quality Certification
If an USACOE permit (e.g., Non-Reporting Nationwide Permit, Nationwide Permit, Letter of Permission, Individual Permit, Regional General Permit, Programmatic General Permit), or any other federal permit (e.g., Section 9 from the United States Coast Guard), is required for this project due to the disturbance of waters of the United States (such as streams and wetlands), then a Water Quality Certification must be obtained from the Central Valley Water Board prior to initiation of project activities. There are no waivers for 401 Water Quality Certifications.

Waste Discharge Requirements
If USACOE determines that only non-jurisdictional waters of the State (i.e., "non-federal" waters of the State) are present in the proposed project area, the proposed project will require a Waste Discharge Requirement (WDR) permit to be issued by Central Valley Water Board. Under the California Porter-Cologne Water Quality Control Act, discharges to all waters of the State, including all wetlands and other waters of the State including, but not limited to, isolated wetlands, are subject to State regulation.

For more information on the Water Quality Certification and WDR processes, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/help/business_help/permit2.shtml.

Regulatory Compliance for Commercially Irrigated Agriculture
If the property will be used for commercial irrigated agricultural, the discharger will be required to obtain regulatory coverage under the Irrigated Lands Regulatory Program.
There are two options to comply:

1. **Obtain Coverage Under a Coalition Group.** Join the local Coalition Group that supports land owners with the implementation of the Irrigated Lands Regulatory Program. The Coalition Group conducts water quality monitoring and reporting to the Central Valley Water Board on behalf of its growers. The Coalition Groups charge an annual membership fee, which varies by Coalition Group. To find the Coalition Group in your area, visit the Central Valley Water Board's website at:
http://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/app_approval/index.shtml; or contact water board staff at (916) 464-4611 or via email at IrrLands@waterboards.ca.gov.

2. **Obtain Coverage Under the General Waste Discharge Requirements for Individual Growers, General Order R5-2013-0100**. Dischargers not participating in a third-party group (Coalition) are regulated individually. Depending on the specific site conditions, growers may be required to monitor runoff from their property, install monitoring wells, and submit a notice of intent, farm plan, and other action plans regarding their actions to comply with their General Order. Yearly costs would include State administrative fees (for example, annual fees for farm sizes from 10-100 acres are currently $1,084 + $6.70/Acre); the cost to prepare annual monitoring reports; and water quality monitoring costs. To enroll as an Individual Discharger under the Irrigated Lands Regulatory

Program, call the Central Valley Water Board phone line at (916) 464-4611 or e-mail board staff at IrrLands@waterboards.ca.gov.

Low or Limited Threat General NPDES Permit

If the proposed project includes construction dewatering and it is necessary to discharge the groundwater to waters of the United States, the proposed project will require coverage under a National Pollutant Discharge Elimination System (NPDES) permit. Dewatering discharges are typically considered a low or limited threat to water quality and may be covered under the General Order for *Dewatering and Other Low Threat Discharges to Surface Waters* (Low Threat General Order) or the General Order for *Limited Threat Discharges of Treated/Untreated Groundwater from Cleanup Sites, Wastewater from Superchlorination Projects, and Other Limited Threat Wastewaters to Surface Water* (Limited Threat General Order). A complete application must be submitted to the Central Valley Water Board to obtain coverage under these General NPDES permits.

For more information regarding the Low Threat General Order and the application process, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2013-0074.pdf

For more information regarding the Limited Threat General Order and the application process, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2013-0073.pdf

If you have questions regarding these comments, please contact me at (916) 464-4684 or tcleak@waterboards.ca.gov.

Trevor Cleak

Trevor Cleak
Environmental Scientist

cc: State Clearinghouse unit, Governor's Office of Planning and Research, Sacramento

State of California – The Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Bay Delta Region
7329 Silverado Trail
Napa, CA 94558
(707) 944-5500
www.wildlife.ca.gov

EDMUND G. BROWN JR., *Governor*
CHARLTON H. BONHAM, *Director*

March 2, 2015

Mr. Chris Lee
Solano County Water Agency
810 Vaca Valley Parkway
Vacaville, CA 95688

Dear Mr. Lee:

Subject: Putah Creek Restoration Project-Upper Reach Program, Notice of Preparation of a Draft Programmatic Environmental Impact Report, SCH #2015022022, Solano County

The California Department of Fish and Wildlife (CDFW) has reviewed the Notice of Preparation (NOP) of a draft Programmatic Environmental Impact Report (PEIR) for the Putah Creek Restoration Project-Upper Reach Program (Project). The NOP was received in our office on February 5, 2015.

The Project, located along portions of Lower Putah Creek from the Putah Diversion Dam downstream to the Yolo Bypass Wildlife Area, proposes to restore and rehabilitate the creek channel, banks, and associated habitats. The design elements would include channel reconfiguration, improvement to fish spawning gravels, vegetation management, and maintenance.

As Trustee for the state's fish and wildlife resources, CDFW has jurisdiction over the conservation, protection, and management of the fish, wildlife, native plants, and the habitat necessary for biologically sustainable populations of such species for the benefit and use by the people of California. In this capacity, CDFW administers the California Endangered Species Act (CESA), the Native Plant Protection Act, and other provisions of the Fish and Game Code that afford protection to the state's fish and wildlife public trust resources. Pursuant to our jurisdiction, CDFW submits the following comments and recommendations regarding the Project.

Subsequent Environmental Review

The preparation of a PEIR, pursuant to California Environmental Act (CEQA) Guidelines §15168, deals with the effects of the Project as specifically and comprehensively as possible to minimize the amount of environmental documentation that may need to be prepared for subsequent Project activities. Based on the scale and scope of the Project and anticipated preparation of a PEIR, CDFW anticipates that site-specific environmental documents may need to be prepared and tiered from the PEIR for certain subsequent Project activities (CEQA Guidelines, §§15152 and 15162).

Establishing a procedure in the PEIR for determining if subsequent Project activities are within the scope of the PEIR, or require a site-specific environmental document, will be critical to ensuring adequate analysis of Project activity effects on biological resources. CEQA Guidelines §15168(c)(4) states "Where the subsequent activities involve site-specific operations, the agency should use a written checklist or similar device to document the evaluation of the site and the activity to determine whether the environmental effects of the operation were covered in the program EIR." In addition, CEQA Guidelines §15168(c)(5) states that, "A program EIR will be most helpful in dealing with subsequent activities if it deals with the effects of the program as specifically and comprehensively as possible. With a good and detailed analysis of the program, many subsequent activities could be found to be within the scope of the project described in the program EIR, and no further environmental documents would be required." CDFW recommends a checklist be developed and included in the PEIR.

The checklist should be accompanied by enough relevant information and reasonable inferences from this information to support each conclusion concerning biological resources. For subsequent Project activities that may affect sensitive biological resources, a site-specific analysis should be prepared, from which the supporting information would be derived. The checklist should cite the specific portions of the PEIR, including page and section references, containing the analysis of the subsequent Project activities' significant effects and indicate whether it incorporates all applicable mitigation measures from the PEIR. The PEIR should state that as soon as the Lead Agency has determined an additional environmental document will be required for a subsequent Project activity, it shall consult with all responsible and trustee agencies, including CDFW, to obtain recommendations as to whether an additional EIR or negative declaration should be prepared (CEQA Guidelines, §15063).

Habitat Assessment/Project Impacts

The PEIR should include a complete project description of all phases of the Project, including the equipment to be used, access roads, staging areas, construction procedures, construction schedule, long- and short-term monitoring, and biological resources. In addition, the PEIR should include a complete assessment (including but not limited to type, quantity and locations) of the habitats, flora and fauna within and adjacent to the project area, including endangered, threatened, and locally unique species and sensitive habitats. The assessment should include the reasonably foreseeable direct and indirect changes (temporary and permanent) that may occur with implementation of the project, including impacts downstream of the project. Rare, threatened and endangered species to be addressed should include all those which meet the CEQA definition (see CEQA Guidelines, Section 15380). An analysis of the cumulative effects the Project activities would have on biological resources should also be included (CEQA Guidelines §15355).

The PEIR should identify and discuss any impacts to habitats and any mitigation measures necessary to offset those impacts. CDFW recommends mitigation for impacts to sensitive habitat types including, but not limited to, grasslands, riparian, wetlands, oak woodland, and

vernal pool. We recommend temporary and permanent impacts be mitigated by avoidance, minimization of impacts, and acquisition and preservation of at least an equal area and quality as that lost.

Species Surveys

The Project covers a large regional area, most of which contains habitat for special-status species. CDFW recommends focused species surveys be conducted at proposed Project locations by qualified biologists during the appropriate survey period(s) to determine if any species are present and if they would be impacted by any of the proposed Project activities. Information regarding survey and monitoring protocols and guidelines for sensitive species can be found on CDFW's website at http://www.dfg.ca.gov/wildlife/nongame/survey_monitor.html.

Bird Protection

CDFW has jurisdiction over actions which may result in the disturbance or destruction of active nest sites or the unauthorized "take" of birds. Fish and Game Code sections that protect birds, their eggs and nests include, §3503 (regarding unlawful "take", possession or needless destruction of the nest or eggs of any bird), §3503.5 (regarding the "take", possession or destruction of any birds-of-prey or their nests or eggs), and §3513 (regarding unlawful "take" of any migratory nongame bird). In the event vegetation removal is planned, it is advised that appropriate avoidance and minimization measures for raptors and other nesting birds potentially present in the Project site vicinity be addressed in the PEIR.

Water Pollution

Pursuant to Fish and Game Code §5650, it is unlawful to deposit in, permit to pass into, or place where it can pass into the "Waters of the State" any substance or material deleterious to fish, plant life, or bird life, including non-native species. Application of herbicides may result in pollution of "Waters of the State" and could impact the fish and wildlife resources within the Project area. The PEIR should include a discussion of both environmental fate chemistry and non-target organism toxicology for the Project herbicides on all biological resources that could be affected.

California Endangered Species Act

CDFW has regulatory authority over projects that could result in the "take" of any species listed by the State as threatened, endangered or candidate, pursuant to Fish and Game Code §2081. Please be advised that a CESA Permit, pursuant to Fish and Game Code §§2050 et seq., must be obtained if the Project has the potential to result in take of species of plants or animals listed under CESA, either during Project activities or over the life of the Project. Issuance of a CESA Permit is subject to CEQA documentation; therefore, the PEIR must specify impacts, mitigation measures, and a mitigation monitoring and reporting program. If the proposed Project will impact CESA-listed species, early consultation with CDFW is encouraged, as significant modification to the Project and mitigation measures may be required in order to obtain a CESA Permit. More information about the CESA permit process can be found on the CDFW website at https://www.wildlife.ca.gov/Conservation/CESA.

Lake and Streambed Alteration Agreement

CDFW may require a Lake and Streambed Alteration Agreement (LSAA), pursuant to Fish and Game Code §§1600 et seq. Notification is required for any activity that will divert or obstruct the natural flow, change the bed, channel, or bank including associated riparian or wetland/marsh resources, use material from the stream/channel bed, or substantially adversely affect fish and wildlife resources. Issuance of an LSAA is subject to CEQA. CDFW, as a Responsible Agency under CEQA, will consider the CEQA document for the Project. Therefore, the CEQA document must specify impacts, mitigation measures, and include a mitigation monitoring and reporting program. More information about the LSAA process can be found on the CDFW website at https://www.wildlife.ca.gov/Conservation/LSA.

If you have any questions, please contact Ms. Lorie Hammerli, Environmental Scientist, at; lorie.hammerli@wildlife.ca.gov or (707) 944-5568; or Mr. Adam McKannay, Acting Senior Environmental Scientist (Supervisory), at adam.mckannay@wildlife.ca.gov or (707) 944-5534.

Sincerely,

Scott Wilson

Scott Wilson
Regional Manager
Bay Delta Region

cc: State Clearinghouse

develop water surface elevation and velocity under existing conditions for 100-year flows, and then study the effects of the proposed changes. Higher water surface elevations and velocities may have an adverse impact on State highways.

Encroachment Permit

Please be advised that any work or traffic control that would encroach onto the State Right of Way (ROW) requires an encroachment permit that is issued by Caltrans. To apply, a completed encroachment permit application, environmental documentation, and five sets of plans clearly indicating State ROW must be submitted to the address below.

For District 3, regarding the Putah Creek intersection with I-505 contact Sergio Aceves, California Department of Transportation, District 3 - Office of Permits, 703 B Street, Marysville, CA 95901.

For District 4, regarding the Putah Creek intersection with I-80 contact David Salladay, California Department of Transportation, District 4 - Office of Permits, P.O. 23660, Oakland, CA 94623.

If an encroachment permit is needed for both locations, please notify the perspective District of any previously submitted encroachment permit applications per the Putah Creek Restoration Project – Upper Reach Program.

Traffic-related mitigation measures should be incorporated into the construction plans prior to the encroachment permit process. See the website link below for more information. http://www.dot.ca.gov/hq/traffops/developserv/permits/.

Please provide our office with copies of any further actions regarding this project. We would appreciate the opportunity to review and comment on any changes related to this development.

If you have any questions regarding these comments or require additional information, please contact Arthur Murray, Intergovernmental Review Coordinator at (916) 274-0616 or by email at: arthur.murray@dot.ca.gov.

Sincerely,

for
ERIC FREDERICKS, Chief
Office of Transportation Planning – South

c: Scott Morgan, State Clearinghouse

DEPARTMENT OF TRANSPORTATION
DISTRICT 3 – SACRAMENTO AREA OFFICE
2379 GATEWAY OAKS DRIVE, SUITE 150 – MS 19
SACRAMENTO, CA 95833
PHONE (916) 274-0635
FAX (916) 263-1796
TTY 711

Serious drought.
Help save water!

March 5, 2015

032015-YOL-0011
03-YOL-505 / .001
SCH# 2015022022

Chris Lee
Solano County Water Agency
810 Vaca Valley Parkway
Vacaville, CA 95688

Putah Creek Restoration Project – Upper Reach Program – Notice of Preparation (NOP) for a Programmatic Environmental Impact Report (PEIR)

Dear Chris Lee:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the project referenced above. The draft PEIR will apply to proposed restoration efforts for the Upper Reach of the Putah Creek Restoration Project, which is the subject of a program of proposed activities planned by the Solano County Water Agency (SCWA) and the Lower Putah Creek Coordinating Committee. Program activities will include channel reconfiguration, vegetation management, and maintenance work. The Upper Reach project area includes locations from just downstream of the Putah Diversion Dam, one mile west of the City of Winters, to the western edge of the Yolo Basin Wildlife area near Yolo County Road 106A, approximately 1.5 miles south of the City of Davis. Putah Creek, the project site, intersects Interstate (I-505) in Yolo County at post mile (PM) 0.001, and I-80 at Solano County PM 42.377. The following comments are based on the NOP.

Hydraulics

Putah Creek flows adjacent State Route 128 near the City of Winters and intersects below I-505. The proposed project includes the following activities: reposition thalweg; construct riffles; increase channel sinuosity; construct flow control structures; install log revetments; install root wads; install large wood debris; and fill abandoned gravel pits. All of the proposed activities have the potential to alter water surface elevations.

Please provide detailed plans identifying locations where such proposed activities are to occur. Also, please provide and clearly identify existing and post project conditions at all of the sites where modifications are proposed. Additionally, please conduct hydraulic modeling to determine if the proposed activities could potentially increase water surface elevations and velocities. The model must

Introduction

The following provides descriptions of the Putah Creek subreaches proposed for habitat enhancement projects over the next five to fifteen years under the Lower Putah Creek Restoration Project, Upper Reach Program. The project subreaches are described in order of presentation in the PEIR – from west to east, as they occur along the Project Area. For each subreach a description is provided of the site setting, history, current condition, goals, anticipated project activities, and anticipated outcomes. A subreach data summary is provided in Table 1. Maps of the project subreaches are provided in figures C1 –C4.

Project Subreaches:

1. NAWCA
2. Duncan-Giovannoni
3. Winters Putah Creek Park
4. East of 505
5. Warren
6. Upper McNamara
7. Lower McNamara
8. MacQuiddy (Lester)
9. Russell Ranch
10. Stevenson Bridge
11. Glide Ranch
12. Nishikawa
13. Olmo-Hammond - UCD
14. I80 to Old Davis Road
15. Old Davis Road to Mace
16. Mace to Road 106A
17. Road 106A to Yolo Bypass Wildlife Area

Table 1. Subreach Data Summary

Existing Conditions						With Project	
Upstream longitude	Title	total acres	Linear feet	Net weed acres	Open water acres	Design Channel Acres	Design Floodplain Acres
-122.0043	NAWCA	154	7,800	10.5	8	6	2
-121.9843	Duncan - Giovannoni	99	7,539	9.8	15	6	9
-121.9679	Winters Putah Creek Park	42	4,987	8.5	5	4	1
-121.9527	East of 505	36	4,878	6.4	7	4	3
-121.941	Warren	15	1,688	2.4	2	1	1
-121.9303	Upper McNamara	41	5,414	6.4	10	4	6
-121.9171	Lower McNamara	15	2,681	1.8	5	2	3
-121.9303	MacQuiddy (Lester)	65	8,524	3.2	9	6	3
-121.882	Russell Ranch	65	7,953	3.3	8	6	2
-121.8556	Stevenson Bridge	19	2,216	0.5	2	2	0
-121.8482	Glide Ranch	125	11,238	8.1	12	8	4
-121.812	Nishikawa	30	2,548	1.5	3	2	1
-121.8032	Olmo-Hammond-UCD	90	9,930	2.5	15	7	8
-121.7717	I80 to Old Davis Road	75	4,418	3.3	5	3	2
-121.7572	Old Davis Road to Mace	165	17,932	4.8	29	13	15
-121.6491	Mace to Road 106A	240	14,240	12.6	25	11	14
-121.649	Road 106A to Yolo Bypass Wildlife Area	41	6,153	8.5	12	5	7
Totals		**1,317**	**120,139**	**94**	**171**	**89**	**82**

1. NAWCA

Setting: The NAWCA subreach consists of 154 acres of the Putah Creek corridor, located immediately downstream of the Putah Diversion Dam. The site is 7,800 feet long and averages 860 feet wide. Putah Creek in this subreach features perennially cold water habitat, supporting rainbow trout (*Oncorhynchus mykiss*) year round. In this subreach, Putah Creek is bounded by almond, walnut, and plumb orchards.

History: The greater Putah Creek channel was formed by peak flows of approximately 50,000 cfs, with recurrence intervals on the order of five years. Construction of Monticello Dam reduced peak flows by 90%. The channel was manipulated to facilitate gravel extraction and flood conveyance, and many of the naturally formed channel features were filled for orchards. The site was extensively mined for gravels as recently as the 1960s, and the disturbed channel was abandoned when gravel mining ceased. Six culverts have been abandoned in the channel at two crossing sites. Vast disturbed areas have been subject to heavy growth of invasive plant species. Wildfires have occurred on the site as often as every other year.

Current Condition: The Putah Creek channel in this subreach lacks natural form (width and depth ratios, meander wavelength, floodplain geometry and pool-riffle-run sequences in scale with the current – managed – hydrologic regime). Past disturbance has left the channel form overly straight and wide. The longitudinal profile consists of long runs with few pools and riffles. The channel has become deeply incised; the north bank of the flow channel is bounded by steep banks and is largely devoid of floodplains. A restoration project was recently implemented on the south bank to restore low floodplains along the edge of the active channel. Invasive weeds including giant reed (*Arundo donax*), Himalayan blackberry (*Rubus armeniacus*), tree-of-heaven (*Ailanthus altissima*), and edible fig (*Ficus carica*) occupy approximately 10.5 acres of the site. The upper edges of the creek corridor are dry and ruderal, supporting few riparian plants. Infrequency of scouring flows (>3,000 cfs) has resulted in cementation of gravels on the channel floor.

The disturbed channel form in this subreach systematically inhibits geomorphic and ecological function, reducing diversity of aquatic habitat and inhibiting natural recruitment of native vegetation. Wildfires and disturbance have reduced the native riparian canopy. Excess width of the creek channel, combined with limited shading riparian vegetation, results in warming of the water and degraded aquatic habitat. Cementation of gravels has degraded spawning habitat and reduced the abundance and diversity of benthic invertebrates.

Project Goals:

- Restore natural channel form and function

- Re-establish the native canopy vegetation
- Enhance spawning gravels
- Stabilize banks
- Enhance aquatic and riparian habitat diversity

Anticipated Program Activities:

- Channel reconfiguration
    - Narrow the low flow channel width by an average of 44 feet to an average of 27 feet
    - Reposition thalweg
    - Increase channel sinuosity
    - Recreate floodplain elevation surfaces adjacent to the low flow channel
    - Create side channels
    - Construct new riffles
    - Construct in-channel cross-vane/grade controls
    - Install rock and log revetments
    - Install root wads/large woody debris
    - Loosen embedded gravels by scarification
    - Augment gravel in riffles

- Vegetation Management
    - Control and remove invasive weeds
    - Plant native grasses, sedges, shrubs and trees

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Conversion of 8 acres of open water in over-wide channel to 6 acres of design low flow channel and 2 acres of floodplain habitat
- Eradication of invasive weeds from 10.5 acres of the site
- Enhanced geomorphic form and function
- Increased shaded riverine aquatic cover
- Lower water temperatures
- Enhanced habitat for Chinook salmon and rainbow trout
- Restored native wetland and riparian vegetation

- Diversified aquatic and riparian habitat

2. <u>Duncan-Giovannoni</u>

Setting: The Duncan-Giovannoni subreach consists of 99 acres located immediately west (upstream) of the Winters Car Bridge. The site is 7,500 feet long, averages 750 feet wide and features a large gravel pit that is contiguous with the creek channel. The site is on the eastern boundary of perennially cold-water habitat. The site is bounded by walnut orchards, a retail landscape supply business, a bar and residences.

History: The site was extensively mined for gravels as recently as the 1960s. The channel alignment was manipulated to facilitate gravel extraction, and the disturbed channel was abandoned when gravel mining ceased.

Current Condition: The channel is overly straight from past alterations to facilitate gravel extraction and flood conveyance. The longitudinal profile is characterized by an excess of pools and a shortage of riffles. The creek channel and adjacent gravel pit is bounded by steep banks. Invasive weeds, primarily giant reed and Himalayan blackberry, with some edible fig, tree-of-heaven and tamarisk (*Tamarix* spp.), occupy approximately 9.8 acres. In 2011, the lower 1500 feet of this subreach was restored in connection with the Winters Putah Creek Nature Park / Floodplain Restoration and Recreational Access Project (Winters Putah Creek Park Restoration Project).

The excess width of open water results in long residence times and warming of the creek water. Warmer water creates conditions unsuitable for native fish. Invasive weeds have displaced native vegetation and degraded wildlife habitat. Lack of natural channel form systematically inhibits ecological function, reduces the quality of aquatic and riparian habitats and impedes natural recruitment of native vegetation.

Project Goals:

- Restore natural channel form and ecological function
- Enhance aquatic conditions for native fish and other species
- Restore riparian vegetation and establish 50% canopy cover over the water surface of the channel

Anticipated Program Activities:

- Channel Reconfiguration:
    - Narrow the active channel from an average of 87 feet to an average of 27 feet
    - Reposition thalweg

    - Increase channel sinuosity
    - Create floodplain elevation surfaces adjacent to the low flow channel
    - Fill the gravel pit to floodplain elevation, retaining (or creating) isolated pools and wetlands to enhance habitat diversity
    - Create side channels
    - Install rock and log revetment between gravel pit and creek channel
    - Augment spawning gravels

- Vegetation Management
    - Eradicate invasive plants
    - Plant native vegetation

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Conversion of 15 acres of open water to 6 acres of design low flow channel and 9 acres of floodplain
- Eradication of invasive plants over 9.8 acres
- Enhancement of 75 acres riparian forest wildlife habitat
- Enhanced geomorphic form and function
- Lower water temperatures
- Enhanced habitat for Chinook salmon and rainbow trout (extend perennial rainbow trout habitat through Winters)
- Restored native wetland and riparian vegetation
- Increased shaded riverine aquatic cover
- Diversified aquatic and riparian habitat

3. <u>Winters Putah Creek Park</u>

Setting: The Winters Putah Creek Park subreach consists of 42 acres between the Winters Car Bridge and the Highway 505 overcrossing. The site is 5,000 feet long and averages 365 feet wide. The site features cool water habitat supporting low numbers of rainbow trout year round. The riparian corridor is bounded by Putah Creek Road along the top of the south bank and the City of Winters on the north bank. Restoration actions that have been completed at Winters Putah Creek Park (by the Winters Putah Creek Park Restoration Project) serve as a

model for habitat enhancement projects described under the Upper Reach Program, especially in sites of former gravel mining operations.

History: The site was extensively mined for gravels as recently as the 1960s; a nearly continuous, deep and wide pool was formed by gravel extraction. A percolation dam was constructed in the 1930s and operated until the early 1950s, when abutments on the north and south side were washed out in high flows. The south bank abutment was replaced, but the dam was abandoned after the north abutment failed. Heavy riprap was placed in the channel upstream and downstream of the dam to repair scouring eddies created by the dam. The derelict foundation of the percolation dam was removed in 2009. The City of Winters operated wastewater treatment ponds on the south side of the channel until approximately 1970.

This subreach also was heavily disturbed by illegal dumping. Starting in the late 1990s, community volunteers began cleaning the creek of rubbish in this subreach, and filled 40-cubic yard trash containers twice per year. With regular cleanup events and other site improvements the volume of trash collected has steadily diminished to around 5 cubic yards per year, most of which is found near the Highway 505 overcrossing. Unauthorized use by off-highway vehicles was common until 2003, when post and cable barriers and native vegetation plantings were installed to deter access.

In 2011, with the Winters Putah Creek Park Restoration Project, the channel was realigned to a narrower meandering form with low floodplains and planted to native vegetation. The old Winters Car Bridge was removed and a temporary crossing installed. A new bridge is currently under construction. The City of Winters recently completed a paved north bank trail along the entire length of the Winters Putah Creek Park, and has plans to extend the trail to Highway 505 if PG&E acquires the remaining parcel. Public use of the park has dramatically increased with improvements created by the channel realignment project.

Current Condition: All but the eastern-most 1000 feet of channel in this subreach is currently undergoing habitat maintenance and/or enhancement. The remainder is impacted by a eucalyptus grove on the north bank and remnant giant reed, Himalayan blackberry, tree-of-heaven, and black locust (*Robinia pseudoacacia*). Legacy dump-sites are partially buried on the north bank. The slope of the floodplain is inverted, with high mounds near the flow channel formed by sediments and other materials that were trapped by giant reed and Himalayan blackberry. The Upper Reach Program would support ongoing enhancement efforts in the entire subreach and implement activities to restore habitat in the as yet unrestored eastern-most 1000 feet.

Project Goals:

- Restore natural channel form and ecological function
- Enhance aquatic conditions for native fish and other species
- Restore riparian vegetation and establish 50% canopy cover over the channel water surface

Anticipated Program Activities:

- Channel Reconfiguration:
    - Narrow the low flow channel
    - Lower the edge of the flow channel to floodplain elevation
    - Create side channels
    - Construct riffles
    - Increase channel sinuosity
    - Install rock vanes/grade control
    - Install large woody debris
    - Augment gravel in riffles
    - Fill abandoned gravel pits

- Vegetation Management
    - Lowering the north bank giant reed and blackberry mounds to floodplain elevation and re-establishing native vegetation
    - Control and remove invasive weeds
    - Plant native grasses, sedges, shrubs and trees

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Conversion of 5 acres of open water to 4 acres of design channel and 1 acre of new floodplain habitat Lower water temperatures
- 10 acres of restored riparian vegetation
- Eradication of invasive weeds over 8.5 acres
- Enhanced spawning habitat for Chinook salmon and rainbow trout
- Diversified aquatic and riparian habitat
- Diversified native vegetation

4. East of 505

Setting: The East of 505 subreach consists of 36 acres located immediately downstream (east) of the Highway 505 overcrossing. The site is 5,000 feet long and averages 300 feet wide. This subreach features cool water habitat supporting occasional rainbow trout. The creek corridor is bounded by Putah Creek Road along the top of the south bank, and walnut orchards and a walnut processing plant on the north bank.

History: This subreach of Putah Creek bears evidence of historic gravel extraction and channelization for flood conveyance. It has also been the site of illegal dumping. Larger trash items were removed in 2005 and again in 2012; smaller items have been cleaned up annually by community volunteers. Until 2003, when access was curtailed by construction of a post and cable barrier, unauthorized off highway vehicles drove off of Putah Creek Road, east of the eastern span of the Highway 505 Bridge, drove through the creek, and up the north bank onto Highway 505.

Current Condition: The channel immediately east of the Highway 505 crossing is impacted by Himalayan blackberry and giant reed. The south bank is very steep along the entire length of the subreach, especially in the vicinity of Boyce Road. Approximately 500 feet downstream of the bridge, the creek flow is deflected into the toe of the south bank by a large clump of giant reed and continues immediately against the bank for another 800 feet downstream. Here, the creek bank has eroded to form a vertical wall that is 50 feet long and approximately 30 feet high. The top of this bank now lies within 20 feet of the edge of Putah Creek Road. The channel in this location is densely vegetated with eucalyptus and Himalayan blackberry. East of Boyce Road the channel forms a straight and continuous pool of relatively uniform width and moderate depth. The lower third of the south bank is lined with eucalyptus trees. The top of the south bank is in mixed oak woodland, dominated by valley oak (*Quercus lobata*), blue elderberry (*Sambucus nigra* ssp. *caerulea*) and buckeye (*Aesculus californica*). Overall, invasive weeds including eucalyptus, giant reed, Himalayan blackberry, tree-of-heaven, tamarisk, and edible fig cover approximately 6.4 acres of the site.

The steep south bank west of Boyce Road presents a risk of catastrophic failure and undermining of Putah Creek Road. The wide pools on the eastern half of the subreach and lack of riffles result in poor aquatic habitat.

Project Goals:

- Restore natural channel form and ecological function
- Alleviate bank erosion
- Remove invasive weeds

- Restore riparian vegetation and establish canopy cover over the channel water surface
- Enhance aquatic and riparian habitat for fish and other native wildlife

Anticipated Program Activities:

- Channel Reconfiguration
    - Narrow the low flow channel width by an average of 50 feet to an average of 27 feet
    - Reposition thalweg
    - Create floodplains along the realigned low flow channel
    - Construct riffles
    - Install rock and log revetments along the edge of the creek in the widest reaches
    - Install root wads/large woody debris
    - Fill abandoned gravel pits

- Vegetation Management
    - Eradicate invasive vegetation
    - Plant native grasses, sedges, shrubs and trees

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Conversion of 7 acres of over-wide open water to 4 acres of design channel and 3 acres of floodplain
- Eradication of invasive plant species over 6.4 net acres of weeds
- Stabilized channel banks
- Restoration and enhancement of riparian vegetation
- Lower water temperatures with shaded riverine aquatic cover
- Enhanced geomorphic form and function
- Enhanced habitat for Chinook salmon and rainbow trout
- Increased diversity of aquatic and floodplain habitat

5. <u>Warren</u>

Setting: Warren subreach consists of 15 acres of riparian forest located 1.5 miles east of Highway 505. The site is 1,700 feet long and averages 400 feet wide. The site features cool

water habitat supporting occasional rainbow trout. The riparian corridor in this subreach is bounded by walnut orchards.

History: The Putah Creek channel bears evidence of channelization for flood conveyance in this subreach, with a nearly continuous over-widened and moderately deep pool.

Current Condition: The north bank is dominated by eucalyptus grove with invasive weeds occupying more than two net acres of the site overall. Dominant weeds include eucalyptus, giant reed and Himalayan blackberry. The eucalyptus stand includes over 300 stems averaging 18 inches in diameter where there were none twenty years ago.

Project Goals:

- Remove invasive weeds.
- Restore natural channel form and ecological function

Anticipated Program Activities:

- Channel Reconfiguration
    - Narrow the width of the creek channel from an average of 50 feet to an average of 27 feet
    - Reposition thalweg
    - Create floodplains along the realigned low flow channel
    - Increase channel sinuosity
    - Construct riffles
    - Install rock and log revetments along the edge of the creek in the widest reaches
    - Install root wads/large woody debris
    - Augment spawning gravels
    - Loosen embedded gravels by scarification

- Vegetation Management
    - Eradicate invasive vegetation
    - Plant native grasses, sedges, shrubs and trees

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Conversion of 2 acres of open water to 1 acre of design channel and 1acre of floodplain habitat
- Removal of invasive vegetation from 2.4 acres
- Restoration of 15 acres of riparian vegetation
- Re-establishment of shading riparian vegetation over the creek channel
- Lower water temperatures
- Enhanced spawning habitat for Chinook salmon and rainbow trout
- Increased diversity of aquatic, floodplain and riparian habitat

6. <u>Upper McNamara</u>

Setting: The Upper McNamara subreach consists of 41 located two miles east of Highway 505. The site is 5,400 feet long, averages 330 feet wide and features steep banks and a continuous wide and deep pool with little or no floodplains. The site is bounded by walnut orchards.

History: The site -- along with upstream reaches -- was extensively mined for gravels as recently as the 1960s. Once the site was abandoned, it became a deep pool.

Current Condition: The channel currently lacks meander form, riffles and floodplains. Invasive weeds, mainly eucalyptus, tree-of-heaven and Himalayan blackberry occupy at least 6.4 net acres of the site.

The excess width and depth of open water results in warming and long residence time of the creek water in a pool that lacks perceptible flow velocity in all but winter runoff flows. Warmer water favors non-native fish over native fish. Invasive weeds have displaced native vegetation and degraded wildlife habitat. Lack of natural form systematically inhibits ecological function, including diversity of aquatic habitat and natural recruitment of native vegetation.

Project Goals:

- Restore natural channel form and ecological function
- Removing invasive weeds
- Restore native vegetation.

Anticipated Program Activities:

- Channel Reconfiguration
    - Narrow the width of the channel by two thirds from an average of 80 feet to 27 feet and create adjacent floodplain surfaces

    - Create side channels
    - Reposition thalweg
    - Construct riffles
    - Increase channel sinuosity
    - Construct rock vanes/grade control
    - Construct rock and/or log revetments
    - Install root wads/large woody debris
    - Augment spawning gravels
    - Fill gravel pits

- Vegetation Management
    - Eradicate invasive vegetation
    - Plant native grasses, sedges, shrubs and trees

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Conversion of 10 acres of open water to 4 acres of design channel and 6 acres of floodplain
- Eradication of invasive plants from 6.4 acres of the site
- Lower water temperatures
- Extend perennial rainbow trout habitat
- Enhancement of wildlife habitat on 41 acres of riparian forest
- Improve aquatic habitat diversity
- Increased shaded riverine aquatic habitat

7. <u>Lower McNamara</u>

Setting: The Lower McNamara subreach consists of 15 acres located three miles east of Highway 505. The site is 2,681 feet long, averages 240 feet wide and features a continuous wide and deep pool with little or no floodplains and steep banks. The site is bounded by walnut orchards.

History: The site -- along with upstream reaches -- was extensively mined for gravels as recently as the 1960s. When the site was abandoned the area became a deep pool.

Current Condition: The channel currently consists of a continuous pool lacking natural meander form, riffles and floodplains. Invasive weeds, mainly eucalyptus, tamarisk and Himalayan blackberry occupy at least 1.8 net acres.

The excess channel width results in warming and long residence time of the water in a pool that lacks perceptible flow velocity in all but winter runoff flows. Warmer water favors non-native fish over native fish. Invasive weeds displace native vegetation and degrade wildlife habitat. Lack of natural form systematically inhibits ecological function, including diversity of aquatic habitat and natural recruitment of native vegetation.

Project Goals:

- Restore natural channel form and ecological function
- Removing invasive weeds
- Restore native vegetation.

Anticipated Program Activities:

- Channel Reconfiguration
    - Narrow the width of the channel from an average of 80 feet to 27 feet and create adjacent floodplain surfaces
    - Create side channels
    - Reposition thalweg
    - Construct riffles
    - Increase channel sinuosity
    - Construct rock vanes/grade control
    - Construct rock and/or log revetments
    - Install root wads/large woody debris
    - Augment spawning gravels
    - Fill gravel pits

- Vegetation Management
    - Eradicate invasive vegetation
    - Plant native grasses, sedges, shrubs and trees

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Conversion of 5 acres of open water to 2 acres of design channel and 3 acres of floodplain
- Eradication of invasive plants from 1.8 acres of the site
- Lower water temperatures
- Extend perennial rainbow trout habitat
- Enhancement of wildlife habitat on 41 acres of riparian forest
- Improve aquatic habitat diversity
- Increased shaded riverine aquatic habitat

8. **<u>MacQuiddy (Lester)</u>**

Setting: The MacQuiddy subreach consists of 65 acres located four miles east of Highway 505. The site is 8,500 feet long and averages 333 feet wide. Aquatic habitat is dominated by native fishes other than salmonids. The riparian corridor is bounded walnut orchards.

History: The site bears evidence of channelization for flood conveyance and gravel extraction. Several legacy dump-sites have been removed from the banks.

Current Condition: The channel lacks natural meander form and floodplains, and has a shortage of riffles and gravel substrate. Five primary invasive weeds consisting of giant reed, tamarisk, eucalyptus, Himalayan blackberry, and tree-of-heaven occupy 3.2 net acres.

Weeds have displaced native vegetation and stabilized gravel bars contributing to the depletion of spawning gravels.

Project Goals:

- Restore natural channel form and ecological function
- Removing invasive weeds
- Restore native vegetation.

Anticipated Program Activities:

- Channel Reconfiguration
    - Narrow the width of the channel and create adjacent floodplain surfaces
    - Create side channels
    - Reposition thalweg
    - Construct riffles

    - Increase channel sinuosity
    - Construct rock vanes/grade control
    - Construct rock and/or log revetments
    - Install root wads/large woody debris
    - Augment spawning gravels
    - Loosen embedded gravels by scarification

- Vegetation Management
    - Eradicate invasive vegetation
    - Plant native grasses, sedges, shrubs and trees

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Conversion of 9 acres of open water to 6 acres of design channel and 3 acres of floodplain
- Eradication of invasive plants from 3.2 acres of the site
- Lower water temperatures
- Enhanced spawning habitat for Chinook salmon and rainbow trout
- Restoration of 65 acres of riparian vegetation
- Improve aquatic habitat diversity
- Increased shaded riverine aquatic habitat

9. <u>Russell Ranch</u>

Setting: The Russel Ranch subreach consists of 65 acres located five miles east of Highway 505. The site is 8,000 feet long, averages 350 feet wide and features a nearly continuous wide and deep pool with little or no floodplains and steep banks. The site is bounded by walnut orchards on the south bank and U.C. Davis agricultural research fields on the north bank.

History: The site -- along with upstream reaches -- was channelized for flood conveyance and extensively mined for gravels as recently as the 1960s. When abandoned, the site became a deep pool.

Current Condition: The channel currently consists of a nearly continuous pool lacking natural meander form, riffles and floodplains. Invasive weeds, mainly tamarisk, giant reed, eucalyptus and perennial pepperweed (*Lepidium latifolium*) occupy 3.3 net acres.

The excess width and depth of open water results in warming and long residence time of the water. The channel lacks perceptible flow velocity in all but winter runoff flows. Invasive weeds have displaced native vegetation and degraded wildlife habitat. Lack of natural channel form systematically inhibits ecological function, including diversity of aquatic habitat and natural recruitment of native vegetation.

Project Goals:

- Restore natural channel form and ecological function
- Removing invasive weeds
- Restore native vegetation.

Anticipated Program Activities:

- Channel Reconfiguration
    - Narrow the width of the channel from an average of 43 feet to 27 feet and create adjacent floodplain surfaces
    - Create side channels
    - Reposition thalweg
    - Construct riffles
    - Increase channel sinuosity
    - Construct rock vanes/grade control
    - Construct rock and/or log revetments
    - Install root wads/large woody debris
    - Augment spawning gravels
    - Fill abandoned gravel pits

- Vegetation Management
    - Eradicate invasive vegetation
    - Plant native grasses, sedges, shrubs and trees

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Conversion of 8 acres of open water to 6 acres of design channel and 2 acres of floodplain
- Eradication of invasive plants from 3.3 acres of the site
- Lower water temperatures
- Enhanced spawning habitat for Chinook salmon and rainbow trout
- Improved wildlife habitat on 65 acres of riparian forest
- Improved aquatic and riparian habitat diversity
- Increased shaded riverine aquatic habitat

10. <u>Stevenson Bridge</u>

Setting: The Stevenson Bridge subreach consists of 19 acres centered on Stevenson Bridge. The site is 2,200 feet long, averages 375 feet wide and features a wide and deep pool with little or no floodplains and steep banks. The site is bounded by walnut orchard on the south bank and a rural residential development on the north bank.

History: The site -- along with upstream reaches -- was channelized for flood conveyance and extensively mined for gravels as recently as the 1960s. Once abandoned the site became a deep pool.

Current Condition: The channel currently consists of a nearly continuous pool, lacking natural meander form, riffles and floodplains. Six primary invasive weeds consisting of tamarisk, Himalayan blackberry, eucalyptus, giant reed, perennial pepperweed, and edible fig occupy at least 0.5 acres of the site.

The excess width and depth of open water results in warming from solar radiation and long residence time of the water in a pool that lacks perceptible flow velocity in all but winter runoff flows. Invasive weeds displace native vegetation and degrade wildlife habitat. Lack of natural channel form systematically inhibits ecological function, including diversity of aquatic habitat and natural recruitment of native vegetation.

Goals: Restore natural channel form and ecological function by narrowing the creek channel, removing invasive weeds and planting native vegetation.

Project Goals:

- Restore natural channel form and ecological function
- Removing invasive weeds

- Restore native vegetation.

Anticipated Program Activities:

- Channel Reconfiguration
    - Narrow the width of the channel and create adjacent floodplain surfaces
    - Reposition thalweg
    - Construct riffles
    - Increase channel sinuosity
    - Construct rock vanes/grade control
    - Construct rock and/or log revetments
    - Install root wads/large woody debris
    - Augment spawning gravels
    - Loosen embedded gravels by scarification

- Vegetation Management
    - Eradicate invasive vegetation
    - Plant native grasses, sedges, shrubs and trees

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Restoration of a functional low flow channel and adjacent floodplain
- Eradication of invasive plants from 0.5 acres of the site
- Lower water temperatures
- Enhanced spawning habitat for Chinook salmon and rainbow trout
- Improved wildlife habitat on 19 acres of riparian forest
- Improved aquatic and riparian habitat diversity
- Increased shaded riverine aquatic habitat

11. <u>Glide Ranch</u>

Setting: The Glide Ranch subreach consists of 125 acres, located midway between Stevenson Bridge and Pedrick Road. The site is 11,200 feet long, averages nearly 500 feet wide and features a nearly continuous wide and deep pool with little or no floodplains, few riffles and

steep banks. The site is bounded by rural residential properties on the south bank and row crops on the north bank.

History: The site was channelized for flood conveyance and mined for gravels until as recently as the 1960s. Since the site was abandoned it has become a nearly continuous deep pool.

Current Condition: The channel currently consists of a nearly continuous pool lacking natural meander form, riffles and floodplains. Invasive weeds, mainly eucalyptus, tamarisk and Himalayan blackberry occupy at least eight net acres.

The excess width and depth of open water results in warming and long residence time of the water in a pool that lacks perceptible flow velocity in all but winter runoff flows. Warmer water favors non-native fish over native fish. Invasive weeds have displaced native vegetation and degraded wildlife habitat. Lack of natural form systematically inhibits ecological function, including diversity of aquatic habitat and natural recruitment of native vegetation.

Project Goals:

- Restore natural channel form and ecological function
- Removing invasive weeds
- Restore native vegetation.

Anticipated Program Activities:

- Channel Reconfiguration
    - Narrow the width of the channel from an average of 46 feet to 27 feet and create adjacent floodplain surfaces
    - Create side channels
    - Reposition thalweg
    - Construct riffles
    - Increase channel sinuosity
    - Construct rock vanes/grade control
    - Construct rock and/or log revetments
    - Install root wads/large woody debris
    - Augment spawning gravels
    - Fill Abandoned gravel pits

- Vegetation Management
    - Eradicate invasive vegetation
    - Plant native grasses, sedges, shrubs and trees

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Conversion of 12 acres of open water to 8 acres of design channel and 4 acres of floodplain
- Eradication of invasive plants from 8.1 acres of the site
- Lower water temperatures
- Enhanced spawning habitat for Chinook salmon and rainbow trout
- Improved wildlife habitat on 125 acres of riparian forest
- Improved aquatic and riparian habitat diversity
- Increased shaded riverine aquatic habitat

12. <u>Nishikawa</u>

Setting: The Nishikawa subreach consists of 30 acres located immediately upstream of Pedrick Road. The site is 2,550 feet long and averages 512 feet wide. Aquatic habitat is dominated by native fishes other than salmonids. The riparian corridor is bounded by row crops on the south bank and the U.C. Davis Riparian Reserve on the north bank.

History: The site bears evidence of channelization for flood conveyance. Several legacy dump sites have been removed from the banks, including seven cars.

Current Condition: The channel lacks natural meander form and floodplains, and has a shortage of riffles and gravel substrate. Five primary invasive weeds consisting of giant reed, tamarisk, eucalyptus, Himalayan blackberry and tree-of-heaven occupy 1.5 net acres.

Weeds have displaced native vegetation and stabilized gravel bars contributing to the depletion of spawning gravels.

Project Goals:

- Restore natural channel form and ecological function
- Removing invasive weeds
- Restore native vegetation.

Anticipated Program Activities:

- Channel Reconfiguration

    - Narrow the width of the channel from an average of 50 feet to an average of 27 feet and create adjacent floodplain surfaces
    - Create side channels
    - Reposition thalweg
    - Construct riffles
    - Increase channel sinuosity
    - Construct rock vanes/grade control
    - Construct rock and/or log revetments
    - Install root wads/large woody debris
    - Augment spawning gravels
    - Loosen embedded gravels by scarification

- Vegetation Management
    - Eradicate invasive vegetation
    - Plant native grasses, sedges, shrubs and trees

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Conversion of 3 acres of open water to 2 acres of design channel and 1 acre of floodplain
- Eradication of invasive plants from 1.5 acres of the site
- Lower water temperatures
- Enhanced spawning habitat for Chinook salmon and rainbow trout
- Restoration of 30 acres of riparian habitat
- Improved aquatic and riparian habitat diversity
- Increased shaded riverine aquatic habitat

13. <u>Olmo-Hammond-UCD</u>

Setting: The Olmo-Hammond-UCD subreach consists of 90 acres of the Putah Creek corridor between Pedrick Road and Highway 80. The site is 10,000 feet long, averages nearly 400 feet wide and features a nearly continuous wide and deep pool with little or no floodplains, few riffles and steep banks. The site is bounded by walnuts, grapes and row crops on the south bank and the U.C. Davis campus on the north bank.

History: This portion of the creek was channelized for flood conveyance and extensively mined for gravels until as recently as the 1960s. The gravel pits were abandoned and recaptured the creek flow to form a nearly continuous pool. The eastern half of the subreach begins at the South Fork of Putah Creek, where, in the 1870s, a new channel was created to bypass the City of Davis. The Putah Creek South Fork channel is now bounded by levees.

Current Condition: The channel currently consists of a nearly continuous pool, lacking natural meander form, riffles and floodplains. Invasive weeds, mainly eucalyptus, tamarisk, and Himalayan blackberry, occupy at least 2.5 net acres of the site. Fisheries in this subreach are dominated by non-native fish. The site features the U.C. Davis Picnic Grounds and hosts Camp Putah, a summer camp for Davis youth.

The excess width of the channel results in warming from solar radiation and long residence times of the creek water. The pool lacks perceptible flow velocity in all but winter storm flows. Warmer water results in conditions unfavorable for native fish. Invasive weeds have displaced native vegetation and degraded wildlife habitat. Lack of natural form in the channel systematically inhibits ecological function, reducing diversity of habitat and recruitment of native vegetation.

Project Goals:

- Restore natural channel form and ecological function
- Enhance native fish and wildlife habitat
- Remove invasive weeds
- Restore native vegetation

Anticipated Program Activities:

- Channel Reconfiguration
    - Narrow the width of the flow channel from an average of 70 feet to an average of 27 feet
    - Create adjacent flood plains
    - Reposition thalweg
    - Create side channels
    - Construct riffles
    - Increase channel sinuosity
    - Construct rock cross vanes/grade controls
    - Construct rock and/or log revetments
    - Install root wads/large woody debris
    - Augment spawning gravels

    - Fill abandoned gravel pits

- *Vegetation Management*
    - Eradicate invasive weeds
    - Plant native vegetation

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Conversion of 15 acres of open water to 7 acres of design channel and 8 acres of floodplain habitat
- Eradication of 2.5 net acres of invasive weeds
- Improved wildlife habitat on 90 acres of riparian forest
- Increased shaded riverine aquatic habitat
- Lower water temperature
- Improve aquatic and riparian habitat quality and diversity
- Enhanced natural setting and learning opportunities for Camp Putah

14. <u>I-80 to Old Davis Road</u>

Setting: The I80 to Old Davis Road subreach consists of 75 acres located between the Highway 80 overcrossing and Old Davis Road. The site is 4,400 feet long, averages nearly 740 feet wide and features levees, over-widened pools with little or no floodplains, few riffles and steep banks. The site is bounded by orchard, row crops and field crops on both banks.

History: The channel is part of the South Fork of Putah Creek, a diversion around the City of Davis that was constructed in the 1870s and expanded by the U.S. Army Corps of Engineers starting in the 1940s. In 2001, U.C. Davis created a restoration site called "Restoria" in this reach, establishing native grasses and oak woodland habitat.

Current Condition: The channel currently consists of over widened pools connected by a narrow ditch and bounded by high terraces. Five primary invasive weeds consisting of Eucalyptus, Himalayan blackberry, perennial pepperweed, tamarisk, and tree tobacco occupy 3.3 net acres.

The excess width of the channel results in warming from solar radiation and long residence times of the creek water in the pools. The pools lack perceptible flow velocity in all but winter storm flows. Warmer water results in conditions unfavorable for native fish. Invasive weeds have displaced native vegetation and degraded wildlife habitat. Lack of natural form in the channel systematically inhibits ecological function, reducing diversity of habitat and recruitment of native vegetation.

Project Goals:

- Restore natural channel form and ecological function
- Enhance native fish and wildlife habitat
- Remove invasive weeds
- Restore native vegetation

Anticipated Program Activities:

- Channel Reconfiguration
    - Narrow the width of the flow channel from an average of 50 feet to 27 feet
    - Create adjacent flood plains
    - Reposition thalweg
    - Create side channels
    - Construct riffles
    - Increase channel sinuosity
    - Construct rock cross vanes/grade controls
    - Construct rock and/or log revetments
    - Install root wads/large woody debris

- *Vegetation Management*
    - Eradicate invasive weeds
    - Plant native vegetation

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Conversion of 5acres of open water to 3 acres of design channel and 2 acres of floodplain habitat
- Eradication of 3.3 net acres of invasive weeds

- Improved wildlife habitat on 75 acres of riparian forest
- Increased shaded riverine aquatic habitat
- Lower water temperature
- Improve aquatic and riparian habitat quality and diversity

15. <u>Old Davis Road to Mace</u>

Setting: The Old Davis Road to Mace subreach consists of 165 acres located between Old Davis Road and Mace Boulevard. The site is 18,000 feet long, averages 400 feet wide and features a nearly continuous wide and deep pool with little or no floodplains, few riffles and steep banks. The site is bounded by walnuts, row crops and field crops on both banks.

History: This portion of Putah Creek was created by the excavation of the South Fork of Putah Creek to bypass flows around the City of Davis. It features a nearly continuous, overly wide pool that was most likely excavated to create the adjacent levees.

Current Condition: The channel currently consists of a nearly continuous pool lacking natural meander form, riffles and floodplains. Invasive weeds, mainly eucalyptus, tamarisk, giant reed and perennial pepperweed occupy 4.8 net acres. The site is dominated by non-native fish. During the summer, thick mats of the invasive aquatic weed water primrose (*Ludwigia sp.*) cover most of the water surface.

The excess width and depth of open water results in warming from solar radiation and long residence time of the water in a pool that lacks perceptible flow velocity in all but winter storm flows. Warmer water favors non-native fish over native fish. Invasive weeds have displaced native vegetation and degraded wildlife habitat. Lack of natural form systematically inhibits ecological function, including diversity of aquatic habitat and natural recruitment of native vegetation.

Project Goals:

- Restore natural channel form and ecological function
- Enhance native fish and wildlife habitat
- Remove invasive weeds
- Restore native vegetation

Anticipated Program Activities:

- Channel Reconfiguration
    - Narrow the width of the flow channel from an average of 70 feet to 27 feet

    - Create adjacent flood plains
    - Reposition thalweg
    - Create side channels
    - Increase channel sinuosity
    - Construct rock cross vanes/grade controls
    - Construct rock and/or log revetments
    - Install root wads/large woody debris

- *Vegetation Management*
    - Eradicate invasive weeds
    - Plant native vegetation

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Conversion of 29 acres of open water to 13 acres of design channel and 15 acres of floodplain habitat
- Eradication of 4.8 net acres of invasive weeds
- Improved wildlife habitat on 165 acres of riparian forest
- Increased shaded riverine aquatic habitat
- Lower water temperature
- Extend native fish habitat
- Increased shaded riverine aquatic habitat
- Improve aquatic and riparian habitat quality and diversity

16. <u>Mace to Road 106A</u>

Setting: The Mace to Road 106A subreach consists of 240 acres located between Mace Boulevard and Road 106A. The site is 14,250 feet long, averages 733 feet wide and features two nearly continuous wide and deep pools connected by a narrow channel with little or no floodplains, few riffles and steep banks. The site is bounded by walnuts, row crops and field crops on both banks.

History: This portion of Putah Creek was created by the excavation of the South Fork of Putah Creek to bypass flows around the City of Davis. It features nearly continuous, overly wide pools that were most likely excavated to create the adjacent levees.

Current Condition: The channel currently consists of two continuous pools connected by a narrow channel and lacking natural meander form, riffles or floodplains. Four primary invasive weeds, consisting mainly of tamarisk, giant reed and perennial pepperweed occupy 12.6 net acres. Fisheries in this subreach are dominated by non-native fish. During the summer, thick mats of water primrose are common on the water surface. The site has several agricultural diversions and also receives agricultural return flows. Water is impounded at Road 106A during the summer to facilitate agricultural diversions. The impoundment consists of an earthen berm that is placed in early April and removed around December 1, in conjunction with removal of the flashboards from the Los Rios Check Dam downstream.

The excess width and depth of open water results in warming from solar radiation and long residence time of the water in a pool that lacks perceptible flow velocity in all but winter runoff flows. Warmer water favors non-native fish over native fish. Invasive weeds displace native vegetation and degrade wildlife habitat. Lack of natural form systematically inhibits ecological function, including diversity of aquatic habitat and natural recruitment of native vegetation.

Project Goals:

- Restore natural channel form and ecological function
- Eliminate the practice of annual construction and degradation of the earthen crossing at Road 106A
- Provide fish passage
- Enhance native fish and wildlife habitat
- Remove invasive weeds
- Restore native vegetation

Anticipated Program Activities:

- Channel Reconfiguration
    - Narrow the width of the flow channel from an average of 76 feet to 27 feet
    - Create adjacent flood plains
    - Create side channels
    - Reposition thalweg
    - Construct riffles
    - Increase channel sinuosity
    - Construct rock cross vanes/grade controls

    - Construct rock and/or log revetments
    - Install root wads/large woody debris
    - Augment spawning gravels
    - Replace the current earthen crossing with modular box culverts on the north half of the channel
    - Provide for fish passage at Road 106A crossing with fish ladder or equivalent feature

- *Vegetation Management*
    - Eradicate invasive weeds
    - Plant native vegetation

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Conversion of 25 acres of open water to 11 acres of design channel and 14 acres of floodplain habitat
- Eradication of 12.6 net acres of invasive weeds
- Improved wildlife habitat on 240 acres of riparian habitat
- Increased shaded riverine aquatic habitat
- Lower water temperature
- Extended native fish habitat
- Increased shaded riverine aquatic habitat
- Improve aquatic and riparian habitat quality and diversity

17. <u>Road 106A to Yolo Bypass Wildlife Area</u>

Setting: The Mace to Road 106A subreach consists of 41 acres located between Road 106A and the Yolo Bypass Wildlife Area (YBWA). The site is 6,150 feet long, averages 290 feet wide and consists of a nearly continuous pool impounded seasonally by the Los Rios Check Dam on the YBWA.

History: This portion of Putah Creek was created by the excavation of the South Fork of Putah Creek to bypass flows around the City of Davis. It features a nearly continuous, overly wide pool that is impounded from April 1 to December 1 by a 12-foot check dam.

Current Condition: The channel currently consists of a nearly continuous pool lacking natural meander form, riffles and floodplains. Invasive weeds, consisting mainly of tamarisk, giant reed and perennial pepperweed occupy 8.5 net acres. Fisheries in this subreach are dominated by non-native fish. The site has several agricultural diversions and also receives agricultural return flows.

The excess width and depth of open water results in warming from solar radiation and long residence time of the water in a pool that lacks perceptible flow velocity in all but winter runoff flows. Warmer water favors non-native fish over native fish. Invasive weeds displace native vegetation and degrade wildlife habitat. Lack of natural form systematically inhibits ecological function, including diversity of aquatic habitat and natural recruitment of native vegetation.

Project Goals:

- Restore natural channel form and ecological function
- Enhance native fish and wildlife habitat
- Remove invasive weeds
- Restore native vegetation

Anticipated Program Activities:

- Channel Reconfiguration
    - Narrow the width of the flow channel from an average of 85 feet to 27 feet
    - Create adjacent flood plains
    - Create side channels
    - Reposition thalweg
    - Construct riffles
    - Increase channel sinuosity
    - Construct rock cross vanes/grade controls
    - Construct rock and/or log revetments
    - Install root wads/large woody debris

- *Vegetation Management*
    - Eradicate invasive weeds
    - Plant native vegetation

- Maintenance
    - Irrigate native vegetation plantings
    - Manage non-native vegetation

Anticipated Outcomes:

- Conversion of 12 acres of open water to 5 acres of design channel and 7 acres of floodplain habitat
- Eradication of 8.5 net acres of invasive weeds
- Improved wildlife habitat on 41 acres of riparian habitat
- Increased shaded riverine aquatic habitat
- Lower water temperature
- Extended native fish habitat
- Increased shaded riverine aquatic habitat
- Improve aquatic and riparian habitat quality and diversity

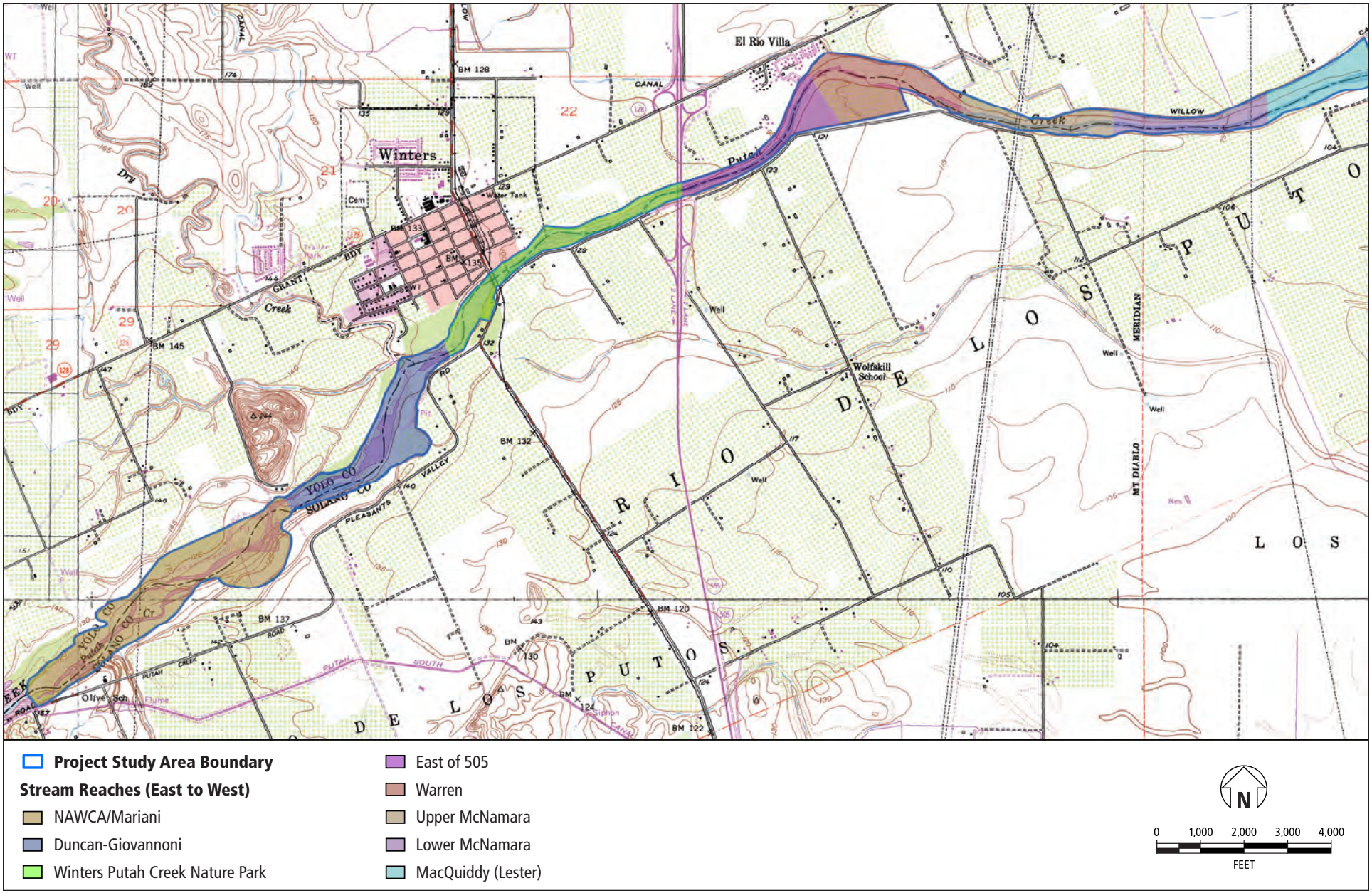
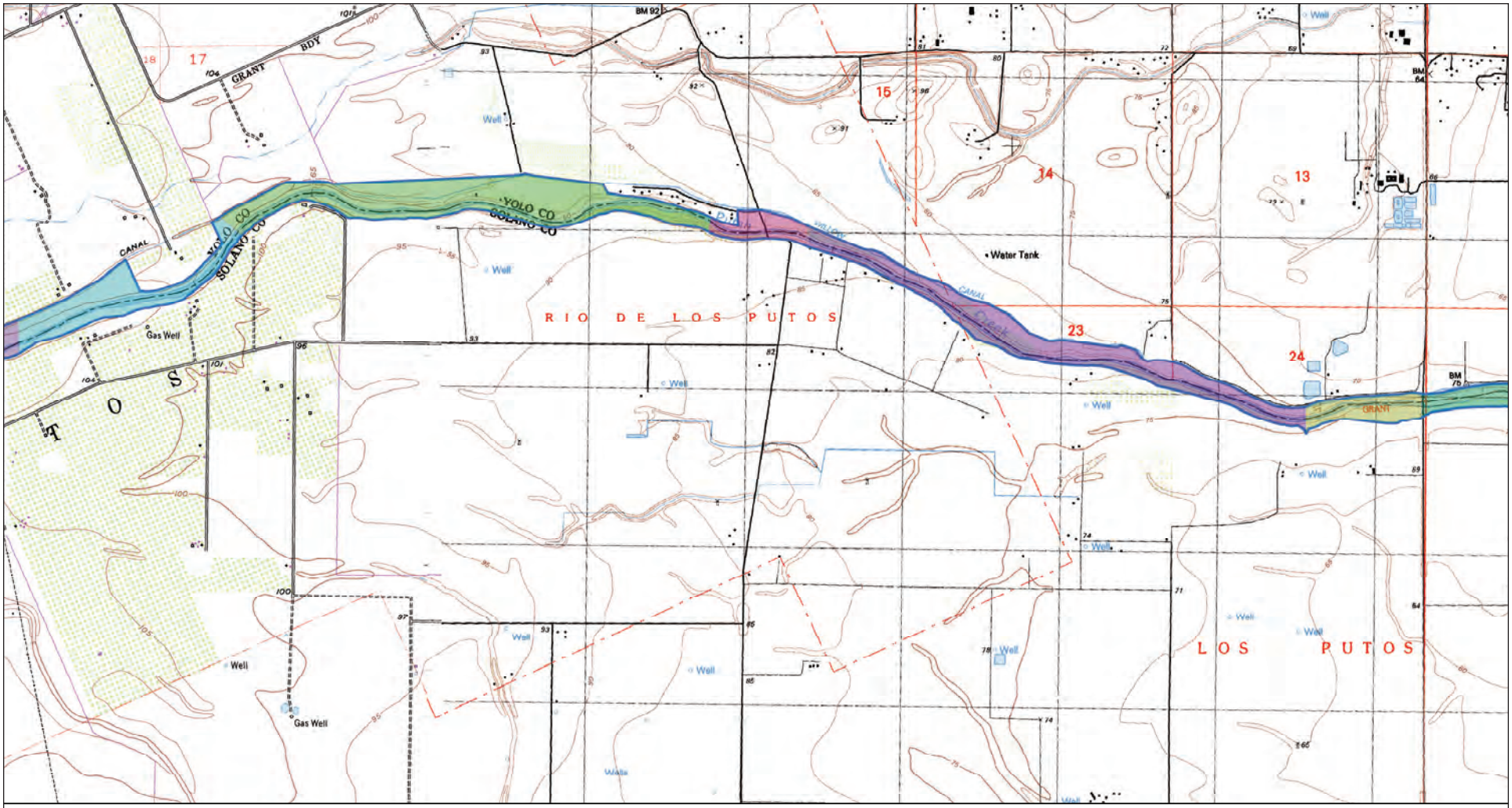


Figure C-1

Stream Reaches

Source: BSK Associates



Project Study Area Boundary

Stream Reaches (East to West)

- Lower McNamara
- MacQuiddy (Lester)
- Russell Ranch
- Stevenson Bridge
- Glide Ranch
- Nishikawa
- Olmo-Hammond-UCD

N

0 1,000 2,000 3,000 4,000

FEET

Figure C-2

Stream Reaches

Source: BSK Associates

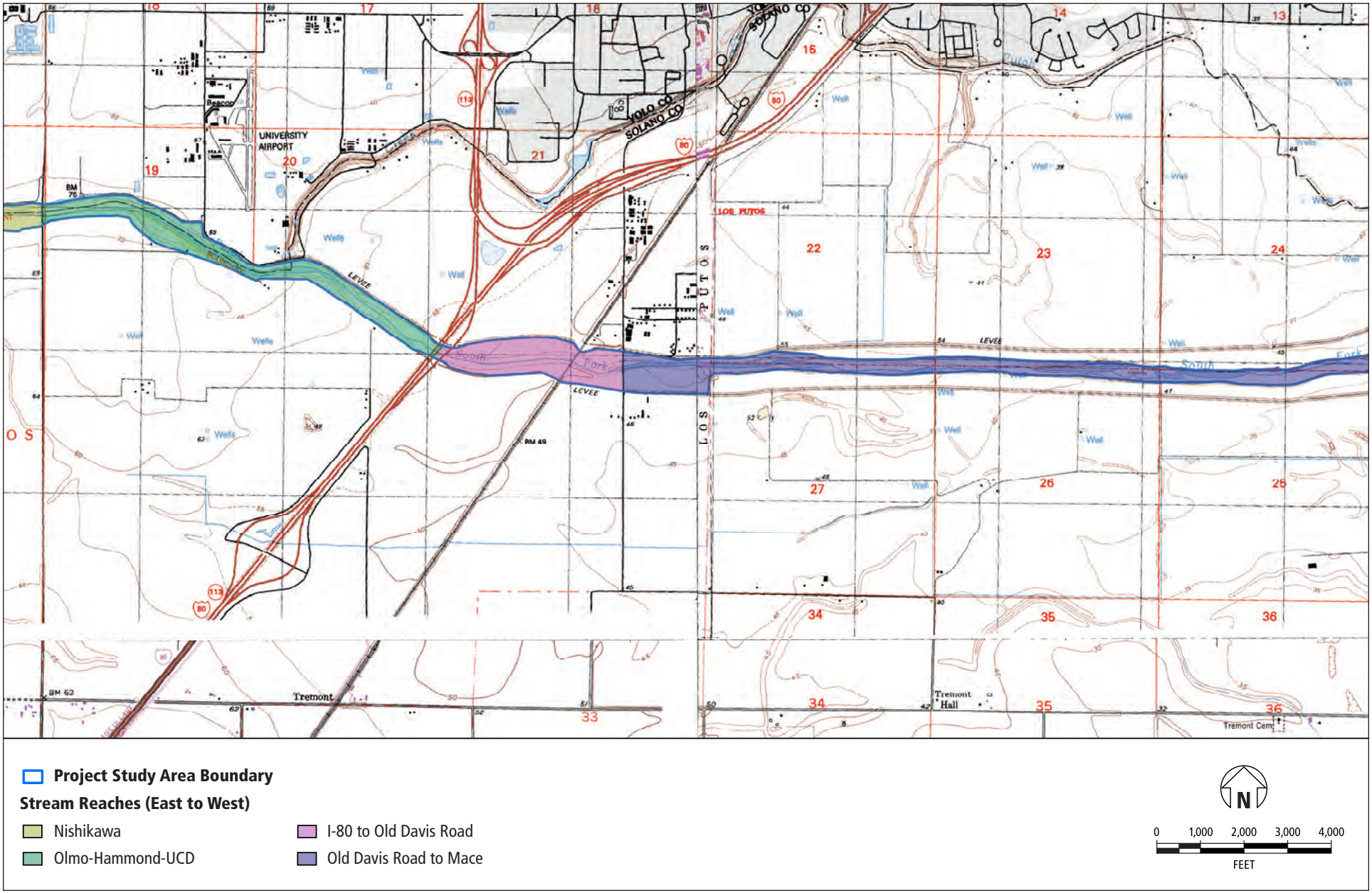


Figure C-3

Stream Reaches

Source: BSK Associates

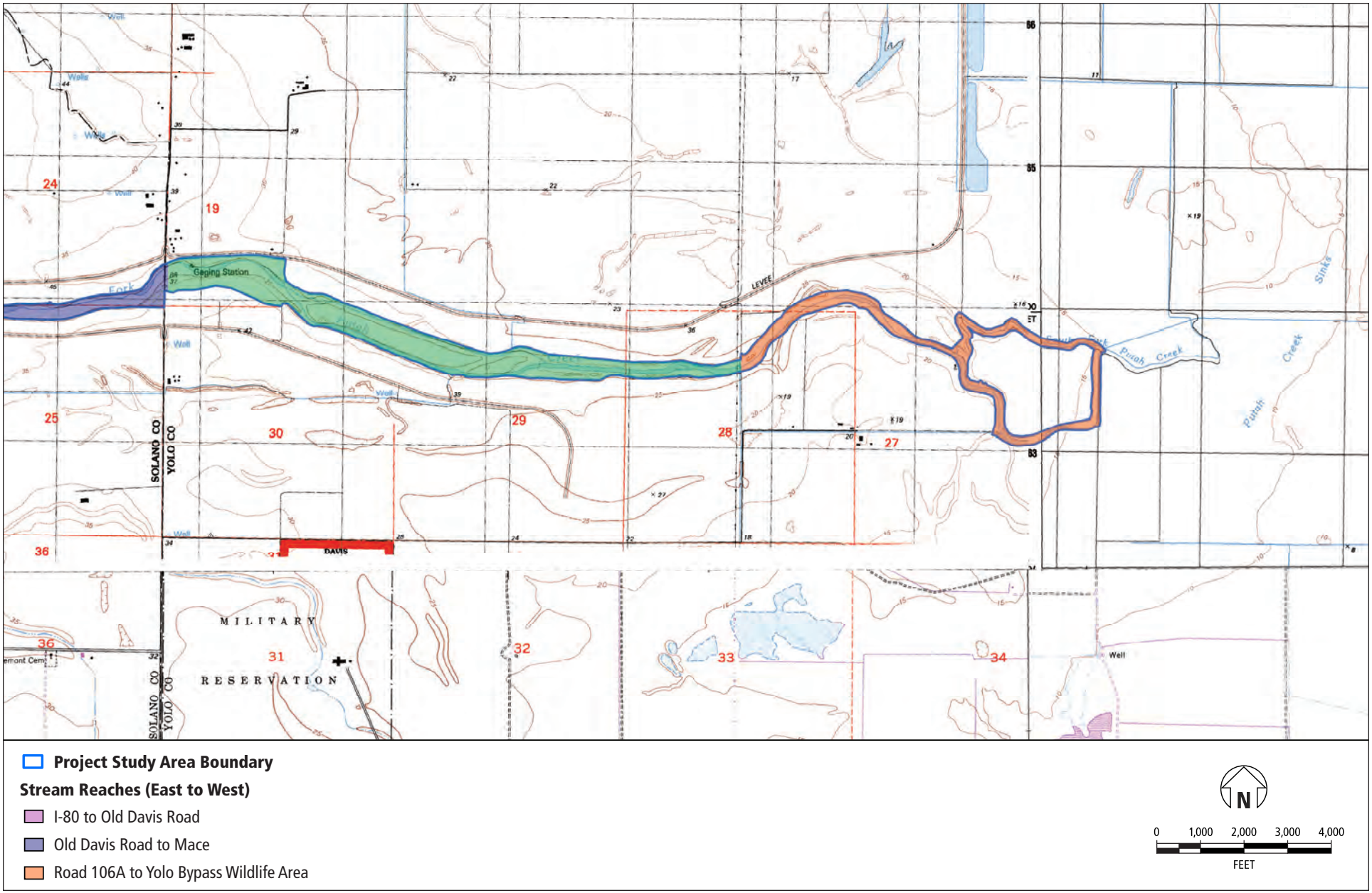


Figure C-4

Stream Reaches

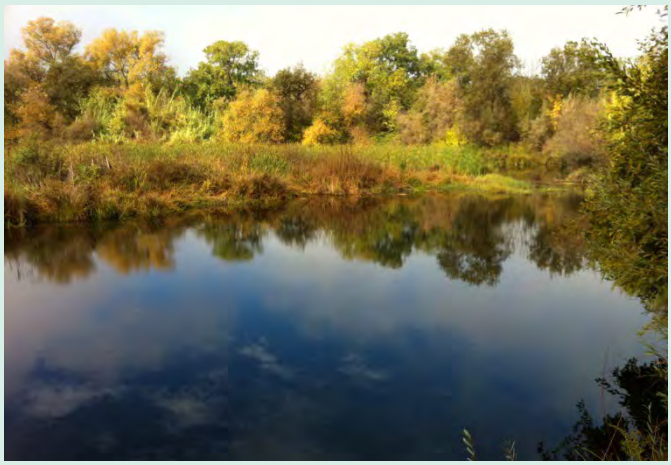
Source: BSK Associates

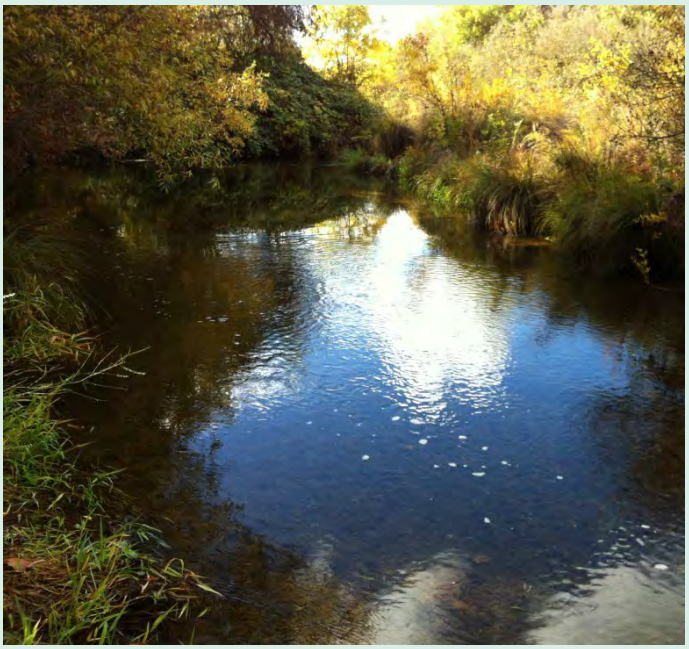
APPENDIX D

Habitat Assessment

JUNE 2015

Habitat Assessment for the Lower Putah Creek Restoration Project—Upper Reach





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Suggested citation:
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Cover photos (clockwise from upper left): Duncan-Giovannoni Pool; Winters Putah Creek Project; Lower McNamara Pool; and Putah Diversion Dam. All photos by Stillwater Sciences.

EXECUTIVE SUMMARY

The Yolo Basin Foundation (YBF) and California Department of Fish and Wildlife (CDFW), in collaboration with the Solano County Water Agency (SCWA) and the Lower Putah Creek Coordinating Committee (LPCCC), are considering restoration along portions of Lower Putah Creek from the Putah Diversion Dam (PDD) downstream to the Yolo Bypass Wildlife Area (YBWA) as part of the Lower Putah Creek Restoration Project, ERP Grant Number E1183015. This assessment summarizes existing information that can be used in the Project's National Environmental Policy Act (NEPA)/California Environmental Quality Act (CEQA) compliance documents and any necessary Biological Assessment (BA), and identifies additional studies that may be necessary prior to implementation efforts. Potential impacts of the Project are not evaluated in this habitat assessment.

Lower Putah Creek has been the subject of multiple studies of habitat conditions and species use. Historical and recent land use practices have had effects on natural communities in and along Putah Creek, including the conversion of lands adjacent to Putah Creek to farms and urban development, water diversions, gravel extraction operations, and channelization for flood control purposes. Recent restoration efforts have been made to reverse the effects of these practices, including floodplain grading, channel re-scaling, non-native invasive plant removal, and revegetation with native plants. Existing vegetation types within the riparian corridor include mixed riparian forest, valley oak riparian forest, riparian scrub, disturbed riparian woodland, riverine wetland, ruderal (non-native annual grasslands), and agricultural land. There are three partial or permanent barriers to fish passage along Lower Putah Creek: Los Rios Check Dam, which limits upstream and downstream passage between April 1 and December 1; Road 106A, a seasonal barrier near the boundary of the Yolo Bypass that is operated in conjunction with the Los Rios Check Dam; and the PDD, which constitutes the upper (year-round) boundary of fish migration. Streamflow in Lower Putah Creek is primarily controlled by releases at Monticello Dam and the PDD. Releases from the PDD are intended to benefit aquatic and riparian resources in the lower creek, and include spawning flows for Chinook salmon. Water temperatures downstream of PDD increase rapidly in the summer months, which affects fish distribution.

Plants and natural communities –There are 34 special-status plant species and 4 rare natural communities with moderate or high potential to occur in the assessment area.

Invertebrates – One special-status invertebrate, valley elderberry longhorn beetle, is known to occur in the assessment area.

Fish – There are four special-status fish species with moderate or high potential to occur in the assessment area: Pacific lamprey, Chinook salmon, Central Valley steelhead, and Sacramento splittail. Two of these, Pacific lamprey and Chinook salmon, seasonally occur throughout the Upper Reach. Steelhead have not been observed spawning in Putah Creek in recent history, and splittail are likely limited to the lowermost portion of the reach within the Yolo Bypass during periods of flooding.

Reptiles and Amphibians – One special-status reptile, western pond turtle, is documented as being widespread along Putah Creek where sections of creek are relatively slow-moving and deep, and have structures for basking such as logs, rocks, or exposed banks.

Birds – Seven special-status bird species, white-tailed kite, northern harrier, Swainson's hawk, western yellow-billed cuckoo, willow flycatcher, yellow warbler, and tricolored blackbird were identified as having moderate to high potential to occur in the assessment area. Four of these species may nest in the assessment area. Additionally, raptors and other native migratory birds (including their occupied nests and eggs) protected by the Federal Migratory Bird Treaty Act may occur.

Mammals – Three special-status mammals, western red bat, pallid bat, and California ringtail, may occur throughout the assessment area in riparian habitat, riparian forests with tree hollows, and stands of cottonwood.

Existing information was not readily available to sufficiently specify locations and distributions of special-status plants and natural communities, valley elderberry longhorn beetle, and salmon and steelhead at certain times of the year. Subsequently, three additional surveys may be necessary at a Project-specific level to inform design, facilitate evaluation of potential Project impacts within construction areas, and develop appropriate impact avoidance measures: (1) protocol-level surveys for special-status plants, along with concurrent surveys of natural communities; (2) surveys to determine locations of elderberry plants, and if the plants cannot be avoided, protocol-level surveys for valley elderberry longhorn beetle (if the species is still listed at the time of NEPA/CEQA document development); and (3) pre-construction snorkel surveys for salmon and steelhead between Interstate 80 and Highway 505, if in-water work during fish migration periods cannot be avoided.

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Appendices

1 INTRODUCTION

The Yolo Basin Foundation (YBF) and California Department of Fish and Wildlife (CDFW), in collaboration with the Solano County Water Agency (SCWA) and the Lower Putah Creek Coordinating Committee (LPCCC), are considering restoration along portions of Lower Putah Creek from the Putah Diversion Dam (PDD) downstream through the Yolo Bypass Wildlife Area (YBWA) as part of the Lower Putah Creek Restoration Project, ERP Grant Number E1183015. The Putah Creek Restoration Project is divided into two geographic extents: (1) the portion of Putah Creek that crosses the Yolo Basin Wildlife Area (YBWA), called the "YBWA Reach"; and (2) the portion of Putah Creek between the western YBWA boundary and the Putah Diversion Dam (PDD), called the "Upper Reach." This study applies to the Upper Reach of the Putah Creek Restoration Project, which is the subject of a program of proposed activities planned by SCWA and LPCCC (Project).

This report describes the methods and results of a habitat assessment for the Upper Reach – Lower Putah Creek from the Putah Diversion Dam (PDD) downstream to the western boundary of the Yolo Bypass Wildlife Area (Figure 1) – and includes an assessment of existing habitat and special-status plants and animals in the Project area.

The results of this habitat assessment are intended to: (1) help determine the need for additional species surveys; (2) identify habitat areas and species life history stages that may need to be addressed and/or protected during Project planning and design; and (3) inform the National Environmental Policy Act (NEPA)/California Environmental Quality Act (CEQA) compliance documents and Biological Assessment (BA) for the Project. Potential impacts of the Project on special-status species or their habitat are not evaluated in this habitat assessment.

A separate habitat assessment has been prepared for the YBWA Reach (Stillwater Sciences and Vollmar 2014).

1.1 Project Area

Putah Creek originates in California's Coast Range in Lake County at an elevation of approximately 4,700 ft and flows approximately 35 miles eastward before being impounded into Lake Berryessa behind Monticello Dam. Water released from Monticello Dam flows for approximately six and a half miles to the PDD near the town of Winters, where most of the water is diverted to the Putah South Canal for agricultural and municipal use in Solano County. Downstream of the PDD, Putah Creek flows for approximately 37 km (23 mi) before reaching the tidally influenced Toe Drain within the Yolo Bypass, which connects Putah Creek to the Sacramento River.

The habitat assessment area (referred to hereafter as the "assessment area") is analogous to the Upper Reach, which includes the Putah Creek channel and adjacent terrestrial-riparian corridor from the PDD to the boundary with the YBWA (Figure 1).

The Upper Reach riparian corridor is bordered on both sides by agricultural fields and/or urban development. The primary water diversion point within the Upper Reach is the PDD where the Solano Project and SCWA route water to the Putah South Canal. The amount of water released below PDD had been the point of contention between users and residents in Yolo and Solano Counties until a 2000 court settlement was made. The Putah Creek Water Accord (Accord), signed in May 2000, followed the extended drought from 1987 to 1992 in which long sections of

Putah Creek went dry and large fish die-offs were reported (EDAW 2005). Implementation of the Accord provided for increased flow releases into Putah Creek downstream of the PDD with the purpose of creating a flow regime more closely resembling the natural (unimpaired) flow regime, and maintaining a living stream for the benefit of fish, wildlife, and native plants from the PDD to the Toe Drain in the Yolo Bypass. The flows specified in the Accord were developed to attract and support Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*O. mykiss*) to Putah Creek, and to supply enough water to support spawning and rearing for these and other native species. In addition to flow releases, the Accord also provided funds for restoration and monitoring activities in Putah Creek.

The lower approximately 3.3 km (2.0 mi) of the Upper Reach flows through the Yolo Bypass. The Yolo Bypass is an approximately 5-km (3-mi) wide, 64-km (40-mi) long stretch of mostly agricultural land that extends from the junction of the Sacramento and Feather rivers to just north of the City of Rio Vista, where it rejoins the Sacramento River. During wet years, floodwaters from the Sacramento River enter the Yolo Bypass, routing flood flows away from the City of Sacramento and creating up to 24,000 ha (60,000 ac) of shallow water habitat for native fish and migratory and wintering shorebird populations (Sommer et al. 2001a, Sommer et al. 2001b, Sommer et al. 2003). Floodwaters through the Yolo Bypass, which are joined by Putah Creek and other Yolo Basin tributaries (e.g., Cache Creek and Willow Slough), move overland south toward the Sacramento River and Delta.

The final 1.6 km (1.0 mi) of the Upper Reach consists of a manmade channel within the Yolo Bypass that is seasonally impounded by the Los Rios Check Dam. When installed, the Los Rios Check Dam (discussed in the YBWA Reach Habitat Assessment [Stillwater Sciences and Vollmar 2014]) is a passage barrier to upstream and downstream fish migration.

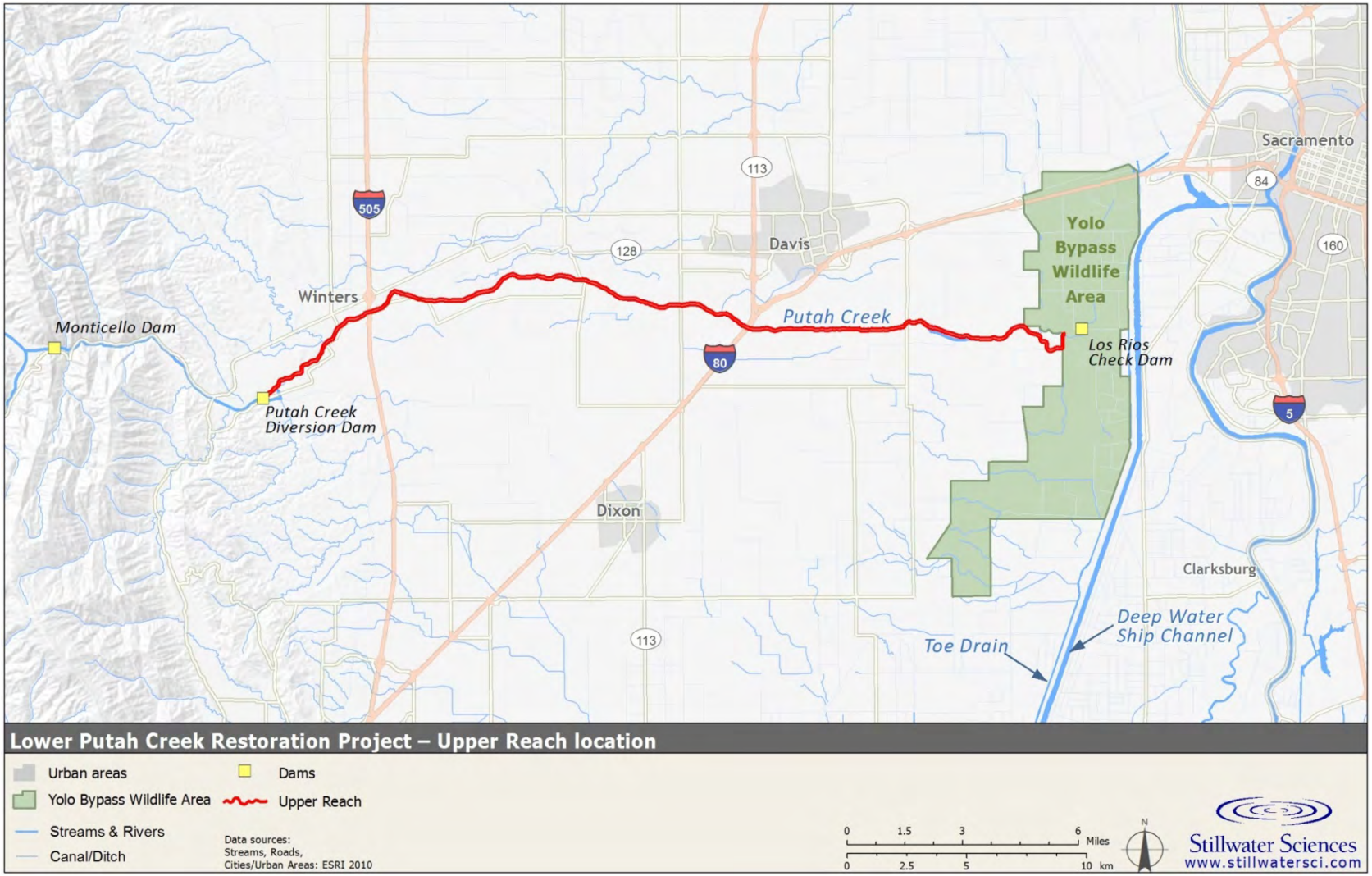


Figure 1. The Lower Putah Creek Restoration Project Upper Reach—Putah Diversion Dam to the Yolo Bypass Wildlife Area.

2 METHODS

Preparation of this habitat assessment included review of existing reports, plans, and journal articles relevant to the Project area, and a one-day reconnaissance-level survey of select sites along the western half of the Upper Reach (described in more detail in Sections 2.2–2.4, below). This habitat assessment provides a baseline characterization of habitat quality and distribution for special-status species; no specific or protocol-level surveys were conducted.

2.1 Special-Status Species Scoping

The target list of special-status wildlife, fish, plant species, and natural communities of special concern with potential to occur in the project region was developed through querying the following resources and resource reports specific to Lower Putah Creek:

- The U.S. Fish and Wildlife Service (USFWS) list of federally listed and proposed endangered and threatened species (USFWS 2012),
- The National Oceanographic and Atmospheric Association's National Marine Fisheries Service (NMFS) fish species list (NMFS 2012),
- The California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database (CNDDB) (CDFG 2012, CDFW 2014 and 2015[1]), and
- The California Native Plant Society's (CNPS) online Inventory of Rare and Endangered Vascular Plants of California (CNPS 2012).

The USFWS, CNDDB, and CNPS database queries were each based on a search of the six U.S. Geological Survey (USGS) 7.5' quadrangles in which the Putah Creek Upper Reach is located: Mount Vaca (499A), Allendale (498B), Winters (514C), Merritt (514D), Davis (513C), Sacramento West (513D); and the 18 surrounding quadrangles: Esparto (515A), Madison (514B), Woodland (514A), Grays Bend (513B), Taylor Monument (513A), Rio Linda (512B), Sacramento East (512C), Florin (496B), Clarksburg (497A), Saxon (497B), Dixon (498A), Dozier (498D), Elmira (498C), Fairfield North (499D), Mount George (499C), Capell Valley (499B), Lake Berryessa (515C), and Monticello Dam (515D).

Special-status plant species include those that are:

- Listed, proposed, or under review as endangered or threatened under the federal Endangered Species Act (ESA);
- Listed, proposed, or under review as endangered or threatened under the California ESA;
- Listed as rare under the California Native Plant Protection Act (CNPPA); and/or
- Included on the CDFG (2012) *Special Vascular Plants, Bryophytes, and Lichens List* with a California Rare Plant Rank (CRPR) of 1, 2, 3, or 4.

Rare natural communities are vegetation types with a ranking of S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable) on the CDFG (2010) *List of California Terrestrial Natural Communities*.

[1] CNDDB was re-queried in January 2014 and January 2015 to review any new occurrence data.

Special-status wildlife species include those that are:

- Listed, proposed, or under review as endangered or threatened under the federal ESA (ESA);
- Listed, proposed, or under review as endangered or threatened under the California ESA (CESA);
- Designated as a CDFW Species of Special Concern; and/or
- Designated as Fully Protected under the California Fish and Game Code (Sections 3511, 4700, 5050, and 5515).

All special-status wildlife, fish, plant species, and natural communities identified from the sources described above are listed in Appendices A, B, and C. The potential for these species to occur in the assessment area was determined by reviewing the documented occurrence information from the databases and other information sources consulted, and comparing the habitat associations for each species or plant community with existing background information about the assessment area.

2.2 Existing Information Review

Botanical resources and natural communities information contained in the *Lower Putah Creek Watershed Management Action Plan* (EDAW 2005) was reviewed for the purposes of this assessment. The vegetation information gleaned from this source was verified in the field (see Section 2.3 below) and then compared to the habitat requirements for the special-status plants and natural communities in Appendices A and B, to determine the likelihood of each species or natural community to occur in the assessment area.

Lower Putah Creek has been the subject of multiple studies of riparian habitat conditions and fish use (Sommer et al. 2001a–b, 2003, 2005, USACE and CALFED 2002, Harrell and Sommer 2003, Yates 2003, and TRPA 2010). These studies, which documented aquatic habitat characteristics, fish species composition, and fish species distribution in Lower Putah Creek, were reviewed and compared to the special-status species listed in Appendix C to determine the potential for each species to occur in the assessment area.

Background materials providing information specific to wildlife resources were reviewed, including the *Putah Creek Terrestrial Wildlife Monitoring Program: Comprehensive Report 1997–2009* (Truan et al. 2010) and eBird's online database of bird distribution and abundance (eBird 2014). The habitat requirements for the special-status wildlife species listed in Appendix C were compared with general habitat conditions described in the literature and observed in the field (see Section 2.3 below) to determine the potential for each species to occur in the assessment area.

2.3 Habitat and Natural Community Assessment Field Reconnaissance

On 1 November 2012, a reconnaissance-level visit of potential project activity locations along the assessment area was conducted by a Stillwater Sciences botanist and wildlife biologist to confirm the general accuracy of the existing literature on the vegetation types and to assess the general overall habitat conditions in the assessment area.

3 RESULTS

3.1 Riparian Habitat and Land Uses

In addition to water diversions, other historical and recent land use practices have had effects on natural communities in and along Putah Creek. The conversion of land adjacent to Putah Creek to farms and urban development has significantly reduced the extent of the riparian corridor along the Upper Reach (EDAW 2005). Gravel extraction operations and channelization within the Upper Reach have left many long, featureless pools. In these and other areas, the low-flow channel is overly wide. The wide channel has, in many areas, become disconnected functionally from the floodplain due to a combination of channel incision and fine sediment deposition (EDAW 2005). Floodplains upstream of the Yolo Bypass are typically densely vegetated, with much of the vegetation consisting of non-native invasive species.

Large pool resulting from gravel extraction operations, approximately 2.2 miles downstream of the PDD.

Putah Creek restoration site just downstream of PDD with Chinook/steelhead spawning habitat.

As a result of prior land use practices and water diversions, native plant, fish, and wildlife communities and habitat to support them have diminished within the Upper Reach. A number of recent efforts have been made to reverse the effects of these impacts on Putah Creek. Multiple restoration projects including floodplain grading, channel re-scaling, non-native invasive plant removal, and revegetation with native plants have been implemented downstream of the PDD. Efforts to enhance salmon spawning habitat in the Upper Reach continue, through gravel augmentation and the addition of large woody debris (Marovich 2011).

3.1.1 Vegetation types

Vegetation types documented in the assessment area include mixed riparian forest, valley oak riparian forest, riparian scrub, disturbed riparian woodland, riverine wetland, ruderal areas, and agricultural lands (EDAW 2005). The dominant native community types are mixed riparian forest, disturbed riparian woodland, and valley oak riparian forest. During the site reconnaissance, a general assessment was made to document the presence/absence of each of the vegetation types described in the *Lower Putah Creek Watershed Management Action Plan* (EDAW 2005). Table 1 provides a summary of the vegetation types in the assessment area, as verified during the site visit, and a cross-walk between the terminology used in the existing vegetation information sources (EDAW 2005) and the vegetation alliances that are defined in the *Manual of California Vegetation, Second Edition* (MCV2) (Sawyer et al. 2009) and used by CDFW. The vegetation descriptions that follow are based primarily on information presented in the *Lower Putah Creek*

Watershed Management Action Plan (EDAW 2005), with caveats and clarifications provided where desktop analyses and field reconnaissance provided further insight.

Table 1. Vegetation types in the assessment area.

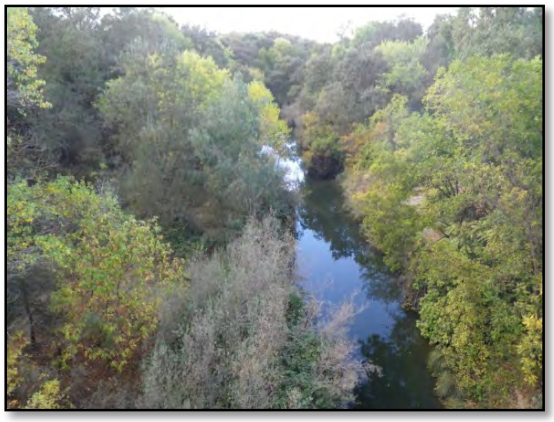
EDAW (2005) Vegetation Types	Examples of potential corresponding vegetation alliances (Sawyer et al. 2009)
Mixed Riparian Forest	• *Populus fremontii* ssp. *fremontii* Forest Alliance (Fremont cottonwood forest)[1] • *Fraxinus latifolia* Forest Alliance (Oregon ash groves) [1] • *Salix gooddingii* Woodland Alliance (Black willow thickets) [1] • *Acer negundo* Forest Alliance (Box-elder forest) [1]
Valley Oak Riparian Forest	• *Quercus lobata* Woodland Alliance (Valley oak woodland) [1] • *Sambucus nigra* ssp. *caerulea* Shrubland Alliance (blue elderberry stands)[1]
Riparian Scrub	• *Salix exigua* Shrubland Alliance (Sandbar willow thickets) • *Salix lasiolepis* Shrubland Alliance (Arroyo willow thickets) • *Salix laevigata* Woodland Alliance (Red willow thickets) [1] • *Rubus armeniacus* Semi-Natural Shrubland Stands (Himalayan blackberry brambles)
Disturbed Riparian Woodland	• *Eucalyptus camaldulensis* Semi-Natural Woodland Stands (Eucalyptus groves) • Others not currently defined in MCV2
Riverine Wetland	• *Schoenoplectus acutus* Herbaceous Alliance (Hardstem bulrush marsh) • *Typha* (*angustifolia*, *domingensis*, *latifolia*) Herbaceous Alliance (Cattail marshes) • *Juncus effusus* Herbaceous Alliance (Soft rush marshes) • Others not currently defined in MCV2
Ruderal (non-native annual grasslands)	• *Avena* (*barbata, fatua*) Semi-Natural Herbaceous Stands (Wild oats grasslands) • *Brassica (nigra)* and Other Mustards Semi-Natural Herbaceous Stands (Upland mustards) • *Bromus* (*diandrus, hordeaceus*)– *Brachypodium distachyon* Semi-Natrual Herbaceous Stands (Annual brome grasslands) • *Centaurea solstitialis* Semi-Natural Herbaceous Stands (Yellow star-thistle fields) • Others not currently defined in MCV2
Agricultural Land	N/A

1 This alliance is classified as a rare natural community; see Section 3.2.

3.1.1.1 Mixed riparian forest

Mixed Riparian Forest is the most common plant community and occurs throughout the assessment area. It grows in locations above the active creek channel and is characterized by one or more well-developed canopy layers. Dominant canopy species include Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), valley oak (*Quercus lobata*), Oregon ash (*Fraxinus latifolia*), Goodding's willow (*Salix gooddingii*), and box elder (*Acer negundo*). Where a subcanopy exists, associates include arroyo willow (*Salix lasiolepis*) and sandbar willow (*S. exigua*). The shrub layer includes blue elderberry (*Sambucus nigra* ssp. *caerulea* [*S. mexicana* in Hickman 1993]), button bush (*Cephalanthus occidentalis*), Himalayan blackberry (*Rubus armeniacus* [*R. discolor* in Hickman 1993]), wild rose (*Rosa californica*), poison oak (*Toxicodendron diversilobum*), and

wild grape (*Vitis californica*). Herbaceous species include creeping wildrye (*Elymus triticoides* [*Leymus triticoides* in Hickman 1993]) and mugwort (*Artemisia douglasiana*). Many invasive weeds have colonized the habitat type, including tamarisk (*Tamarix* spp.), giant reed (*Arundo donax*), tree of heaven (*Ailanthus altissima*), and walnut hybrids (*Juglans* spp.) (EDAW 2005).



Putah Creek riparian habitat at Steven's Bridge.

3.1.1.2 Valley oak riparian forest

Valley Oak Riparian Forest occurs throughout the assessment area, on the upland terraces and high floodplains of the creek, adjacent to mixed riparian forest. It is typically located above the active creek channel in areas that are less subject to scour from flooding but still receive annual inputs of silty alluvium and subsurface water (Holland 1986). Valley oak is the dominant species. Associated species include interior live oak (*Q. wislizeni*), box elder, Oregon ash, and walnut hybrids. The shrub layer is sparse and includes poison oak, blue elderberry, wild rose, wild grape, and California pipevine (*Aristolochia californica*). The ground layer is also sparse and includes a mixture of species found closer to the active creek channel in Mixed Riparian Forest and species found in the adjacent uplands (EDAW 2005).

Putah Creek valley oak riparian forest downstream of PDD.

3.1.1.3 Riparian scrub

Riparian Scrub occurs throughout the assessment area along stream margins and within the streambed on gravel bars and similar formations. It is a shrub-dominated community with dominant species including sandbar willow, arroyo willow, and red willow (*Salix laevigata*). Sometimes the early-successional stage stands of mixed riparian forest (e.g., arroyo willow) are considered riparian scrub because of the shrub-like stature of the trees. Stands typically lack an understory but may support an understory of Himalayan blackberry, wild rose, wild grape, and various nonnative grasses (EDAW 2005).

3.1.1.4 Disturbed riparian woodland

There are many pockets of Disturbed Riparian Woodland in the assessment area; these patches have been documented and mapped in the *Lower Putah Creek Watershed Management Action Plan* (EDAW 2005). The habitat exists in areas that have been highly disturbed by human activity and/or by the unabated encroachment of nonnative, invasive species.

Disturbed riparian woodland, with a patch of giant reed.

Dominant, invasive tree species in these areas include red gum (*Eucalyptus camaldulensis*) and tree of heaven (*Ailanthus altissima*). Where other invasive species dominate, Disturbed Riparian Woodland can include some native tree, shrub, and herbaceous species (EDAW 2005).

3.1.1.5 Riverine wetland

Riverine wetland habitat on the far bank.

Riverine Wetland in the assessment area includes seasonal and perennial wetlands along the creek channel and lower bank, instream wetlands that formed on sand or gravel bars, and patches of emergent freshwater marsh. Riverine Wetland is influenced by frequent flooding, scour, and seasonal and annual water level fluctuations.

In areas most clearly defined as freshwater emergent marsh, the habitat type is dominated by cattails (*Typha* spp.), tules (*Schoenoplectus* spp. [*Scirpus* spp. in Hickman 1993]), and California bulrush (*S. californicus*). Common associates in these and more seasonal types of Riverine Wetland include smartweed (*Polygonum* spp.), sedges (*Carex* spp.), common rush (*Juncus effusus*), mugwort (*Artemisia vulgaris*), cocklebur (*Xanthium strumarium*), rice cutgrass (*Leersia oryzoides*), canarygrass (*Phalaris* spp.), field mint (*Mentha arvensis*), and western goldenrod (*Euthamia occidentalis*). Invasive weeds such as giant reed and tamarisk also occur on sand or gravel bars in the creek (EDAW 2005).

3.1.1.6 Ruderal (Non-Native Annual Grassland)

Ruderal vegetation occurs throughout the assessment area on the upland boundary of the riparian corridor. These areas are generally disturbed by adjacent land uses (farming, roadsides) and are therefore dominated by nonnative herbs such as yellow star-thistle (*Centaurea solstitialis*), milk thistle (*Silybum marianum*), Italian thistle (*Carduus pycnocephalus*), prickly lettuce (*Lactuca serriola*), mustard species (*Brassica nigra, Hirschfeldia incana*), soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), and wild oat (*Avena fatua*) (EDAW 2005).

Ruderal vegetation on the upper bank, foreground, overlooking the riparian corridor.

3.1.1.7 Agricultural

A large majority (92%) of the land surface of Yolo County is reserved for agriculture and open space, and agriculture is the largest industry in Yolo County (County of Yolo 2005, 2009). Additionally, 67% of the unincorporated area of the county is protected under Williamson Act contracts to provide further long-term protection of these lands (County of Yolo 2005). A majority (70%) of the unincorporated land surface of Solano County is also reserved for agricultural, open space and watershed use, and 62% of the county's agricultural lands are protected under Williamson Act contracts to provide further long-term protection of these lands (County of Solano 2008). Subsequently, approximately 70% of the land adjacent to the assessment area is used for growing crops (Figure 2). Typical agricultural uses include walnut and almond orchards, vineyards, row crops such as barley, wheat, tomatoes, and safflower, and for pasture. The agricultural fields often extend up to the channel margin (top of terrace), limiting the riparian corridor.

3.2 Aquatic Habitat

Example of potential Chinook and steelhead spawning habitat, approximately 3 miles downstream of Highway 505.

The Upper Reach of Putah Creek contains primarily slow water habitat separated by shallow riffles. The Upper Reach flows from the base of the foothills of the Coast Range Mountains to the valley floor; elevations range from approximately 36 m (120 ft) to 3.4 m (11 ft) above mean sea level (Figure 3). Between the PDD and the Yolo Bypass, over 70% of aquatic habitat is comprised of pool habitat, 23% run habitat, and only 7% riffle habitat (Yates 2003, EDAW 2005). Much of the pool habitat is a result of historical in-channel gravel mining. Natural gravel recharge is substantially arrested, with sediments trapped behind the dams or in the former in-channel gravel mining pits. Subsequently, spawning gravel is limited for

Chinook salmon downstream of the PDD, with recent surveys estimating approximately 3 km (1.9 mi) of Chinook spawning habitat within the 37 km (23 mi) of Putah Creek between the Yolo Bypass and the PDD (Yates 2003). The resulting overly wide and deep channel of Putah Creek downstream of the PDD cannot 'self-adjust' to more natural morphology, because of reduced sediment supply and reduced flow velocities that are insufficient to mobilize sediment (Yates 2003).

Large pool downstream of Pedrick Road.

Unique floodplain habitat is located in the lower 0.5 km (0.3 mi) portion of the assessment area where Putah Creek lies within the Yolo Bypass. When available, the seasonally flooded floodplain habitat of the Yolo Bypass is utilized for spawning and/or rearing by several special-status fish species (see Section 3.4). Between 1956 and 2000, floodplain inundation in the Yolo Bypass occurred during approximately two-thirds of those years (Schemel et al. 2004). Although the duration of floodplain inundation varies among years, the average annual duration of inundation is 23 days (Sommer et al. 2001b). The value of inundated floodplain habitat in the Yolo Bypass for fish has been recognized by state and federal agencies, leading both NMFS and USFWS to designate the Yolo Bypass as critical habitat for the recovery of listed fish species (see Section 3.4).

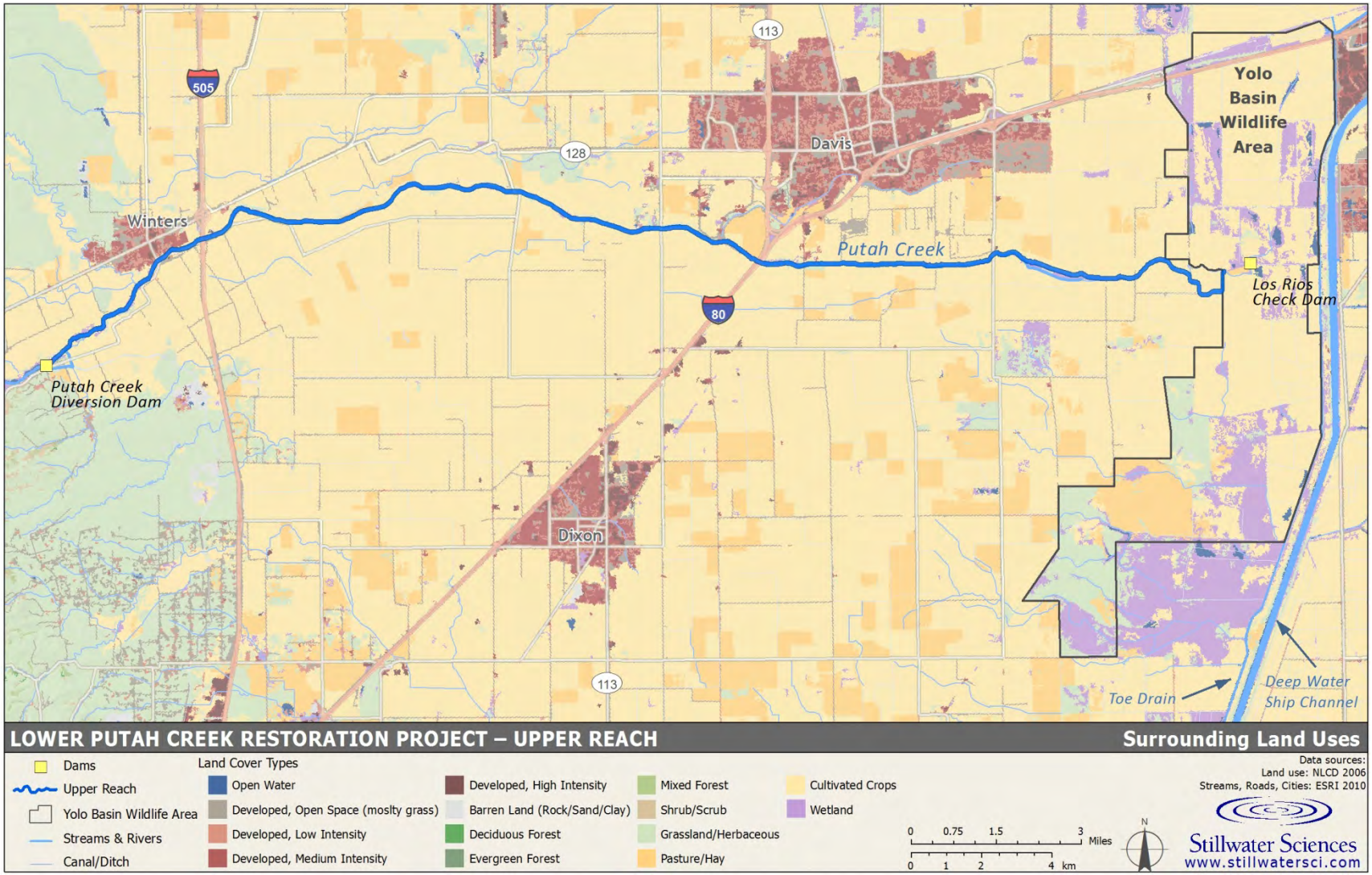


Figure 2. Land uses surrounding the Lower Putah Creek Restoration Project—Upper Reach.

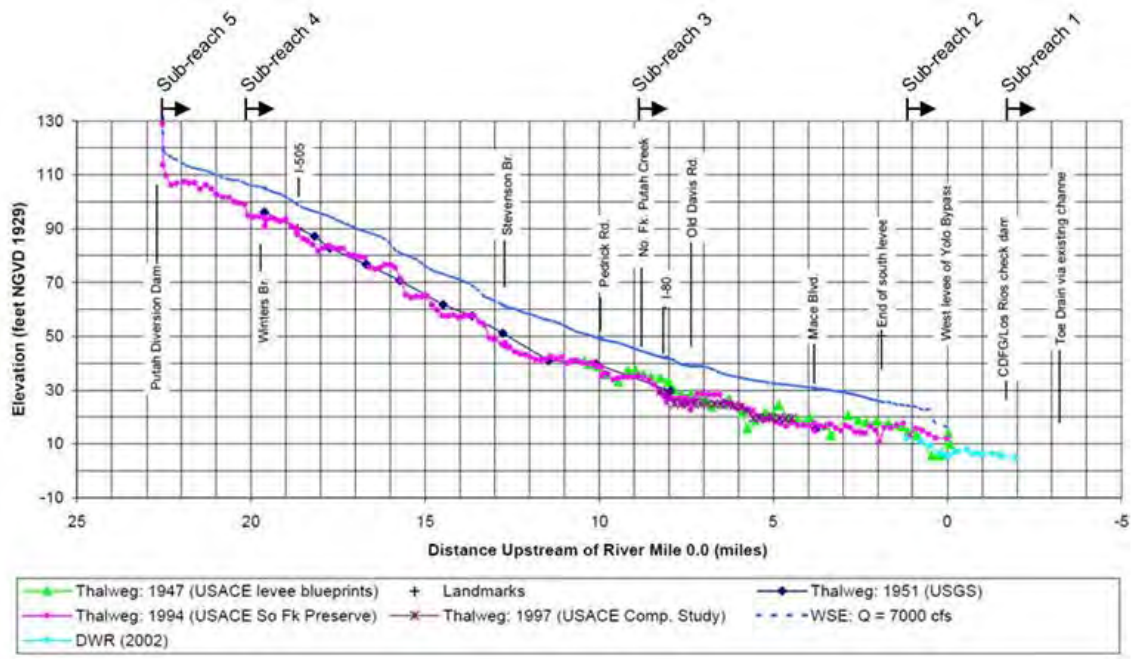


Figure 3. Lower Putah Creek Restoration Project—Upper Reach longitudinal profile (Stillwater Sciences 2014).

3.2.1 Passage barriers

Fish migrating up Putah Creek encounter a number of potential passage barriers. The first barrier encountered is within the YBWA Reach at the Los Rios Check Dam. The Los Rios Check Dam is a 3.6-m (12-ft)-high concrete box-type structure, fitted with wooden flashboards. Boards from the dam are typically removed on 1 December, in conjunction with mandated pulse flow releases from the PDD, to facilitate the migration of fall-run Chinook salmon. The boards are replaced on or around 1 April to create a head of water for irrigation diversion to neighboring agricultural lands and permanent wetlands in the YBWA. The next potential impediment to upstream passage is approximately one mile upstream of Los Rios Check Dam at Road 106A, where a seasonal earthen road crossing is built across Putah Creek, in conjunction with the operation of the Los Rios Check Dam; fill is pushed into Putah Creek to create an earthen dam and crossing on approximately April 1, when the Los Rios Check Dam boards are installed, and notched to wash the fill downstream on approximately December 1, when the Los Rios Check Dam boards are pulled. Both structures are used for retaining creek flows for agricultural diversions and are currently managed to accommodate fish passage during late fall through early spring. Between the Road 106A crossing and the PDD, beaver dams may create additional migration barriers (Yates 2003). Under most conditions, the PDD is a complete barrier to fish passage, restricting anadromous fish to downstream sections.

3.2.2 Hydrology

The Project region experiences a two-season Mediterranean-type climate, with wet, cool winters and dry, warm summers. Rainfall is primarily concentrated between November and April with a mean annual rainfall across the entire Putah Creek watershed between 48 and 158 cm (19 and 62 in) (1981–2010 [PRISM 2013]). A clear pattern of increased rainfall with elevation is expressed

across the watershed, as the valley floor receives about one-third of the rainfall received near the creek's headwaters. Subsequently, streamflow in Lower Putah Creek is primarily controlled by releases at Monticello Dam and PDD (Stillwater Sciences 2014).

Historically, the inherently stochastic nature of runoff in the upper watershed and flooding in the Yolo Basin resulted in substantial year-to-year variability in streamflow and overbank inundation patterns along Lower Putah Creek. Prior to 1957, the creek emptied (streamflow and sediment load) into the Yolo Basin with occasional through-flow farther into the north Delta during higher flows (Whipple et al. 2012). The lower creek is believed to have been intermittent during most water years as the upper watershed tributaries would usually run dry in summer months, thus any low flows in the creek were wholly maintained by shallow groundwater inflow (Yates 2003, EDAW 2005). The completion of Monticello Dam in water year 1957 led to a reduction in peak streamflow downstream (Figure 4). Since completion of Monticello Dam and the other Solano Project facilities, peak flows in the lower creek have been limited to high runoff inputs from tributaries below the dam, such as Dry Creek, or the less frequent dam-spill events (Figure 5).

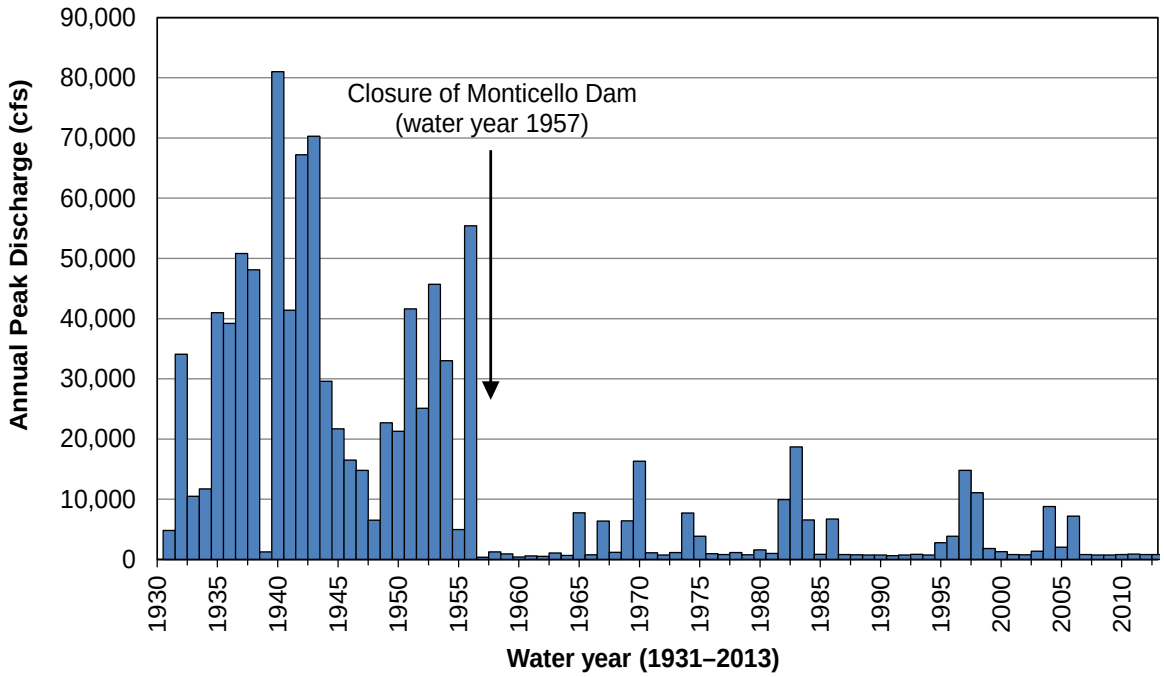


Figure 4. Historical peak flows upstream of Putah Diversion Dam (USGS #11454000).

In May 2000, the Putah Creek Accord began the formal regulation of seasonal flows that Solano County Water Agency (SCWA) and Solano Irrigation District release from PDD to ensure minimum instream flows to chiefly benefit aquatic and riparian resources in the lower creek downstream to its terminus at the toe drain (Solano County Superior Court 2000, Sacramento County Superior Court 2002). Four flow-requirement categories were described in the Accord; the "rearing flows" to be maintained in the lower creek are summarized in Table 2. These releases provide perennial stream flow between the PDD and Interstate 80 (minimum 2–5 cfs, depending on the water year), and a wetted channel in non-drought years downstream of Interstate 80. Maintenance of continuous flows downstream of I-80 is not required under drought conditions; however, to date, this condition has not been triggered (USGS 2014).

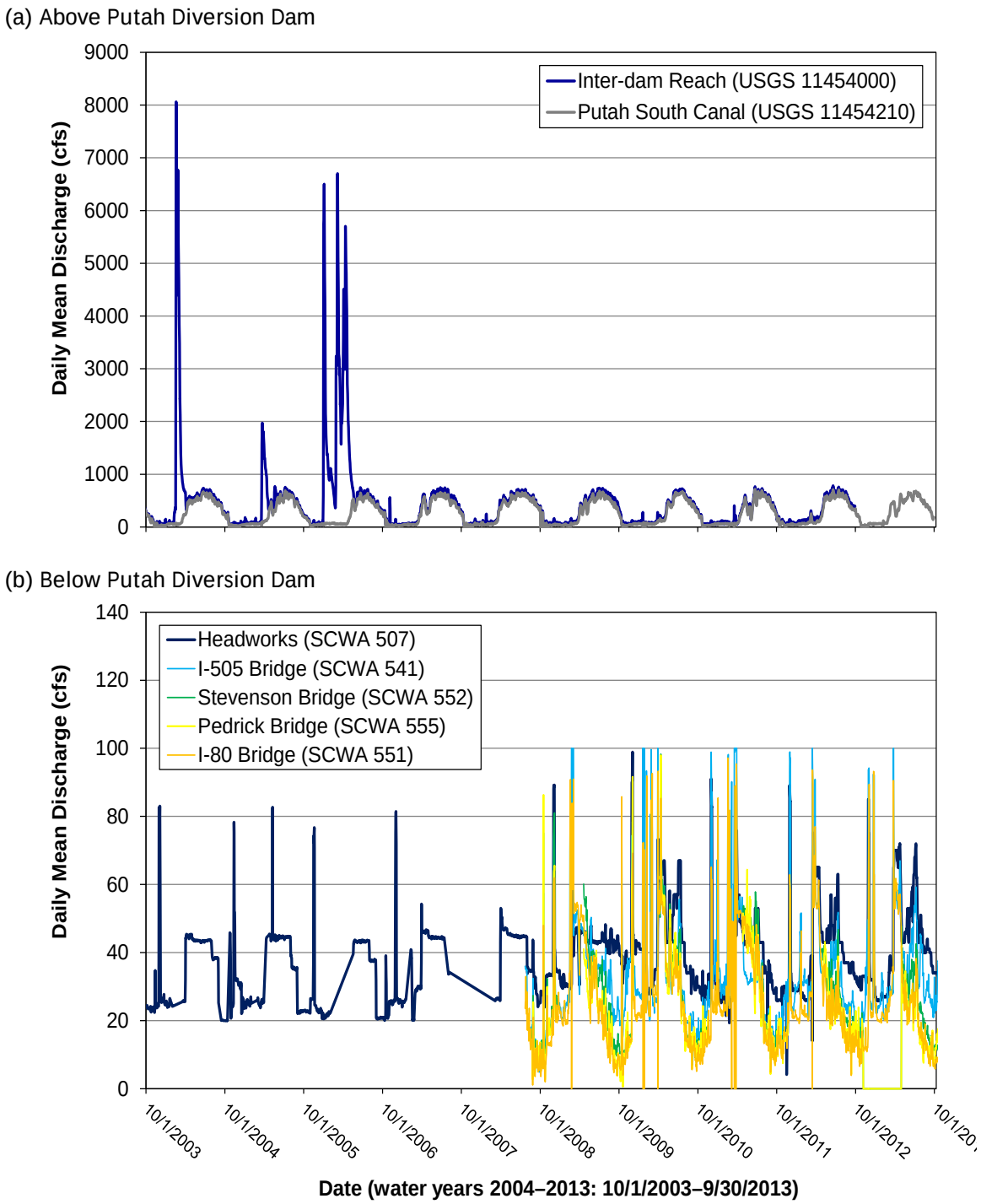


Figure 5. Daily mean discharge, computed by USGS upstream (a), and by SCWA downstream (b), of Putah Diversion Dam on Lower Putah Creek.

Additionally, the Accord includes "spawning flows" below the Putah Diversion Dam as a 3-day pulse with associated minimum flows and gradual ramp-down rates between February 15 and March 31 of every year: 150 cfs for the first 24 hours, 100 cfs for the second 24 hours, and 80 cfs

for the third 24 hours, followed by at least 50 cfs to be maintained for five consecutive days between November 15 and December 15 of each calendar year at the point where Putah Creek discharges into the toe drain. This pulse is coordinated with removal of the flash boards at Los Rios Check Dam and generally coincides with the degrading of the earthen crossing at Road 106A.

Table 2. Minimum daily required "rearing flows" to be recorded at two SCWA-operated gaging stations on Lower Putah Creek.

SCWA gaging station	Water year type	Minimum daily required "rearing flows" (cfs)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
PDD	Normal	20	25	25	25	16	26	46	43	43	43	34	20
	Drought	15	15	25	25	16	26	46	33	33	33	26	15
I-80	Normal	5	10	10	15	15	25	30	20	15	15	10	5
	Drought	2	2	2	2	2	2	2	2	2	2	2	2

Source: Sacramento County Superior Court 2002.

Since the Accord was enacted, flows released from the PDD into Lower Putah Creek have averaged approximately 40 cfs and reached peaks of up to about 90 cfs (Figure 6). Instream flows during the summer months at Interstate 80 typically range from 10 cfs to 30 cfs (Figure 7).

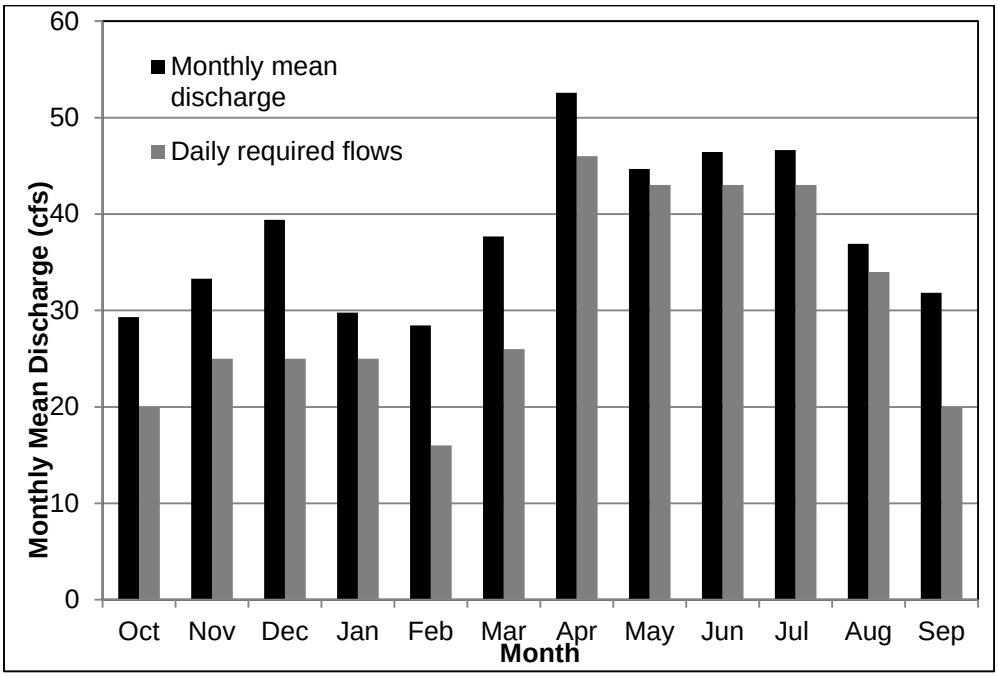


Figure 6. Monthly mean discharge (cfs) as measured at PDD release valve between 8/20/2003 and 3/04/2013.

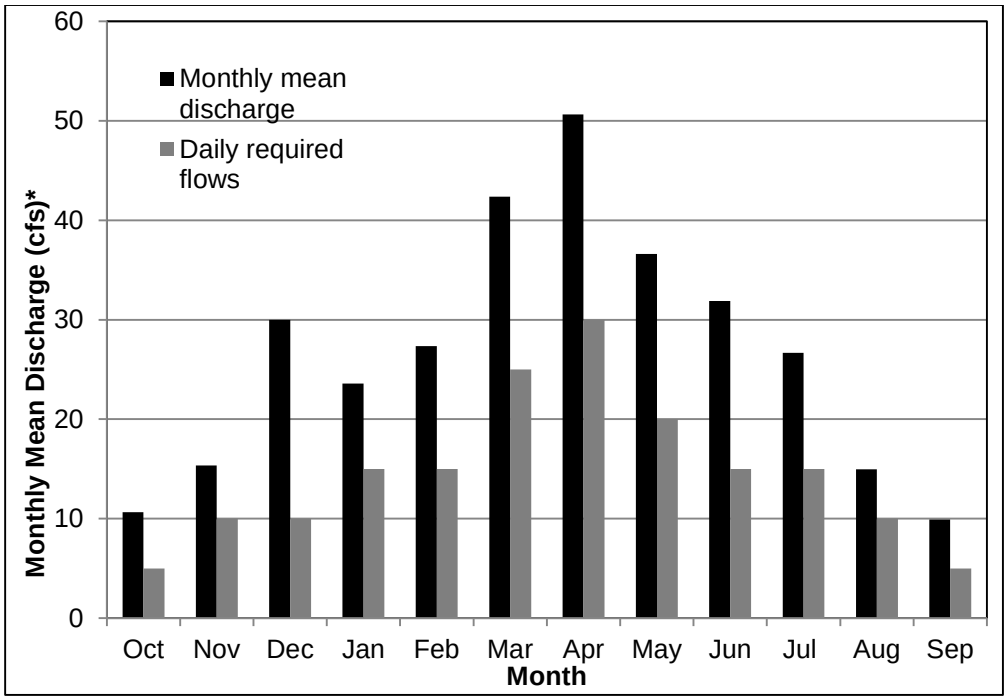


Figure 7. Monthly mean discharge (cfs) as measured in Putah Creek at Interstate 80 between 7/23/2008 and 3/04/2013.

* ***Flows above 100 cfs were truncated in the analysis as the rating curves are only maintained up to 100 cfs, thus any flows above100 cfs are not accurate***

3.2.3 Water temperature

The average daily air temperature range is approximately 13–35ºC (55–95ºF) in summer, and approximately 4–13ºC (39–55ºF) in the winter (CDFG et al. 2008). Water releases from Lake Berryessa at Monticello Dam are typically drawn from the bottom of the water column, and water temperatures are near a constant 13°C (55°F). Water releases from the PDD range from 12–15°C (54–59°F), then increase rapidly in the first four miles downstream of the PDD. Stream temperatures can exceed 20°C (68 °F) during summer months by the time they reach Highway 505 (Yates 2003). This increase in temperature is attributed to the flow levels and large pools in Putah Creek, which slow water down and have less stream shading, allowing for increased solar heating. By the time Putah Creek reaches Interstate 80, summer water temperatures are typically near or above 25°C (77 °F) and continue to warm downstream (Yates 2003). As water temperatures rise, dissolved oxygen levels fall. As a result of these longitudinal temperature and resulting dissolved oxygen patterns, the fish community downstream of Pedrick Road (approximately River Mile 10) is dominated by warm-water exotic species (TRPA 2010). Upstream of Pedrick Road, the fish community is dominated by native species (TRPA 2010).

3.3 Special-status Plants and Rare Natural Communities with Potential to Occur in the Assessment Area

There are 75 special-status plant species and 7 rare natural communities with documented occurrences in and around (including adjacent USGS quads) the assessment area (Appendices A and B). The likelihood of a documented special-status species or rare natural community to occur

in the assessment area was based on the distribution of the species (i.e., that it overlapped with the assessment area) and presence of the species' required or preferred habitat elements in the assessment area (e.g., associated plant species, vegetation types, soil types, and hydrologic conditions). This resulted in the following general categories of occurrence potential in the assessment area:

- None: The assessment area is outside the species'/natural community's known distributional or elevation range and/or the species'/natural community's required habitat is lacking from the assessment area.
- Low: The species'/natural community's known distributional or elevation range overlaps with the Project region, but not the assessment area and/or the species'/natural community's required habitat is of very low quality or quantity in the assessment area.
- Moderate: The species'/natural community's known distributional or elevation range overlaps with the assessment area and/or the species'/natural community's required habitat occurs in the assessment area.
- High: The species/natural community has been documented in the assessment area.

Based on a combination of the review of existing literature, database queries, soil classifications (Stillwater Sciences 2014), and the reconnaissance visit, 42 of the special-status plant species were eliminated from further consideration because the assessment area is outside of the species' elevation range or the required soils and and/or habitats are not present in the assessment area (Appendix A). There are 34 special-status plant species with the potential to occur in the assessment area (Table 3). One of these species—Baker's navarretia *(Navarretia leucocephala* ssp. *bakeri*)—has been previously identified in the assessment area (Appendix A). Special-status plant species previously identified in the assessment area and reported in the CNDDB are shown in Figure 8.

Table 3. Special-status plant species with the potential to occur in the assessment area.

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Elevation range in meters (feet) [2]	Blooming period[2]	Potential to occur in the assessment area and habitat associations[3]
alkali milk-vetch	*Astragalus tener* var. *tener*	–/–/1B.2	1–60 (3–197)	Mar–Jun	Low. Potentially suitable habitat includes adobe clay in valley grasslands (ruderal), but these areas are highly disturbed and/or managed.
heartscale	*Atriplex cordulata* var. *cordulata*	–/–/1B.2	0–560 (0–1,837)	Apr–Oct	Low. Potentially suitable habitat includes sandy soils in valley grasslands (ruderal), but these areas are highly disturbed and/or managed.
brittlescale	*Atriplex depressa*	–/–/1B.2	1–320 (3–1,050)	Apr–Oct	Low. Potentially suitable habitat includes valley grasslands (ruderal), but these areas are highly disturbed and/or managed.
round-leaved filaree	*California macrophylla*	–/–/1B.1	15-1200 (49-3,937)	Mar-May	Low. Potentially suitable habitat includes clay soils in valley grasslands (ruderal), but these areas are highly disturbed and/or managed.

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Elevation range in meters (feet) [2]	Blooming period[2]	Potential to occur in the assessment area and habitat associations[3]
bristly sedge	*Carex comosa*	–/–/2.1	0–625 (0–2,051)	May–Sep	Moderate. Potentially suitable habitat includes marshes (riverine wetland) and valley grasslands (ruderal).
pappose tarplant	*Centromadia parryi* ssp. *parryi*	–/–/1B.2	2–420 (7–1,378)	May-Nov	Low. Potentially suitable habitat includes vernally mesic valley and foothill grasslands (ruderal), but these areas are highly disturbed and/or managed.
Parry's rough tarplant	*Centromadia parryi* ssp. *rudis*	–/–/4.2	0–100 (0–328)	May–Oct	Moderate. Potentially suitable habitat includes vernally mesic roadsides and valley grasslands (ruderal). These areas are highly disturbed and/or managed; however, documented occurrences downstream persist in habitat that is highly managed.
Bolander's water-hemlock	*Cicuta maculata* var. *bolanderi*	–/–/2.1	0–200 (0–656)	Jul–Sep	Moderate. Potentially suitable habitat includes marshes (riverine wetland) and fresh water.
Peruvian dodder	*Cuscuta obtusiflora* var. *glandulosa*	–/–/2.2	15–280 (49–919)	Jul–Oct	Moderate. Potentially suitable habitat includes freshwater marshes (riverine wetland).
dwarf downingia	*Downingia pusilla*	–/–/2.2	1–445 (3–1,460)	Mar–May	Low. Potentially suitable habitat includes mesic valley grasslands (ruderal), but these areas are highly disturbed and/or managed.
stinkbells	*Fritillaria agrestis*	–/–/4.2	10–1,555 (33–5,102)	Mar–Jun	Low. Potentially suitable habitat includes clay soils in valley grasslands (ruderal), but these areas are highly disturbed and/or managed.
fragrant fritillary	*Fritillaria liliacea*	–/–/1B.2	3–410 (10–1,345)	Feb–Apr	Low. Potentially suitable habitat includes valley grasslands (ruderal), but these areas are highly disturbed and/or managed.
adobe-lily	*Fritillaria pluriflora*	–/–/1B.2	60–705 (197–2,313)	Feb–Apr	Low. Potentially suitable habitat includes valley grasslands (ruderal), but these areas are highly disturbed and/or managed.
Boggs Lake hedge-hyssop	*Gratiola heterosepala*	–/CE/1B.2	10–2,375 (33–7,792)	Apr–Aug	Moderate. Potentially suitable habitat includes marshes (riverine wetland).

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Elevation range in meters (feet) [2]	Blooming period[2]	Potential to occur in the assessment area and habitat associations[3]
hogwallow starfish	*Hesperevax caulescens*	–/–/4.2	0–505 (0–1,657)	Mar–Jun	Low. Potentially suitable habitat includes mesic and clay soils in valley grasslands (ruderal), but these areas are highly disturbed and/or managed.
Brewer's western flax	*Hesperolinon breweri*	–/–/1B.2	30–900 (98–2,953)	May–Jul	Low. Potentially suitable habitat includes valley grasslands (ruderal), but these areas are highly disturbed and/or managed.
woolly rose-mallow	*Hibiscus lasiocarpos* var. *occidentalis*	–/–/1B.2	0–120 (0–394)	Jun–Sep	Moderate. Potentially suitable habitat includes freshwater marshes (riverine wetland).
Contra Costa goldfields	*Lasthenia conjugens*	FE/–/1B.1	0–470 (0–1,542)	Mar–Jun	Low. Potentially suitable habitat includes valley grasslands (ruderal), but these areas are highly disturbed and/or managed.
Delta tule pea	*Lathyrus jepsonii* var. *jepsonii*	–/–/1B.2	0–4 (0–13)	May–Jul (Sep)	Moderate. Potentially suitable habitat includes freshwater marshes (riverine wetland).
woolly-headed lessingia	*Lessingia hololeuca*	–/–/3	15–305 (49–1,001)	Jun–Oct	Low. Potentially suitable habitat includes clay soils in valley grasslands (ruderal), but these areas are highly disturbed and/or managed.
Mason's lilaeopsis	*Lilaeopsis masonii*	–/CR/1B.1	0–10 (0–33)	Apr–Nov	Moderate. Potentially suitable habitat includes freshwater marshes (riverine wetland) and riparian scrub.
Delta mudwort	*Limosella australis*	–/–/2.1	0–3 (0–10)	May–Aug	Moderate. Potentially suitable habitat includes freshwater marshes (riverine wetland) and riparian scrub.
little mousetail	*Myosurus minimus* ssp. *apus*	–/–/3.1	20–640 (66–2,100)	Mar–Jun	Low. Potentially suitable habitat includes valley grasslands (ruderal), but these areas are highly disturbed and/or managed.
Tehama navarretia	*Navarretia heterandra*	–/–/4.3	30–1,010 (98–3,314)	Apr–Jun	Low. Potentially suitable habitat includes mesic valley grasslands (ruderal), but these areas are highly disturbed and/or managed.
Baker's navarretia	*Navarretia leucocephala* ssp. *bakeri*	–/–/1B.1	5–1,740 (16–5,709)	Apr–Jul	High. Potentially suitable habitat includes valley grasslands (ruderal). Documented within 200 ft buffer of the assessment area.
Gairdner's yampah	*Perideridia gairdneri* ssp. *gairdneri*	–/–/4.2	0–610 (0–2,001)	Jun–Oct	Low. Potentially suitable habitat includes vernally mesic soils valley grasslands (ruderal), but these areas are highly disturbed and/or managed.

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Elevation range in meters (feet) [2]	Blooming period[2]	Potential to occur in the assessment area and habitat associations[3]
bearded popcorn-flower	*Plagiobothrys hystriculus*	–/–/1B.1	0–274 (0–899)	Apr–May	Low. Potentially suitable habitat includes mesic valley grassland (ruderal), but these areas are highly disturbed and/or managed.
California beaked-rush	*Rhynchospora californica*	–/–/1B.1	45–1,010 (148–3,314)	May–Jul	Moderate. Potentially suitable habitat includes freshwater marshes (riverine wetland).
Sanford's arrowhead	*Sagittaria sanfordii*	–/–/1B.2	0–650 (0–2,133)	May–Oct	Moderate. Potentially suitable habitat includes assorted shallow freshwater marshes (riverine wetland).
Suisun Marsh aster	*Symphyotrichum lentum*	–/–/1B.2	0–3 (0–10)	May–Nov	Moderate. Potentially suitable habitat includes freshwater marshes (riverine wetland).
Napa bluecurls	*Trichostema ruygtii*	–/–/1B.2	30–680 (98–2,231)	Jun–Oct	Low. Potentially suitable habitat includes valley grasslands (ruderal), but these areas are highly disturbed and/or managed.
two-fork clover	*Trifolium amoenum*	FE/–/1B.1	5–415 (16–1,362)	Apr–Jun	Low. Potentially suitable habitat includes valley grasslands (ruderal), but these areas are highly disturbed and/or managed.
Crampton's tuctoria or Solano grass	*Tuctoria mucronata*	FE/CE/1B.1	5–10 (16–33)	Apr–Aug	Low. Potentially suitable habitat includes mesic valley grasslands (ruderal), but these areas are highly disturbed and/or managed.

[1] Status:

Federal		**State**	
FE	Federally listed as endangered	CE	California State listed as endangered
FT	Federally listed as threatened	CT	California State listed as threatened
–	No federal status	CR	California State listed as rare
		–	No state status

California Rare Plant Rank

1B Plants rare, threatened, or endangered in California and elsewhere
2 Plants rare, threatened, or endangered in California, but more common elsewhere
3 More information needed about this plant, a review list
4 Plants of limited distribution, a watch list
- 0.1 Seriously threatened in California (high degree/immediacy of threat)
- 0.2 Fairly threatened in California (moderate degree/immediacy of threat)
- 0.3 Not very threatened in California (low degree/immediacy of threats or no current threats known)

[2] Source: CNPS (2012)
[3] Source: CDFG (2012) and CNPS (2012) unless otherwise cited

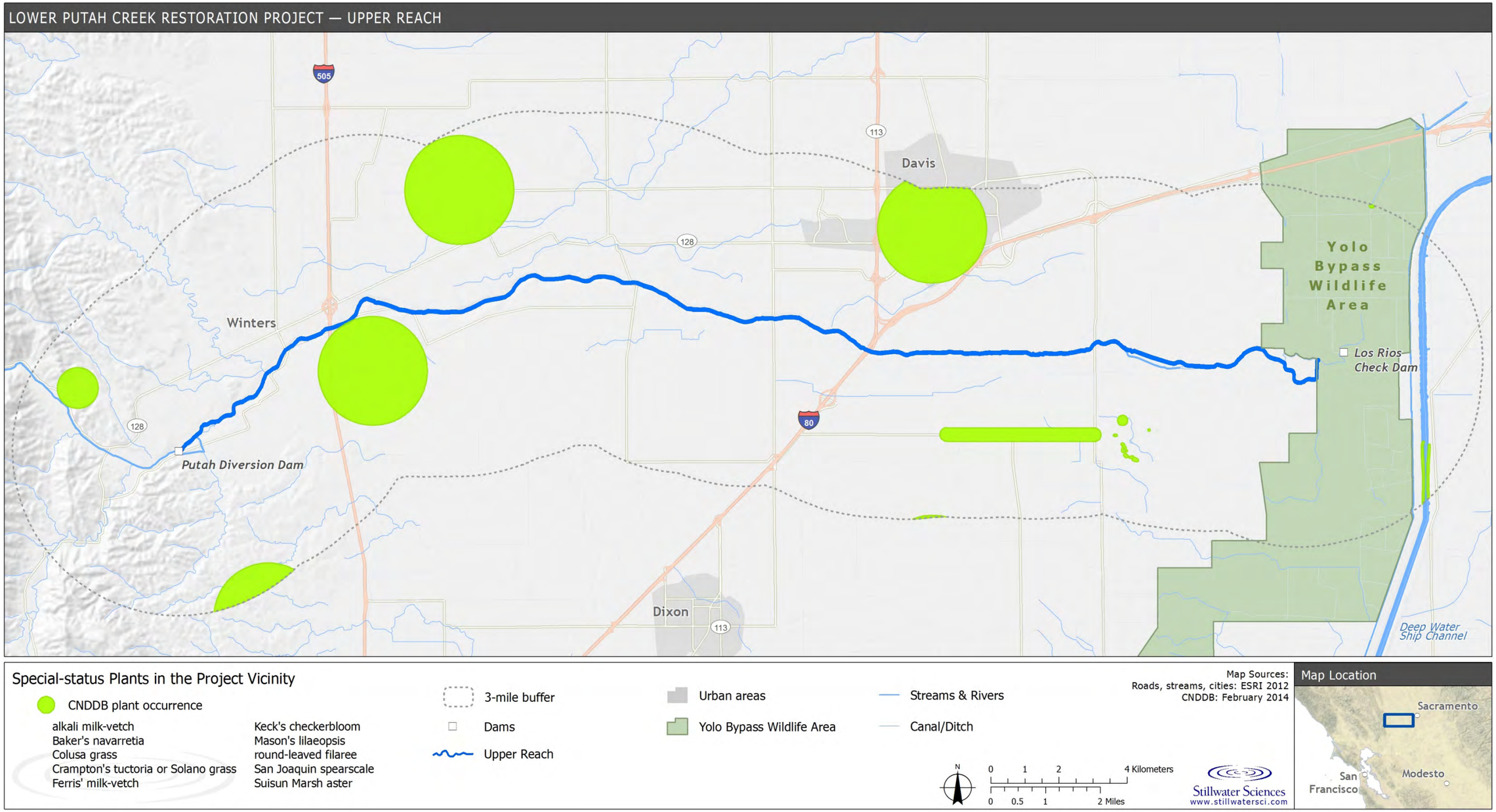


Figure 8. Special-status plants documented by CNDDB in the assessment area and vicinity.

Based on a combination of the review of existing literature and the reconnaissance visit, three of the seven rare natural communities with potential to occur were eliminated from further consideration (Appendix B). Four of the Holland-type rare natural communities have the potential to occur in the assessment area (Table 4).

Rare natural communities reported in the CNDDB database were generally typed using an older vegetation classification scheme (Holland 1986) that has been replaced by CDFW's *List of Vegetation Alliances and Associations* (CDFG 2010) which follows the classification scheme of MCV2 (Sawyer et al. 2009). Assessments of impacts to rare natural communities are now typically based on the vegetation classification system used by CDFW (i.e., MCV2), rather than the natural community types included in and provided by the CNDDB (i.e., Holland 1986). To determine what rare natural communities have the potential to occur, the Holland types were cross-walked to the potential MCV2 vegetation alliances and associations occurring in the assessment area (Table 1).

Table 4. Rare natural communities with the potential to occur in the assessment area.

Natural community (Holland classification)	Corresponding MCV2 alliances	Rank[1] (Global /State)	Habitat description[2]	Potential to occur in the assessment area
Coastal and Valley Freshwater Marsh	• *Schoenoplectus acutus* Herbaceous Alliance • *Typha (angustifolia, domingensis, latifolia)* Herbaceous Alliance	G3/S2.1	Dominated by perennial, emergent monocots including tules (*Scirpus* spp.) and cattails (*Typha* spp.). Often forms completely closed canopies.	High. Tules and cattails are present in the assessment area. MCV2 herbaceous alliances are likely to be present in the assessment area. Though these alliances are not considered rare natural communities by CDFW (i.e., MCV2), CDFW still retains some Holland types, including Valley Freshwater Marsh, which is documented in the assessment area in riverine wetland (EDAW 2005).
Elderberry Savanna	• *Sambucus nigra ssp. caerulea* Shrubland Alliance	G2/S2.1	An open, winter-deciduous shrub savanna dominated by blue elderberry, usually with an understory of introduced annual grasses and forbs.	Moderate. Blue elderberry is documented in the assessment area in Valley Oak Riparian Forest (distributed throughout the assessment area; EDAW 2005) and there may be stands that would be classified as the MCV2 shrubland alliance [3].
Great Valley Cottonwood Riparian Forest	• *Populus fremontii* Forest Alliance • *Salix gooddingii* Woodland Alliance	G2/S2.1	A dense, broadleaved, winter-deciduous riparian forest dominated by Fremont cottonwood and Goodding's willow, with abundant wild grape in the canopy. Understories are dense with scattered seedlings–saplings of shade-tolerant species such as box elder and Oregon ash.	High. Fremont cottonwood and Goodding's willow are documented in the assessment area in Mixed Riparian Forest (distributed throughout the assessment area EDAW 2005). There are documented stands of *Populus fremontii* Forest Alliance[3] and there may be stands that would be classified as *Salix gooddingii* Woodland Alliance[3].
Valley Oak Woodland	• *Quercus lobata* Woodland Alliance	G3/S2.1	Similar to Oregon Oak Woodland and Blue Oak Woodland, but typically more open, forming a grassy savanna rather than a closed woodland. Valley oak is usually the only tree present; its canopy seldom exceeds 30-40% absolute cover.	High. Valley Oak Riparian Forest is distributed throughout the assessment area (EDAW 2005) and the stands would be classified as *Quercus lobata* Woodland Alliance[3].

[1] Status:

Global Rank		**State Rank**		**Additional Threat Ranks:**	
G1	Critically Imperiled	S1	Critically Imperiled	0.1	Very threatened
G2	Imperiled	S2	Imperiled	0.2	Threatened
G3	Vulnerable	S3	Vulnerable		

[2] Source: Holland (1986) unless otherwise noted

[3] A rare natural community.

3.4 Special-status Invertebrate, Fish, and Wildlife Species with Potential to Occur in the Assessment Area

Fifty-one special-status aquatic and terrestrial wildlife species (invertebrates, fish, amphibians, reptiles, birds, and mammals) were initially identified as having potential to occur in the assessment area (Appendix C). Sixteen of these species were eliminated from further consideration, since no suitable habitat is present in the assessment area, or the assessment area is outside of the species' range (Appendix C). Thirty-five special-status wildlife species have low, moderate, or high potential to occur within the assessment area (Table 5). Species with moderate or high potential to occur are discussed in further detail below. Special-status species in the vicinity of the Upper Reach and reported in the CNDDB are shown in Figure 9.

The following describe general categories of occurrence potential in the assessment area:

- None: the assessment area is outside the species' known distributional or elevation range and/or the species' required habitat is lacking from the assessment area.
- Low: the species' known distribution or elevation range overlaps with the Project region but not the assessment area, and/or the species' required habitat is of very low quality or quantity in the assessment area.
- Moderate: The species' known distribution or elevation range overlaps with the assessment area and the species' required habitat occurs in the assessment area.
- High: The species has been documented in the assessment area.

Table 5. Special-status invertebrate, fish, and wildlife species with potential to occur in the assessment area.

Common name	Scientific name	Status[1] (Federal/ State)	Potential to occur in assessment area
Invertebrates			
valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT, FX/–	High. Present along numerous sections of Putah Creek where host plant *Sambucus sp.* (blue elderberry) is present. Evidence of species documented (CDFG 2012).
Fish			
Pacific lamprey	*Entosphenus tridentatus*	FSC/–	High. Reported to maintain small runs in Putah Creek (Moyle 2002). Ammocoetes and juveniles are expected to be present year-round upstream of approximately Highway 505.
river lamprey	*Lampetra ayresi*	–/SSC	Low.[2] Occurrences limited to the lower ~4 km (2.5 mi) within the Yolo Bypass (Sommer et al. 2001b, Sommer et al. 2003) during brief periods when the Bypass is at high flood stage and juvenile migratory habitat is extended upstream into the Putah channel.

Common name	Scientific name	Status[1] (Federal/ State)	Potential to occur in assessment area
green sturgeon	*Acipenser medirostris*	FT/SSC	Low.[2] Since green sturgeon do not spawn in Putah Creek, occurrences (adults, subadults, and juveniles) would be limited to the lower ~4 km (2.5 mi) within the Yolo Bypass when the Bypass is at high flood stage for an extended period and juvenile migratory habitat is extended upstream into the Putah channel (NMFS 2009c). Habitat is not available during most of the year in the assessment area, and the species is unlikely to occur within the stream channel outside of the Yolo Bypass flood season.
Sacramento splittail	*Pogonichthys macrolepidotus*	–/SSC	Moderate.[2] Within the species' known range and expected to occur within the lower ~4 km (2.5 mi) of the reach (within the Yolo Bypass) during extended periods of flooding. One occurrence documented 1.6 km (~1 mi) upstream of the YBWA Reach within the Yolo Bypass (Sommer et al. 2001b, Harrell and Sommer 2003, Small et al. 2004).
delta smelt	*Hypomesus transpacificus*	FT, FX/SE	Low.[2] Documented within the Yolo Bypass (Sommer et al. 2003); however, any occurrence would be limited to the lower ~4 km (2.5 mi) and only when the Bypass is at high flood stage and habitat is extended upstream into the Putah channel. Habitat is not available during most of the year in the assessment area, and the species is unlikely to occur within the stream channel outside of the Yolo Bypass flood season.
longfin smelt	*Spirinchus thaleichthys*	FPT/ST	Low.[2] Longfin smelt are rarely observed in the Yolo Bypass. Extensive fish monitoring studies conducted in the Yolo Bypass from 1997 to 2002 only reported observations of longfin smelt during one year (Sommer et al. 2001b, 2003, and 2004, Harrell and Sommer 2003). Further, any occurrence would be limited to the lower ~4 km (2.5 mi) and only when the Bypass is at high flood stage and habitat is extended upstream into the Putah channel. Habitat is not available during most of the year in the assessment area, and the species is unlikely to occur within the stream channel outside of the Yolo Bypass flood season.
Central Valley fall- and late fall-run Chinook salmon	*Oncorhynchus tshawytscha*	FSC/SSC	High. Documented population of fall-run Chinook salmon within Putah Creek (Marovich 2011). Spawning, rearing, and migratory habitat present in the assessment area (Sommer et al. 2001b, Small et al. 2004). Fall-run Chinook are expected to occur within the assessment area from fall through early summer. Late-fall Chinook have not been documented in Putah Creek.

Common name	Scientific name	Status[1] (Federal/ State)	Potential to occur in assessment area
Central Valley spring-run Chinook salmon	*Oncorhynchus tshawytscha*	FT, FX/ST	Low.[2] Within species' known range and documented in Yolo Bypass (Sommer et al. 2001b). Rearing and migratory habitat present in the Yolo Bypass; however, any occurrence would be limited to the lower ~4 km (2.5 mi) and only when the Bypass is at high flood stage and habitat is extended upstream into the Putah channel. Habitat is not available during most of the year in the assessment area, and the species is unlikely to occur within the stream channel outside of the Yolo Bypass flood season.
Sacramento River winter-run Chinook salmon	*Oncorhynchus tshawytscha*	FT, FX/SE	Low.[2] Within species' known range and documented in Yolo Bypass (Sommer et al. 2001b). Rearing and migratory habitat present in the Yolo Bypass; however, any occurrence would be limited to the lower ~4 km (2.5 mi) and only when the Bypass is at high flood stage and habitat is extended upstream into the Putah channel. Habitat is not available during most of the year in the assessment area, and the species is unlikely to occur within the stream channel outside of the Yolo Bypass flood season.
Central Valley steelhead	*Oncorhynchus mykiss*	FT, FX /–	Moderate. Within species' known range and may occur within the assessment area upstream of the Yolo Bypass. Spawning and rearing habitat for steelhead is present in the upper sections of Putah Creek; however, there have been no recent reports confirming steelhead reproduction in Putah Creek (EDAW 2005, CDFG et al. 2008). Steelhead have a high potential to occur in the assessment area within the Yolo Bypass during periods of flooding (Sommer et al. 2001b, Harrell and Sommer 2003); outside of this period, they have a moderate potential to occur in the assessment area, based on the presence of suitable habitat in upstream sections of Putah Creek. If steelhead are accessing upper sections of Putah Creek to spawn, they would be expected to occur during the adult through juvenile migration periods (late fall to early summer).
Sacramento perch	*Archoplites interruptus*	–/SSC	Low. Sacramento perch observations in Putah Creek are rare but have been reported near the UC Davis campus where rearing ponds for Sacramento perch are located and connect to the creek through drainage canals. Attempts to reestablish Sacramento perch in Putah Creek occurred in 2005 through stocking efforts in Lake Solano but no fish have been observed in Putah Creek or the Yolo Bypass since (Sommer et al. 2001b, Harrell and Sommer 2003, TRPA 2010, Crain and Moyle 2011). They are not currently expected to occur in the assessment area, however upstream restoration activities may increase likelihood of occurrence within the assessment area.
Amphibians			

Common name	Scientific name	Status[1] (Federal/ State)	Potential to occur in assessment area
foothill yellow-legged frog	*Rana boylii*	–/SSC	Low. Habitat along Putah Creek in assessment area not suitable for breeding. Low potential for frogs dispersing from suitable tributaries.
Reptiles			
western pond turtle	*Actinemys marmorata*	–/SSC	High. Widespread along the creek (Truan et al. 2010).
giant garter snake	*Thamnophis gigas*	FT/ST	Low. Habitat along Putah Creek in assessment area is unsuitable. Species may rarely migrate through assessment area near downstream sections.
Birds			
white-tailed kite	*Elanus leucurus*	–/SFP	High. Residents widely distributed along upper Putah Creek (Truan et al. 2010). Breeding observed. May nest in trees in or near assessment area.
northern harrier	*Circus cyaneus*	–/SSC	High. Found along lower sections of upper Putah Creek (Truan et al. 2010). Confirmed breeding. However, limited suitable ground nesting habitat within Putah Creek corridor.
Swainson's hawk	*Buteo swainsoni*	–/ST	High. Known to nest in riparian trees in many locations along Putah Creek and common in agricultural lands during summer months (CDFG 2012).
golden eagle	*Aquila chrysaetos*	BGEPA/ SFP	Low. Incidental sightings, generally in winter, along lower reaches (Truan et al. 2010).
American peregrine falcon	*Falco peregrinus anatum*	FD/SD, SFP	Low (foraging only). Sightings are rare and historically only in winter and spring. Observed once in lower reaches of Putah Creek (Truan et al. 2010). No nesting habitat.
western yellow-billed cuckoo	*Coccyzus americanus*	FT/SE	Moderate (foraging only). Rare migrant in Yolo County. Few sightings of single birds along Putah Creek between 2005 and 2007 (Truan et al. 2010).
western burrowing owl	*Athene cunicularia hypugea*	–/SSC	Low. No suitable habitat within Putah Creek corridor.
long-eared owl	*Asio otus*	–/SSC	Low. There have been four sightings of long-eared owl during bird surveys conducted between 1997 and 2009; once at the confluence with Dry Creek, twice at the Diversion Dam, and once at Los Rios Farms (Truan et al. 2010).
olive-sided flycatcher	*Contopus cooperi*	–/SSC	Low (foraging only). A scarce migrant in both spring and fall. During 12 years of bird surveys in along Putah Creek, this species has been detected eight times, usually between Mace Blvd. and Russell Ranch (Truan et al. 2010).
willow flycatcher	*Empidonax traillii*	–/SE	Moderate (foraging only). Migrants documented along Putah Creek corridor (Truan et al. 2010). Very low likelihood of breeding in early successional riparian habitats due to parasitic brown-headed cowbird.

Common name	Scientific name	Status[1] (Federal/ State)	Potential to occur in assessment area
least Bell's vireo	*Vireo bellii pusillus*	FE/SE	Low. Rare migrant in the assessment area (Truan et al. 2010).
purple martin	*Progne subis*	–/SSC	Low (foraging only). Rare in the Central Valley away from urban Sacramento, where it has been observed nesting under highway overpasses (Truan et al. 2010). Documented in the Yolo Bypass outside of the assessment area only as a rare vagrant (CDFG et al. 2008).
bank swallow	*Riparia riparia*	–/ST	Low (foraging only). No suitable nesting habitat. Rarely detected foraging in assessment area (Truan et al. 2010).
yellow warbler	*Dendroica petechia*	–/SSC	Moderate (foraging only). Migrants known to forage in low numbers in riparian habitats along Putah Creek (Truan et al. 2010).
yellow-breasted chat	*Icteria virens*	–/SSC	Low. Rare sightings along Putah Creek (Truan et al. 2010).
tricolored blackbird	*Agelaius tricolor*	–/SSC	Moderate. Documented in the assessment area (Truan et al. 2010) and there may be suitable nesting habitat in expansive marsh vegetation or large blackberry thickets along Putah Creek.
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	–/SSC	Low. Rare to uncommon species along Putah Creek.
Mammals			
western red bat	*Lasiurus blossevillii*	–/SSC	Moderate. Not documented, but roosting habitat present in riparian forest in the assessment area.
pallid bat	*Antrozous pallidus*	–/SSC	Moderate. May roost in riparian tree hollows.
California ringtail	*Bassariscus astutus raptor*	–/SFP	Moderate. No observations, but range overlaps with the assessment area and suitable habitat is present in riparian woodland.

[1] Status:

Federal
FE = Federally listed as endangered under the ESA
FT = Federally listed as threatened under the ESA
FPT = Federally proposed as threatened
FC = Federal candidate species
FSC = Federal species of concern
FD = Federally delisted
FX = Federally designated critical habitat
BGEPA = Federally protected under the Bald and Golden Eagle Protection Act
– = no status

State
SE = State listed as endangered under the California ESA
ST = State listed as threatened under the California ESA
SSC = CDFW Species of Special Concern
SD = State delisted
SFP = State Fully Protected
– = no status

[2] Potential for species occurrence is limited to the section of the Upper Reach within the Yolo Bypass (between the County Road 106A stream crossing and the YBWA boundary) during periods when the bypass is at high flood stage resulting in inundation or potential backwater effect upstream into the channel.

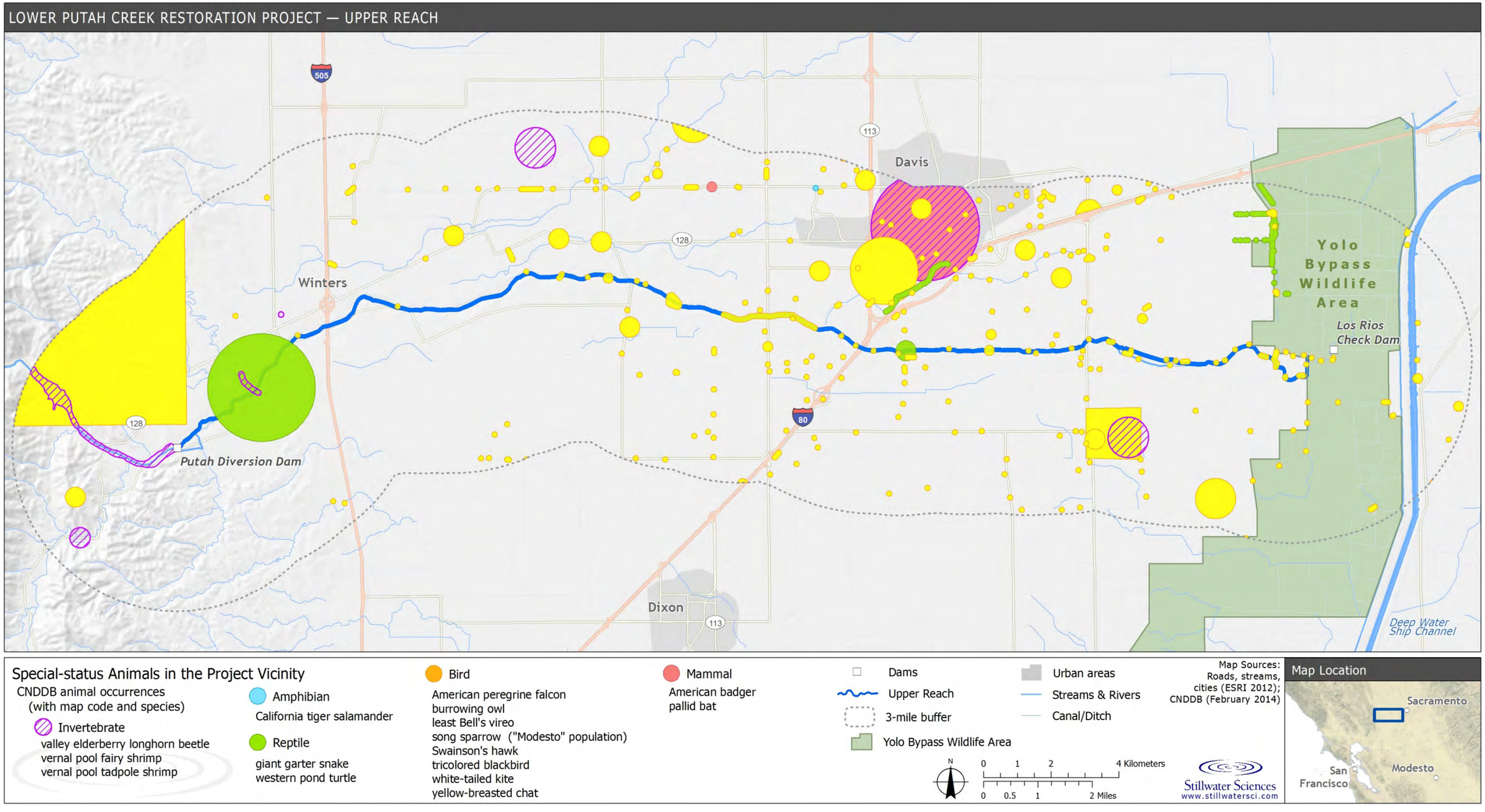


Figure 9. Special-status wildlife documented by CNDDB in the assessment area and vicinity.

Special-status animals with moderate to high potential to occur within the assessment area are described in further detail below.

3.4.1 Invertebrates

One special-status invertebrate species, valley elderberry longhorn beetle, was identified as having moderate to high potential to occur in the assessment area.

3.4.1.1 Valley elderberry longhorn beetle

Valley elderberry longhorn beetle is federally listed as threatened. On 12 October 2012, the USFWS formally proposed delisting the species, but withdrew the proposal on September 17, 2014 (77 FR 60238).

A California endemic species, the valley elderberry longhorn beetle is found in scattered populations throughout its range, which includes most of the Central Valley (Barr 1991). The beetle may be present in an area despite lack of evidence of emergence holes in host plants, because the beetle may disperse to trees that do not yet contain emergence holes (Kellner 1992). Therefore, the locations of elderberry trees may provide a more accurate indication of the presence of the beetle (Kellner 1992).

Elderberry (*Sambucus* spp.) is the primary host plant for valley elderberry longhorn beetle. Larvae feed on tree pith, while adults eat the foliage and possibly the flowers of the plants. The adult stage of the valley elderberry longhorn beetle is short-lived, and most of the life cycle is spent in the larval stage (USFWS 1999). The adults are active from early March through early June with mating occurring in May (Barr 1991). Eggs are laid singly, or in small groups, in crevices in elderberry bark and hatch in about 10 days (Barr 1991). Larvae bore into the pith of elderberry roots, branches, and trunks to create an opening in the stem within which they pupate, remaining in this stage for one to two years before emerging as adults (Barr 1991, USFWS 1999). After metamorphosing into an adult, the beetle chews a circular exit hole through which it emerges, sometime during the period of late March to June (Barr 1991, USFWS 1999). It has been suggested that the beetle is a poor disperser, based on the spatial distribution of occupied shrubs (USFWS 1997).

Blue elderberry is present along portions of the Upper Reach, and evidence of valley elderberry longhorn beetle has been documented along Putah Creek (CDFG 2012). Adults and exit holes were documented in the assessment area as recently as 2001 along Putah Creek in Winters, approximately 1.3 mi west-northwest of the Winters Road and Bakers Road intersection (CDFG 2012). Older records for adults and exit holes occur just upstream of the assessment area, from Monticello Dam 6 mi east to the PDD (CDFG 2012). Because evidence of valley elderberry longhorn beetle has been documented along numerous sections of Putah Creek, this species has a high occurrence potential within the assessment area.

3.4.2 Fish

Four special-status fish species, Pacific lamprey, Sacramento splittail, fall-run Chinook salmon, and Central Valley steelhead, have moderate to high potential to occur in the assessment area. Two of these, Pacific lamprey and Chinook salmon occur throughout the Upper Reach at various times of the year, whereas splittail are likely limited to periods of flooding within the lowermost

portion of the creek, and steelhead have not been observed spawning in Putah Creek in recent history.

3.4.2.1 Pacific lamprey

The Pacific lamprey is a wide-ranging anadromous fish that spawns and rears in streams along the northern margin of the Pacific Ocean, from central Baja California north along the west coast of North America to the Bering Sea in Alaska (Hubbs 1971, Ruiz-Campos and Gonzales-Guzman 1996, Lin et al. 2008). Widespread anecdotal accounts of fewer spawning adults, along with a substantial decline in counts of adults migrating past dams beginning in the 1950s, indicate a range-wide decline of Pacific lamprey abundance and distribution, particularly in southern portions of its range (Kostow 2002, Moser and Close 2003, Nawa 2003, Swift and Howard 2009, Luzier et al. 2011). The Pacific lamprey is designated a species of concern by the USFWS. Limited data on Pacific lamprey populations are available to assess status, but loss of access to historical habitat throughout California and the Sacramento and San Joaquin river basins indicates populations are greatly suppressed compared with historical levels (Moyle et al. 2009).

The Pacific lamprey rears in freshwater before migrating to the ocean, where it grows to full size prior to returning to natal streams to spawn. Adults generally migrate upstream from late fall to spring (Luzier et al. 2006). Data from mid-water trawls in Suisun Bay and the lower Sacramento River indicate that adults likely migrate into the Sacramento River and tributaries from late winter through early summer (Hanni et al. 2006). Spawning typically takes place in March through July, depending on water temperature and local conditions such as seasonal flow regimes (Kan 1975, Brumo et al. 2009, Gunckel et al. 2009). Spawning occurs primarily in the mainstems of medium-sized rivers and larger tributaries, and generally takes place in pool and run tailouts and low-gradient riffles (Luzier et al. 2006, Brumo et al. 2009, Gunckel et al. 2009). Adults typically die within a few weeks after spawning (Kan 1975, Brumo 2006).

After drifting downstream, the eyeless larvae, known as ammocoetes, settle out of the water column and burrow into fine silt and sand substrate in low-velocity, depositional areas such as pools, alcoves, and side channels (Torgensen and Close 2004, Stone and Barndt 2005). Depending on factors influencing their growth rates, ammocoetes remain in freshwater from 4 to 10 years, filter-feeding on algae, diatoms, and detrital matter prior to metamorphosing into adult form (Pletcher 1963, Moore and Mallatt 1980, Beamish and Levings 1991, van de Wetering 1998).

Ammocoetes are often found rearing in low-velocity habitats with silt and sandy substrates, but they can also be found in gravel substrates (Stone and Barndt 2005). Very little data are available on optimum and lethal water temperatures for Pacific lamprey ammocoetes. During the early life stages from embryo fertilization until the ammocoete stage, Meeuwig et al. (2004) found a sharp decline in survival of both “fertilization-to-hatch” and “hatch-to-larvae” stages as development temperature increased from 18 to 22ºC (64 to 72°F). Embryos reared at 22ºC (72°F) were also shown to be approximately six times more likely to have developmental abnormalities than those reared at lower temperatures (Meeuwig et al. 2004).

After metamorphosis, smolt-like individuals known as macropthalmia migrate to the ocean. Data from rotary screw trapping at sites on the mainstem Sacramento River indicate that downstream migration of Pacific lamprey macropthalmia peaks from early winter through early summer, but some downstream migration is observed year-round at both Red Bluff Diversion Dam and the Glenn-Colusa Irrigation District diversion dam (Hanni et al. 2006). Once reaching the ocean,

Pacific lampreys feed parasitically on a variety of marine fishes (Richards and Beamish 1981, Close et al. 2002). They are thought to remain in the ocean for approximately 18–40 months before returning to freshwater as sexually immature adults (Kan 1975, Beamish 1980).

Pacific lampreys have been reported to maintain small runs in Putah Creek (Moyle 2002). Adults are expected to migrate upstream into the reach between December and early April, when the boards of the Los Rios Check Dam are removed, and will continue to migrate upstream to spawn between March and July. The ammocoetes and juveniles are expected to occur throughout the Upper Reach year-round upstream of the Highway 505 bridge, and may occur downstream of Highway 505 when suitable water temperatures are present. Because Pacific lamprey has been documented within Putah Creek and may occur year-round, this species has a high occurrence potential within the assessment area.

3.4.2.2 Sacramento splittail

The USFWS removed Sacramento splittail from the list of threatened species on 22 September 2003. However, Sacramento splittail is a CDFW Species of Special Concern. Sacramento splittail are endemic to the Central Valley of California with a range that centers on the San Francisco Estuary (Moyle et al. 2004). Today they are reportedly found most frequently in the Sacramento River below the mouth of the Feather River, and have become increasingly rare in reaches upstream, particularly during summer and fall (Moyle et al. 2004).

Sacramento splittail spawning can occur anytime between late February and early July, but peak spawning occurs in March and April (Moyle 2002). Adult splittail move upstream in late November through late January, foraging in flooded areas along the main rivers, bypasses, and tidal freshwater marsh areas before spawning (Moyle et al. 2004). Feeding in flooded riparian areas before spawning may contribute to spawning success and survival of adults after spawning (Moyle et al. 2001). Splittail appear to concentrate their reproductive efforts in wet years, when potential success is greatly enhanced by the availability of inundated floodplain habitat (Meng and Moyle 1995, Sommer et al. 1997); attraction flows are necessary to initiate movement onto floodplains where spawning occurs (Moyle et al. 2004). Splittail are fractional spawners, with individuals spawning over several months (Wang 1995). Spawning generally occurs in water with depths of 0.9–1.8 m (3–6 ft) over submerged vegetation, where eggs adhere to vegetation or debris until hatching (Moyle 2002, Wang 1986). Most larval splittail remain in flooded riparian areas for 10 to 14 days, likely feeding in submerged vegetation before moving into deeper water as they become stronger swimmers (Wang 1986, Sommer et al. 1997). Juveniles prefer shallow-water habitat with emergent vegetation during rearing (Meng and Moyle 1995), and most move downstream in response to flow pulses into shallow, productive bay and estuarine waters from April to August (Meng and Moyle 1995, Moyle 2002).

One Sacramento splittail observation was reported approximately 1.6 km (1 mi) from the lower boundary of the Upper Reach (i.e., between the YBWA and Road 106A); however in high outflow years, Sacramento splittail are expected to occur in the Yolo Bypass, which includes approximately 4 km (2.5 mi) of the Upper Reach during the winter and spring (Sommer et al. 2001b, Harrell and Sommer 2003, Small et al. 2004). Additionally, adults may migrate further upstream into flooded areas within the Putah Creek channel. Because splittail are known to occur within the bypass and inundated floodplains along the bypass, because they have been documented within the Putah Creek channel up to Road 106A, and because habitat exists in the lowermost portion of the assessment area, splittail has a high occurrence potential within the Yolo Bypass section of the assessment area. Splittail have a moderate occurrence potential a short

distance upstream of the bypass; however, there is a very low occurrence potential for a majority of the reach due to limited floodplain spawning habitat along Putah Creek.

3.4.2.3 Central Valley fall-run Chinook salmon

Chinook salmon is the most commercially important species of anadromous fish in California. Chinook salmon have evolved a broad array of life-history patterns that allow this species to take advantage of diverse riverine conditions throughout the year. Four principal life-history variants are recognized, and are named for the timing of their spawning runs: fall-run, late fall-run, winter-run, and spring-run; although the fall-run and late fall-run are grouped into a single ESU because of their genetic similarity (Garza et al. 2008). Putah Creek currently supports a small population of fall-run Chinook salmon (CDFG et al. 2008). Observations of all four variants have been reported in the Yolo Bypass which serves as a migration corridor for both juvenile and adult life stages (Sommer et al. 2001b, Sommer et al 2003). However, aside from fall-run Chinook salmon, other variants have a low probability of occurrence within the Upper Reach; any occurrence would be limited to the lower 4 km (2.5 mi) and only when the Bypass is at a high flood stage and flood water extends upstream into the Upper Reach. Habitat for other variants is not available during most of the year in the Upper Reach, and the species are unlikely to occur within the Upper Reach outside of the Yolo Bypass flood season.

Central Valley fall-/late fall-run Chinook salmon are a federal species of concern and are identified as a CDFW Species of Special Concern. The Central Valley fall-/late fall-run ESU includes all naturally spawned populations of fall-run and late fall-run Chinook salmon in the Sacramento and San Joaquin river basins and their tributaries. The most abundant spawning populations occur in the Sacramento, Feather, Yuba, and American rivers (Mills and Fisher 1994). The estimated escapement of fall-run Chinook salmon to the Sacramento River and its tributaries was 205,096 in 2011, the highest since 2006, but 83% of the 40-year average of 273,100 (Azat 2012).

Chinook salmon spawning habitat in the Upper Reach.

Fall-run adults migrate in mature condition from saltwater into the Sacramento River and its tributaries, including Lower Putah Creek, between June and December, and spawn soon after arriving at their spawning grounds, from mid-September through December (Yoshiyama et al. 1998, Williams 2006). Peak spawning typically occurs in October and November (Williams 2006); however, upstream passage into Lower Putah Creek is currently blocked by Los Rios Dam until 1 December. Fry emergence occurs between December and March and juveniles rear in freshwater for only a few months. Downstream migration typically occurs from March through July (Yoshiyama et al. 1998), and juvenile outmigration from Lower Putah Creek becomes limited by the replacement of Los Rios Check Dam on or after 1 April. After about 2–4 years of absence, Chinook salmon adults returned to Lower Putah Creek to spawn in December 2003, following the implementation of the Putah Creek Accord, and stream restoration efforts continue to enhance habitat with in the Upper Reach (Marovich 2011). Because fall-run chinook salmon have been documented within Putah Creek, this species has a high occurrence potential

throughout the assessment area. Chinook salmon observed spawning in Lower Putah Creek have included hatchery strays (fish that were spawned in hatcheries on other rivers), indicated by a missing adipose fin (Moyle 2015). The proportion of returning "natural spawned" Chinook salmon is unknown (if any). Successful fry emergence has been documented (Moyle 2015).

3.4.2.4 Central Valley steelhead

The Central Valley steelhead Distinct Population Segment (DPS) includes all naturally spawned populations of anadromous steelhead occurring below natural and human-made impassable barriers in the Sacramento and San Joaquin rivers and their tributaries, excluding steelhead from San Francisco and San Pablo bays and their tributaries. This DPS also includes anadromous steelhead from two artificial propagation programs: the Federal Coleman Nimbus Fish Hatchery and State Feather River Fish Hatchery. The Central Valley steelhead DPS is listed as federally threatened but is not listed under CESA. Critical habitat for Central Valley steelhead includes the Yolo Bypass (NMFS 2005).

Adult steelhead typically begin their upstream migration into Central Valley streams between August and April (Williams 2006, NMFS 2009b) and migration peaks in September, continuing through February or March (Bailey 1954, Hallock et al. 1961, both as cited in McEwan and Jackson 1996). Increased water temperatures may trigger movement, but some steelhead may enter freshwater habitats without any apparent environmental cues (Barnhart 1991). Preferred upstream migration and holding temperatures have been reported to range from 8 to 15°C (46°F to 59°F) (Moyle et al. 1989, McEwan and Jackson 1996), while temperatures exceeding 21°C (70°F) are stressful (Lantz 1971, as cited in Beschta et al. 1987). Spawning occurs primarily from January through March, but may begin as early as late December and may extend through April (Hannon et al. 2003, NMFS 2009b). Optimal spawning temperatures have been reported to range from 4 to 11°C (39 to 52°F) (Hooper 1973, Bovee 1978, Reiser and Bjornn 1979, Bell 1986, CDFG 1991). Female steelhead construct redds in suitable gravels, primarily in pool tailouts and heads of riffles. Unlike Chinook salmon, many steelhead do not die after spawning. Those that survive return to the ocean and may spawn again in future years. In the Central Valley, adult steelhead generally return to freshwater at ages 2 and 3, and range in size from 1–5 kg (2–12 lbs) (Reynolds et al. 1993).

Fry move to shallow-water, low-velocity habitats, such as stream margins and low-gradient riffles, and forage in open areas lacking instream cover (Hartman 1965, Everest et al. 1986, Fontaine 1988). As fry increase in size and their swimming abilities improve during late summer and fall, they increasingly use areas with cover and exhibit a preference for higher-velocity, deeper mid-channel areas near the thalweg (lowest point in the stream channel) (Hartman 1965, Everest and Chapman 1972, Fontaine 1988).

Juvenile steelhead (parr) may rear in freshwater for 1–3 years before migrating to the ocean as smolts (McEwan and Jackson 1996). Juvenile steelhead occupy a wide range of habitats, preferring deep pools as well as higher-velocity rapid and cascade habitats (Bisson et al. 1982, 1988). The time that parr spend in freshwater appears to be related to growth rate, with larger, faster-growing members of a cohort smolting earlier (Peven et al. 1994). During the winter period of inactivity, steelhead prefer low-velocity pool habitats with large rocky substrate or woody debris for cover (Hartman 1965, Raleigh et al. 1984, Swales et al. 1986, Fontaine 1988). During periods of low temperatures (less than 7°C [45°F]) and high flows associated with the winter months, juvenile steelhead seek refuge in interstitial spaces in cobble and boulder substrates (Bustard and Narver 1975, Everest et al. 1986). Juveniles' winter hiding behavior reduces their

metabolism and food intake requirements, and minimizes their exposure to predation and high flows (Bustard and Narver 1975), but substantial mortality still appears to occur during winter. Preferred water temperatures for fry and juvenile steelhead rearing are reported to range from 7–18°C (45–65°F) (NMFS 2002). Although the reported preferred water temperatures for fry and juvenile steelhead rearing range from 7 to 18°C (45 to 65°F), most literature on steelhead smoltification suggests that water temperatures of 11°C (52°F) (Adams et al. 1975, Myrick and Cech 2001, Rich 1987, as cited in Lower Yuba Accord RMT 2010), or less than 13°C (55°F) (Wedemeyer et al. 1980, McCullough et al. 2001, U.S. Environmental Protection Agency 2003, Zaugg and Wagner 1973, as cited in Lower Yuba Accord RMT 2010) are required for successful smoltification to occur. In the Sacramento River, juvenile steelhead generally begin their downstream migration to the ocean in spring and early summer, with peak downstream migration through the Delta occurring from March through April (Reynolds et al. 1993). Downstream migration is reported to occur at 1–3 years of age and a fork length of 10–25 cm (4–10 in) (Reynolds et al. 1993).

Steelhead have been observed in the Yolo Bypass, which serves as a migration corridor for both juvenile and adult life stages (Sommer et al. 2001b, Harrell and Sommer 2003). However, migrating fish within the Yolo Bypass have a low probability of occurrence within the Upper Reach; any occurrence would be limited to the lower 4 km (2.5 mi) and only when the Bypass is at a high flood stage and flood water extends upstream into the Upper Reach. Steelhead could potentially spawn in Putah Creek, although there have been no recent confirmed reports (CDFG et al. 2008). If steelhead are accessing upper sections of Putah Creek to spawn, adults would be expected to migrate upstream beginning in late fall and outmigrating juveniles would typically emigrate by early summer. However, upstream passage into Lower Putah Creek is currently blocked by Los Rios Dam until 1 December and juvenile outmigration from Lower Putah Creek becomes limited by the replacement of Los Rios Check Dam on or after 1 April. Additionally, where suitable habitat exists, juveniles could remain within the stream for up to three years before emigrating; however, juvenile habitat is limited to a small section of stream immediately downstream of the PDD, as water temperatures increase dramatically downstream during the summer months (see Section 3.2.3, *Water Temperature*). Because the assessment area overlaps with the Central Valley steelhead range, there is habitat that can support steelhead within the assessment area (although limited), and because steelhead have been documented within Yolo Bypass (the lowermost portion of the assessment area), this species has a high occurrence potential within the bypass and a moderate occurrence potential in the majority of the assessment area.

3.4.3 Reptiles

One special-status reptile species, western pond turtle, was identified as having moderate to high potential to occur in the assessment area.

3.4.3.1 Western pond turtle

Western pond turtle is a CDFW Species of Special Concern. In California, it is found from the Oregon border along the Coast Ranges to the Mexican border, and west of the crest of the Cascades and Sierras. Western pond turtles inhabit fresh or brackish water characterized by areas of deep water, low flow velocities, moderate amounts of riparian vegetation, warm water and/or ample basking sites, and underwater cover elements, such as large woody debris and rocks (Jennings and Hayes 1994). Along major rivers, western pond turtles are often concentrated in

areas of optimal habitat, and those are often in side channel and backwater areas. Turtles may move to off-channel habitats, such as oxbows, during periods of high flows (Holland 1994). Although adults are habitat generalists, hatchlings and juveniles require specialized habitat for survival through their first few years. Hatchlings spend much of their time feeding in shallow water with dense submergent or short emergent vegetation (Jennings and Hayes 1994). Although an aquatic reptile, western pond turtles spend time on land basking, overwintering, and nesting, up to 1 km (0.6 mi) away from aquatic habitats (Holland 1994). Nests are typically dug in grassy, open fields with soils that are high in clay or silt. Egg-laying usually takes place between March and August.

Western pond turtle is documented as being widespread along Putah Creek (Truan et al. 2010). There is suitable aquatic habitat where sections of creek are relatively slow-moving and deep, with structures for basking such as logs, rocks, or exposed banks. Nesting habitat may include upland areas not prone to flooding that are exposed to sun, with low-growing vegetation. Because western pond turtle has been documented as widespread in Putah Creek, this species has a high occurrence potential throughout the assessment area.

3.4.4 Birds

Seven special-status bird species were identified as having moderate to high potential to occur in the assessment area. Four of these species may nest in the assessment area, while three—western yellow-billed cuckoo, willow flycatcher, and yellow warbler—use habitat in the assessment area only during migration. Listed and non-listed migratory or resident birds could establish nests in suitable habitat in the assessment area, and all native migratory birds, their occupied nests, and their eggs are protected by the Federal Migratory Bird Treaty Act (16 USC 703 et seq.), Title 50 Code of Federal Regulations (part 10), and CDFW Code Sections 3503, 3513, and 3800.[2]

Inactive bird nests in eucalyptus.

3.4.4.1 White-tailed kite

White-tailed kite is a CDFW Fully Protected species. White-tailed kite is a resident (breeding and wintering) species throughout central and coastal California, up to the western edge of the foothills of the Sierra Nevada. California constitutes the stronghold of the North American breeding range (Zeiner et al. 1990a, Dunk 1995). They are not migratory, but may make slight seasonal range shifts in coastal areas during winter (Zeiner et al. 1990a). Riparian corridors represent a preferred landscape characteristic for kites in both the breeding and non-breeding season (Erichsen 1995), and kites may also breed in lowland grasslands, oak woodlands, and wetlands with open areas. Groves of trees are required for perching and nesting, though kites do

[2] A full list of the species protected under the MBTA appears in Title 50, section 10.13, of the Code of Federal Regulations (50 CFR 10.13), and includes federal and state-listed migratory birds as well as other non-listed migratory birds.

not seem to associate with particular tree species (Dunk 1995). Preferred foraging sites include open and ungrazed grasslands, agricultural fields, wetlands, and meadows that support large populations of small mammals. White-tailed kites breed from February through October, although peak breeding occurs from May through August (Zeiner et al. 1990a).

White-tailed kite is widely distributed along the assessment area (Truan et al. 2010, eBird 2014). A majority of observations have been at Old Davis Road-Restoria and UC Davis Picnic Grounds, where breeding has been confirmed (Truan et al. 2010). There is nesting habitat in tall trees along the majority of Putah Creek. A nest site was located in the assessment area in 1993 in riparian habitat on the south bank of Putah Creek, approximately 0.5 mi south of the UCD airport (CDFW 2014). Because white-tailed kites have been documented along the assessment area, this species has a high occurrence potential throughout the assessment area.

3.4.4.2 Northern harrier

Northern harrier is a CDFW Species of Special Concern. It is a fairly common in winter. The breeding population now appears to be restricted to north coastal lowlands, the central coast, the northern Central Valley, Klamath Basin, and Great Basin (MacWhirter et al. 1996, Davis and Niemela 2008). Meadows, marshes, and wetlands are optimal habitat types; other suitable habitats include grasslands, ungrazed or lightly grazed pastures, and grain fields (Davis and Niemela 2008). Northern harriers nest on the ground in shrubby vegetation, usually along the edge of marshes. Nests are constructed of larger plants (e.g., willows, cattails) at the base with grasses and sedges lining the interior. Northern harriers feed primarily on voles or other small mammals; birds, frogs, reptiles, and invertebrates make up the rest of their diet (MacWhirter et al. 1996). This highly territorial species breeds from April through September, with peak breeding during June and July (Zeiner et al. 1990a).

Northern harrier has been observed throughout the assessment area (eBird 2014). Truan et al. (2010) reports most sightings at Old Davis Road-Restoria and at UCD Picnic Grounds. Breeding was documented at Old Davis Road-Restoria (Truan et al. 2010). However, there is very limited ground-nesting habitat in marsh vegetation and low-lying shrubs along the assessment area. Because northern harriers have been documented throughout the assessment area, this species has a high occurrence potential throughout the assessment area.

3.4.4.3 Swainson's hawk

Swainson's hawk, a migratory raptor that is a spring and summer resident in California's Central Valley, is a state-listed threatened species. Throughout its range, the Swainson's hawk nests almost exclusively in only a few species of trees, such as oaks, cottonwoods, sycamores, or willows (Schlorff and Bloom 1983, CDFG 1994) near large, sparsely vegetated flatlands characterized by valleys, plateaus, broad flood plains, and large open expanses (Bloom 1980). Although Swainson's hawk is not an obligate riparian species, the availability of nesting trees is closely tied to riparian areas, usually associated with main river channels (Bloom 1980, Estep 1989). Nesting sites tend to be adjacent or close to suitable foraging grounds, which may include recently harvested alfalfa, wheat, or hay crops; low-growing crops, such as beets or tomatoes; open pasture; non-flooded rice fields; or post-harvest cereal grain crops (Bloom 1980; CDFG 1992, 1994). Swainson's hawks forage in open areas with reduced vegetative cover that provides good visibility of prey, such as voles, ground squirrels, pocket gophers, and deer mice. They cannot forage in tall crops that grow much higher than native grasses, which make prey more difficult to find (CDFG 1994).

Migrating Swainson's hawks first arrive in the Central Valley in mid-March through May and migrate south in September and October (Zeiner et al. 1990a). Breeding occurs from late March to late August, with peak activity from late May through July (Zeiner et al. 1990a). Most clutches are completed by mid-April, and fledging occurs from July to mid-August (Estep 1989).

Swainson's hawk is very common in the assessment area (CDFG 2012, eBird 2014). They are found in areas spanning the length of the Upper Reach, though the majority of sightings are downstream of Lincoln Highway (CDFG 2012, eBird 2014). Breeding was documented at twelve sites from Putah Creek sinks (within the Yolo Bypass) to the Diversion Dam (Truan et al. 2010). There are dozens of documented nest sites along Putah Creek noted in CNDDB (CDFG 2012). There is foraging habitat throughout agricultural lands adjacent to the assessment area (particularly in hay, wheat, or alfalfa fields). Because Swainson's hawks are common within the assessment area and are known to nest along Putah Creek, this species has a high occurrence potential throughout the assessment area.

3.4.4.4 Western yellow-billed cuckoo

Western yellow-billed cuckoo is federally threatened, and is state-listed as endangered. On August 15, 2014, USFWS proposed to designate critical habitat in California, which does not include areas along Putah Creek. Historically, the distribution of western yellow-billed cuckoo extended throughout the Central Valley, where the species is now widely extirpated. Along the Sacramento River, populations of greater than five pairs known to breed yearly are currently limited from Red Bluff to Colusa (Laymon 1998). Yellow-billed cuckoos generally prefer open woodland with trees and low, dense shrubs, often associated with riparian areas (Hughes 1999). For cover, western yellow-billed cuckoos use deciduous trees and shrubs with dense foliage, particularly willows (Zeiner et al. 1990a). Nesting habitat is often associated with young riparian vegetation. On the Sacramento River nests have been found in willows, cottonwoods, and box elders (Layman 1998).

The western yellow-billed cuckoo is presently a rare migrant in Yolo County. The likelihood that yellow-billed cuckoo would be found in the assessment area is considered moderate since there have been a few sightings of single birds along Putah Creek between 2005 and 2007 (Truan et al. 2010). Twice in 2005, a single bird was documented in Putah Creek; once in Los Rios farms in June and once in the Cache Creek Settling Basin in July (Truan et al. 2010). Another single bird was noted at Fremont Weir in June and July (Truan et al. 2010). In 2007, a cuckoo was documented near the Dry Creek confluence (Truan et al. 2010). Because individual western yellow-billed cuckoos have been documented within the assessment area, which overlaps with their historical range, this species has a moderate occurrence potential within the assessment area, but are not expected to nest in the assessment area.

3.4.4.5 Willow flycatcher

Willow flycatcher is state-listed as endangered. Although historically the willow flycatcher occurred throughout California in deciduous shrub and willow thicket habitats, it is currently a rare summer resident in wet meadow and montane riparian habitats at elevations between 600 and 2,440 m (2,000 and 8,000 ft), primarily in the Sierra Nevada and Cascade ranges (Craig and Williams 1998, Sedgewick 2000). Willow flycatchers are no longer present throughout most of the historical California range, but do rarely occur in riparian areas during the spring and fall migration periods.

Willow flycatchers require dense riparian shrubland, often thickets of willows or alder, near permanent standing water for foraging and roosting; however, areas with dense tree cover are not suitable. In addition, low, exposed branches are used during foraging (Zeiner et al. 1990a). Water is always present in willow flycatcher territories in California (Sedgewick 2000). Deciduous shrubs and small trees at least 2 m (6.6 ft) tall are required for nesting (Craig and Williams 1998). Willow flycatcher nests are frequently parasitized by brown-headed cowbirds (*Molothrus ater*) (Craig and Williams 1998). According to Truan et al. (2010), there is little or no probability of restoring successfully breeding willow flycatchers to the Central Valley because of this brood parasitism.

In the assessment area, migrant willow flycatchers have been observed along the length of Putah Creek in spring and fall, most often in September (Truan et al. 2010, eBird 2014). Because western flycatcher has been documented migrating through the assessment area, this species has a moderate occurrence potential within the assessment area; it is very unlikely for willow flycatchers to nest in the assessment area since the Central Valley is not included in their current breeding range.

3.4.4.6 Yellow warbler

Yellow warbler, a CDFW Species of Special Concern, is a summer resident that breeds throughout much of California, except the Central Valley, southern Californian deserts, and high Sierra Nevada (Zeiner et al. 1990a; Heath 1998, 2008). The largest concentrations of breeding pairs occur in northeastern California, in Modoc National Forest and Shasta County, as well as in the Cascade Range and Sierra Nevada (Heath 2008). The preferred habitat of yellow warblers includes open-canopy or deciduous riparian vegetation, often along streams or wet meadows (Heath 2008). This species frequently nests in small willows and alders, and is also associated with cottonwoods, Oregon ash, and other riparian shrubs and trees, depending upon the geographic region (Zeiner et al. 1990a, Heath 2008). Breeding occurs from mid-April through early August, with peak activity in June (Zeiner et al. 1990a). Yellow warblers nest 1to 5 m (2 to 16 ft) above ground, at the bases of branches (branch forks) in small deciduous trees and shrubs, often in willow thickets (Zeiner et al. 1990a, Lowther et al. 1999). Birds forage for insects within the shrub and tree canopy, occasionally feeding on the wing or eating fruit (Zeiner et al. 1990a, Lowther et al. 1999).

Only migrant yellow warblers have been documented along Putah Creek in spring (May through June) and autumn (late July through October) (Truan et al. 2010, eBird 2014). Fall migration is typically heavy in August and early September. In October, this species is rarely encountered (Truan et al. 2010). According to the Breeding Bird Atlas, there is potential nesting habitat at the PDD, Putah Creek Sinks, Winters Putah Creek Park, and Dry Creek Confluence, though nesting has not been observed (Truan et al. 2010). Because migrant yellow warblers have been documented foraging within the assessment area, this species has a moderate occurrence potential.

3.4.4.7 Tricolored blackbird

Tricolored blackbird, previously a CDFW Species of Special Concern, was given emergency Endangered status under CESA in December 2014; CDFW has 180 days to determine whether to make the protections permanent (http://tricolor.ice.ucdavis.edu). This species is a year-round resident in California, where it is largely endemic. The species is common locally throughout the

Central Valley and in coastal areas from Sonoma County south through Monterey County (Zeiner et al. 1990a, Beedy and Hamilton 1999, Beedy 2008). It is also found more sporadically in Mendocino and Humboldt counties, as well as northeastern California, the western Mojave Desert, and the southern California coast (Beedy 2008). It nests in large colonies, typically between February 1 and August 31 within protected stands of cattails, tules, blackberry brambles, or willows, and within 490 m (1600 ft) of open, accessible water (Beedy and Hamilton 1997, Hamilton 2004). Tricolored blackbirds forage in a variety of habitats, including agricultural fields (such as cut grain fields, rice, and alfalfa), dairies and feedlots, irrigated pastures, annual grasslands, ephemeral pools and ponds, wetlands, riparian scrub, and freshwater marsh (Beedy and Hamilton 1997, Beedy 2008).

There may be suitable nesting habitat in expansive marsh vegetation or large blackberry thickets along Putah Creek. There have been eight documented sightings of tricolored blackbird during surveys reported by Truan et al. (2010) from 1997 to 2010, though their surveys were not designed to detect tricolored blackbird in numbers. Tricolored blackbirds were observed at Los Rios Farms, Putah Creek Sinks, Mace Boulevard, and the Center for Land-based Learning (Truan et al. 2010).). Because tricolored blackbirds have been documented along Putah Creek, and nesting habitat may be present, this species has a moderate occurrence potential within the assessment area.

3.4.5 Mammals

Three special-status mammals—western red bat, pallid bat, and ringtail—were identified as having moderate to high potential to occur in the assessment area.

3.4.5.1 Western red bat

Western red bat is a CDFW Species of Special Concern. In California, the western red bat has been observed near the Pacific Coast, Central Valley, and the Sierra Nevada range and foothills. Western red bat roosts have often been observed in edge habitats near streams, fields, orchards, or urban areas (Zeiner et al. 1990b). This species roosts non-colonially, in dense canopies and within tree foliage, beneath overhanging leaves (Constantine 1959, Shump and Shump 1982), at 1 to 12 m (2 to 40 ft) above ground level (Zeiner et al. 1990b). Studies in the Central Valley found that summering populations of western red bats are substantially more abundant in remnant riparian stands of cottonwood or sycamore greater than 50 m (164 ft) wide than in younger, less-extensive stands (Pierson et al. 2000). Western red bats may forage up to 0.5 to 1.0 km (0.3 to 0.6 mi) from their day roost (Zeiner et al. 1990b), both at canopy height and low over the ground (Shump and Shump 1982). This species feeds primarily on small moths, but its diet may include a variety of other insects, such as crickets, beetles, and cicadas (Zeiner et al. 1990b). Western red bats mate in August and September. Breeding females are found in association with the same cover requirements as for roost sites, and with cottonwood/sycamore riparian habitat along large river drainages in the Central Valley (Ziener et al. 1990b, Pierson and Rainey 2003). Fertilization is delayed until March or April. After an 80- to 90-day gestation period, pups are born from late May through early July.

In the assessment area, there is suitable roosting habitat for western red bat in riparian stands of cottonwood along Putah Creek. Because there is suitable habitat within the assessment area, which overlaps with the western red bats range, there is a moderate potential for western red bats to occur within the assessment area.

3.4.5.2 Pallid bat

Pallid bat, a CDFW Species of Special Concern, is fairly widespread in California. Pallid bats occupy a variety of habitats, from arid deserts to grasslands to conifer forests and riparian areas. Roosts (including day, night, and maternity roosts) are typically located in rock crevices and cliffs; day roosts can also be found in tree hollows and caves (Hermanson and O'Shea 1983, Lewis 1994, Pierson et al. 1996, Pierson et al. 2001). In more urban settings, roosts are frequently associated with human structures such as abandoned buildings, abandoned mines, and bridges (Pierson et al. 1996, Pierson et al. 2001). Overwintering roosts require relatively cool and stable temperatures out of direct sunlight. Pallid bats typically glean prey from the ground, and may forage 1 to 3 miles from their day roost (Zeiner et al. 1990b).

The pallid bat is a colonial species, with a typical maternal colony size of 50 to 300 (Hermanson and O'Shea 1983, Lewis 1994, Pierson et al. 1996). Breeding occurs from late October to February. With the average litter size of two, the young are born between April and July and are typically weaned in August (Sherwin and Rambaldini 2005).

Pallid bats may day-roost in the assessment area within the riparian forest if there are large tree hollows present. However, pallid bats are not expected to night or maternity roost within the assessment area, which is largely absent of rock crevices for reproduction and rearing young, though roosts could occur in abandoned structures along the riparian corridor. Though pallid bats have not been documented within the assessment area (CDFG et al. 2008), their range overlaps with the assessment area, which contains roosting habitat, and therefore pallid bats have a moderate potential to occur within the assessment area.

3.4.5.3 California ringtail

California ringtail, a nocturnal carnivore in the raccoon family, is a CDFW Fully Protected species. Ringtails are active year-round and widely distributed throughout California as a non-migratory resident, ranging over the entire state with the exception of the extreme northeast corner and the southern portions of the San Joaquin Valley (Orloff 1988). Little is known about the specific habitat requirements of California ringtails; they are found in a variety of environments including riparian, shrub, and forest in close association with rocky areas or riparian habitats (Jameson and Peeters 2004). Dens may be located in rock crevices, tree cavities, logs, snags, abandoned burrows, or woodrat nests (Zeiner et al. 1990b). The ringtail mating season occurs from February to May, and young are born around May and June (Zeiner et al. 1990b). Ringtails eat mainly rodents (woodrats and mice) and rabbits, although they also forage on fruits, berries, nuts, birds, reptiles, and invertebrates (Zeiner et al. 1990b, Jameson and Peeters 2004).

The California ringtail is currently not documented as present, but it might occur in riparian woodland habitat within the assessment area (C. Rocco, CDFW, pers. comm., April 4, 2013). Ringtails may occur in riparian habitats along the assessment area. However, there is little documentation of known areas occupied by ringtail in Yolo or Solano counties (Belluomini 1980), possibly due to the species' secretive nature. Because there is suitable habitat within the assessment area, which overlaps with the ringtails range, there is a moderate potential for ringtail to occur within the assessment area.

4 ADDITIONAL SURVEY NEEDS

Existing information was not readily available to sufficiently specify locations and distributions of special-status plants and natural communities, valley elderberry longhorn beetle, and salmon and steelhead at certain times of the year. Subsequently, three additional surveys may be necessary at a Project-specific level to inform design, facilitate evaluation of potential Project impacts within construction areas, and develop appropriate impact avoidance measures: (1) protocol-level surveys for special-status plants, along with concurrent surveys of natural communities; (2) surveys to determine locations of elderberry plants, and if the plants cannot be avoided, protocol-level surveys for valley elderberry longhorn beetle (if the species is still listed at the time of NEPA/CEQA document development); and (3) pre-construction snorkel surveys for salmon and steelhead between Interstate 80 and Highway 505, if in-water work during fish migration periods cannot be avoided.

5 REFERENCES

Adams, B. L., W. S. Zaugg, and L. R. McLain. 1975. Inhibition of salt water survival and Na-K-ATPase elevation in steelhead trout (*Salmo gairdneri*) by moderate water temperatures. Transactions of the American Fisheries Society 104:766–769.

Azat J. 2012. Central Valley Chinook salmon harvest and escapement. Interagency Ecological Program for the San Francisco Estuary 25:13–15.

Bailey, E. D. 1954. Time pattern of 1953-54 migration of salmon and steelhead into the upper Sacramento River. California Dept. Fish and Game Unpublished Report.

Barnhart, R. A. 1991. Steelhead (*Oncorhynchus mykiss*). Pages 324–336 *in* J. Stolz and J. Schnell, editors. Trout. Stackpole Books, Harrisburg, Pennsylvania.

Barr, C. B. 1991. The distribution, habitat, and status of the valley elderberry longhorn beetle *Desmocerus californicus dimorphus.* U.S. Fish and Wildlife Service, Sacramento, California.

Beamish, R. J. 1980. Adult biology of the river lamprey (*Lampetra ayresi*) and the Pacific lamprey (*Lampetra tridentata*) from the Pacific coast of Canada. Canadian Journal of Fisheries and Aquatic Sciences 37: 1,906–1,923.

Beamish, R. J., and C. D. Levings. 1991. Abundance and freshwater migrations of the anadromous parasitic lamprey, *Lampetra tridentata*, in a tributary of the Fraser River, British Columbia. Canadian Journal of Fisheries and Aquatic Sciences 48: 1,250–1,263.

Beedy, E. C. 2008. Tricolored blackbird (*Agelaius tricolor*). *In* W. D. Shuford, and T. Gardali, editors. California Bird species of special concern: a ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California and California Department of Fish and Game, Sacramento.

Beedy, E. C. and W. J. Hamilton, III. 1999. Tricolored Blackbird (*Agelaius tricolor*). *In* A. Poole, editor. The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York. http://bna.birds.cornell.edu/bna/species/423/articles/introduction [Accessed July 2010].

Beedy, E. C., and W. J. Hamilton, III. 1997. Tricolored blackbird status update and management guidelines. Prepared by Jones & Stokes Associates, Inc. and University of California, Davis for U.S. Fish and Wildlife Service, Migratory Birds, and Habitat Programs and California Department of Fish and Game, Bird and Mammal Conservation Program.

Bell, M. C., editor. 1986. Fisheries handbook of engineering requirements and biological criteria. NTIS AD/A167-877. Fisheries-Engineering Research Program, U.S. Army Corps of Engineers, North Pacific Division. Portland, Oregon.

Belluomini, L. 1980. Status of the ringtail in California. California Department of Fish and Game, Nongame Wildlife Investigations.

Beschta, R. L., R. E. Bilby, G. W. Brown, L. B. Holtby, and T. D. Hofstra. 1987. Stream temperature and aquatic habitat: fisheries and forestry interactions. Pages 191-232 *in* E. O. Salo and T. W. Cundy, editors. Streamside management: forestry and fishery interactions. Contribution No. 57. College of Forest Resources, University of Washington, Seattle.

Bisson, P., J. L. Nielsen, R. A. Palmason, and L. E. Grove. 1982. A system of naming habitat types in small streams, with examples of habitat utilization by salmonids during low streamflows. Pages 62–73 *in* N. B. Armantrout, editor. Proceedings of the Symposium on Acquisition and Utilization of Aquatic Habitat Inventory Information. American Fisheries Society, Western Division, Bethesda, Maryland.

Bisson, P. A., K. Sullivan, and J. L. Nielsen. 1988. Channel hydraulics, habitat use, and body form of juvenile coho salmon, steelhead trout, and cutthroat trout in streams. Transactions of the American Fisheries Society 117: 262–273.

Bloom, P. H. 1980. The status of the Swainson's hawk in California, 1979. California Department of Fish and Game and USDI Bureau of Land Management, Sacramento, California.

Bovee, K. D. 1978. Probability of use criteria for the family salmonidae. Instream Flow Information Paper No. 4, FWS/OBS-78-7). U.S. Fish and Wildlife Service, Washington, D.C.

Brumo, A. F. 2006. Spawning, larval recruitment, and early life survival of Pacific lampreys in the south fork Coquille River, Oregon. Master's thesis. Oregon State University, Corvallis, Oregon.

Brumo, A. F., L. Grandmontagne, S. N. Namitz, and D. F. Markle. 2009. Approaches for monitoring Pacific lamprey spawning populations in a coastal Oregon stream. American Fisheries Society Symposium 72: 203–222.

Bustard, D. R., and D. W. Narver. 1975. Aspects of the winter ecology of juvenile coho salmon (*Oncorhynchus kisutch*) and steelhead trout (*Salmo gairdneri*). Journal of the Fisheries Research Board of Canada 32: 667–680.

CDFG (California Department of Fish and Game). 1991. Steelhead Restoration Plan for the American River. Prepared by D. McEwan and J. Nelson.

CDFG. 1992. Annual report on the status of California state listed threatened and endangered animals and plants. Fish and Game Commission, Sacramento.

CDFG. 1994. Staff report regarding mitigation for impacts to Swainson's hawks (*Buteo swainsoni*) in the Central Valley of California.

CDFG. 2009. Report to the Fish and Game Commission: A status review of the longfin smelt (*Spirinchus thaleichthys*) in California.

CDFG. 2010. List of California Terrestrial Natural Communities. http://www.dfg.ca.gov/biogeodata/vegcamp/pdfs/natcomlist.pdf

CDFG. 2012. California Natural Diversity Database (CNDDB). Rarefind Version 3.1.1. Electronic database. California Department of Fish and Game, Sacramento, California. http://www.dfg.ca.gov/biogeodata/cnddb/rarefind.asp [Accessed October 2012].

CDFG, Yolo Basin Foundation, and EDAW. 2008. Yolo Bypass Wildlife Area Land Management Plan. Prepared for California Department of Fish and Game, Yolo Bypass Wildlife Area, Davis, California.

CDFW (California Department of Fish and Wildlife). 2014. California Natural Diversity Database (CNDDB). Rarefind Version 3.1.1. Electronic database. California Department of Fish and Game, Sacramento, California. http://www.dfg.ca.gov/biogeodata/cnddb/rarefind.asp [Accessed January 2014].

Close, D. A., M. S. Fitzpatrick, and H. W. Li. 2002. The ecological and cultural importance of a species at risk of extinction, Pacific lamprey. Fisheries 27: 19–25.

County of Solano. 2008. Background Report for the Solano County General Plan Update. August –November.

County of Yolo. 2005. Background Report for the Yolo County General Plan Update, Woodland, California.

County of Yolo. 2009. 2030 Countywide General Plan. November.

CNPS (California Native Plant Society). 2012. Inventory of rare and endangered plants of California. Online database, 7th edition. D. P. Tibor, convening editor. Rare Plant Scientific Advisory Committee, California Native Plant Society, Sacramento, California. http://www.dfg.ca.gov/biogeodata/cnddb/rarefind.asp [Accessed October 2012].

Constantine, D. G. 1959. Ecological observations on lasiurine bats in the North Bay Area of California. Journal of Mammalogy 40:13–15.

Craig, D. and P. L. Williams. 1998. Willow Flycatcher (*Empidonax traillii*). *In* The riparian bird conservation plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/plans.html.

Crain, P. K., and P. B. Moyle. 2011. Biology, history, status and conservation of Sacramento perch, *Archoplites interruptus.* San Francisco Estuary & Watershed Science 9: 1–37.

Davis, J. N., and C. A. Niemala. 2008. Northern harrier (*Circus cyaneus*). Pages 149–155 *in* W. D. Shuford and T. Gardali, editors. California bird species of special concern: a ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of western birds no. 1. Western Field Ornithologists, Camarilla, California and California Department of Fish and Game, Sacramento, California.

Dunk, J. R. 1995. White-tailed kite (*Elanus leucurus*). *In* A. Poole, editor. The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York. http://bna.birds.cornell.edu/bna/species/178/articles/introduction.

eBird. 2013. eBird: An online database of bird distribution and abundance. Website [Accessed January 2013]. eBird, Ithaca, New York.

EDAW. 2005. Lower Putah Creek Watershed Management Action Plan: Phase I—resource assessments. Prepared for Lower Putah Creek Coordinating Committee. Vacaville, California.

Erichsen, A. L. 1995. The white-tailed kite (*Elanus leucurus*): nesting success and seasonal habitat selection in an agricultural landscape. Master's thesis. University of California at Davis, Davis.

Estep, J. A. 1989. Biology, movements, and habitat relationships of the Swainson's hawk in the Central Valley of California, 1986–87. CDFG, Nongame Bird and Mammal Sec. Rep.

Everest, F. H., and D. W. Chapman. 1972. Habitat selection and spatial interaction by juvenile Chinook salmon and steelhead trout in two Idaho streams. Journal of the Fisheries Research Board of Canada. 29: 91–100.

Everest, F. H., G. H. Reeves, J. R. Sedell, J. Wolfe, D. Hohler, and D. A. Heller. 1986. Abundance, behavior, and habitat utilization by coho salmon and steelhead trout in Fish Creek, Oregon, as influenced by habitat enhancement. Annual Report 1985, Project No. 84-11. Prepared by U.S. Forest Service for Bonneville Power Administration, Portland, Oregon.

Fontaine, B. L. 1988. An evaluation of the effectiveness of instream structures for steelhead trout rearing habitat in the Steamboat Creek basin. Master's thesis, Oregon State University, Corvallis, Oregon.

Garza, J.C., and D. E. Pearse. 2008. Population genetic structure of *Oncorhynchus mykiss* in the California Central Valley. Final report for California Department of Fish and Game.
Gertsch, M., D. Van DeWater, and B. Walton. 1994. American peregrine falcon. *In* C. G. Thelander and M. Crabtree, editors. Life on the edge: a guide to California's endangered natural resources: wildlife. Biosystems Books, Santa Cruz, California.

Gunckel, S. L., K. K. Jones, and S. E. Jacobs. 2009. Spawning distribution and habitat use of adult Pacific and western brook lampreys in Smith River, Oregon. Pages 173–189 *in* L. R. Brown, S. D. Chase, M. G. Mesa, R. J. Beamish, and P. B. Moyle, editors. Biology, management, and conservation of lampreys in North America. American Fisheries Society, Symposium 72, Bethesda, Maryland.

Hallock, R. J., W. F. Van Woert, and L. Shapovalov. 1961. An evaluation of stocking hatchery-reared steelhead rainbow trout (*Salmo gairdnerii gairdnerii*) in the Sacramento River system. California Department Fish and Game Fish Bulletin No. 114.

Hamilton, W. J. 2004. Tricolored blackbird (*Agelaius tricolor*). *In* The riparian bird conservation plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/htmldocs/riparian_v-2.html.

Hanni, J., B. Poytress, H. Blaylock-Herod. 2006. Spatial and Temporal Distribution Patterns of Pacific and River Lamprey in the Sacramento and San Joaquin Rivers and Delta. American Fisheries Society, 40th annual meeting of the American Fisheries Society California-Nevada Chapter 3/30-4/1/2006. San Luis Obispo, CA. http://www.fws.gov/stockton/jfmp/datareports.asp.

Hannon, J, Healey, M, Deason, B. 2003. American River steelhead (*Oncorhynchus mykiss*) spawning, 2001-2003. Sacramento, California: U. S. Bureau of Reclamation and California Department of Fish and Game.

Harrell, W. C. and T. R. Sommer. 2003. Patterns of adult fish use on California's Yolo Bypass floodplain. Pages 88–93 *in* P. M. Faber, editor. California riparian systems: Processes and floodplain management, ecology, and restoration. 2001 Riparian Habitat and Floodplains Conference Proceedings, Riparian Habitat Joint Venture, Sacramento, California.

Hartman, G. F. 1965. The role of behavior in the ecology and interaction of underyearling coho salmon (*Oncorhynchus kisutch*) and steelhead trout (*Salmo gairdneri*). Journal of the Fisheries Research Board of Canada 22: 1,035–1,081.

Heath, S. 1998. Yellow warbler (*Dendroica petechia*). *In* The riparian bird conservation plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/plans.html [Accessed July 2010].

Heath, S. K. 2008. Yellow warbler (*Dendroica petechia*). Pages 332–339 *in* W. D. Shuford and T. Gardali, editors. California bird species of special concern: a ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of western birds no. 1. Western Field Ornithologists, Camarilla, California and California Department of Fish and Game, Sacramento, California.

Hermanson, J. W., and T. J. O'Shea. 1983. *Antrozous pallidus*. Mammalian Species 213: 1–8.

Hickman, J. C., editor. 1993. The Jepson manual: higher plants of California. University of California Press, Berkeley.

Holland, D. C. 1994. The Western Pond Turtle: Habitat and History. Final Report. U.S. Department of Energy, Bonneville Power Administration, Portland, Oregon.

Holland, R. F. 1986. Preliminary descriptions of the terrestrial natural communities of California. California Department of Fish and Game, Nongame-Heritage Program, Sacramento, California.

Hooper, D. R. 1973. Evaluation of the effects of flows on trout stream ecology. Pacific Gas and Electric Company, Emeryville, California.

Hubbs, C. L. 1971. *Lampetra* (*Entosphenus*) *lethophaga*, new species, the nonparasitic derivative of the Pacific lamprey. Transactions of the San Diego Natural History Society 16: 125–164.

Hughes, J.M. 1999. Yellow-billed Cuckoo (*Coccyzus americanus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/418.

ICF International. 2012. Bay Delta Conservation Plan Environmental Impact Report /Environmental Impact Statement. Administrative draft. Prepared for the Bay Delta Conservation Plan.

Jameson, E.W., Jr., and H.J. Peeters. 2004. Mammals of California. Revised edition. Berkeley, California.

Jennings, M. R., and M. P. Hayes. 1994. Amphibian and reptile species of special concern in California. Final Report. Prepared by California Academy of Sciences, Department of Herpetology, San Francisco and Portland State University, Department of Biology, Portland, Oregon, for California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova.

Kan, T. T. 1975. Systematics, variation, distribution, and biology of lampreys of the genus *Lampetra* in Oregon. Doctoral dissertation. Oregon State University, Corvallis.

Kellner, C. V. 1992. The presence of the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) in the San Joaquin Valley, California. Pages 143–147 *in* D. F. Williams, S. Byrne and T. A. Rado, editors. Endangered and sensitive species of the San Joaquin Valley, California: their biology, management and conservation. California Energy Commission.

Kostow, K. 2002. Oregon lampreys: natural history, status, and analysis of management issues. Oregon Department of Fish and Wildlife, Portland.

Lantz, R. L. 1971. Influence of water temperature on fish survival, growth, and behavior. Pages 182-193 *in* Forest land uses and stream environment: proceedings of a symposium, J. T. Krygier and J. D. Hall, editor. Oregon State University, Corvallis.

Laymon, S. A. 1998. Yellow-billed Cuckoo (*Coccycus americanus*). In The Riparian Bird Conservation Plan:a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/htmldocs/riparian_v-2.html.

Lewis, S. E. 1994. Night roosting ecology of pallid bats (*Antrozous pallidus*) in Oregon. American Midland Naturalist 132: 219–226.

Lin, B., Z. Zhang, Y. Wang, K. P. Currens, A. Spidle, Y. Yamazaki, and D. A. Close. 2008. Amplified fragment length polymorphism assessment of genetic diversity in Pacific lampreys. North American Journal of Fisheries Management 28: 1,182–1,193.

Lower Yuba River Accord RMT (River Management Team). 2010. Lower Yuba River water temperature objectives. Technical Memorandum. http://www.yubaaccordrmt.com/Studies%20%20Reports/LYR%20Water%20Temp%20Objectives%20Tech%20Memo.pdf.

Lowther, P. E., C. Celada, N. K. Klein, C. C. Rimmer, and D. A. Spector. 1999. Yellow warbler (*Dendroica petechia*). *In* A. Poole, editor. The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York. http://bna.birds.cornell.edu/bna/species/454/articles/introduction.

Luzier, C. W., G. Silver, and T. A. Whitesel. 2006. Evaluate habitat use and population dynamics of lampreys in Cedar Creek. 2005 Annual Report, Project No. 200001400.

Luzier, C.W., H.A. Schaller, J.K. Brostrom, C.Cook-Tabor, D.H. Goodman, R.D. Nelle, K. Ostrand, and B. Streif. 2011. Pacific lamprey (*Entosphenus tridentatus*) assessment and template for conservation measures. U.S. Fish and Wildlife Service, Portland, Oregon.

MacWhirter, R., B. Bildstein, K. L. Bildstein. 1996. Northern harrier (*Circus cyaneus*). *In* A. Poole, editor. The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York. http://bna.birds.cornell.edu/bna/species/210/articles/introduction.

Marovich, R. 2011. Lower Putah Creek Chinook Salmon Habitat Enhancement Project Proposal. Lower Putah Creek Coordinating Committee and Solano County Water Agency. Elmira, California.

McGree M., T. A. Whitesel, and J. Stone. 2008. Larval metamorphosis of individual Pacific lampreys reared in captivity. Transactions of the American Fisheries Society 137: 1,866–1,878.

McCullough, D. A., S. Spalding, D. Sturdevant, and M. Hicks. 2001. Summary of technical literature examining the physiological effects of temperature on salmonids—Issue Paper 5. Report No. EPA-910-D-01-005. United States Environmental Protection Agency.

McEwan, D. and T. A. Jackson. 1996. Steelhead Restoration and Management Plan for California. California Department of Fish and Game. Sacramento, California.

Meeuwig, M. H., J. M. Bayer, and R. A. Reiche. 2004. Identification of larval Pacific lampreys (*Lampetra tridentata*), river lamprey (*L. ayresi*), and western brook lampreys (*L. richardsoni*), and thermal requirements of early life history stages of lampreys. Annual report 2002-2003. DOE/BP-00004695-3. Prepared by U. S. Geological Survey, Western Fisheries Research Center, Columbia River Research Laboratory, Cook, Washington for Bonneville Power Administration, Portland, Oregon.

Meng, L., and P. B. Moyle. 1995. Status of SPLITTAIL in the Sacramento-San Joaquin Estuary. Transactions of the American Fisheries Society 124: 538–549.

Mills, T. J., and F. Fisher. 1994. Central Valley anadromous sport fish annual run-size, harvest, and population estimates, 1967 through 1991. Inland Fisheries Technical Report. California Department of Fish and Game.

Moore, J. W., and J. M. Mallatt. 1980. Feeding of larval lamprey. Canadian Journal of Fisheries and Aquatic Sciences 37: 1,658–1,664.

Moser, M. L., and D. A. Close. 2003. Assessing Pacific lamprey status in the Columbia River basin. Northwest Science 77: 116–125.

Moyle, P. B. 2015. Salmon finding a home in my backyard – Could it be? Prepared by UC Davis Center for Watershed Sciences for California Water Blog. http://californiawaterblog.com/2015/03/11/salmon-finding-a-home-in-my-backyard-could-it-be/ [Accessed June 2015].

Moyle, P. B. 2002. Inland fishes of California. Revised edition. University of California Press, Berkeley.

Moyle, P. B., R. D. Baxter, T. Sommer, T.C. Foin, and R.R. Abbott. 2001. Sacramento splittail white paper. Draft report prepared for CaliforniaLFED Bay-Delta Program. Sacramento, California.

Moyle, P. B., R. D. Baxter, T. Sommer, T.C. Foin, and S.A. Matern. 2004. Biology and population dynamics of Sacramento splittail (*Pogonichthys macrolepidotus*) in the San Francisco Estuary: a review. San Francisco Estuary and Watershed Science 2: Article 3.

Moyle, P. B., L. R. Brown, S. D. Chase, and R. M. Quiñones. 2009. Status and conservation of lamprey in California. Pages 279-292 *in* L. R. Brown, S. D. Chase, M. G. Mesa, R. J. Beamish, and P. B. Moyle, editors. Biology, management, and conservation of lamprey in North America. American Fisheries Society Symposium 72, Bethesda, Maryland.

Moyle, P. B., J. E. Williams, and E. D. Wikramanayake. 1989. Fish species of special concern of California. Final Report. Prepared by Department of Wildlife and Fisheries Biology, University of California, Davis for California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova.

Myrick, C. A. and J. J. Cech. 2001. Temperature effects on Chinook salmon and steelhead: a review focusing on California's Central Valley populations. Bay-Delta Modeling Forum Technical Publication 01-1.

Nawa, R. 2003. A petition for rules to list: Pacific lamprey (*Lampetra tridentata*); river lamprey (*Lampetra ayresi*); western brook lamprey (*Lampetra richardsoni*); and kern brook lamprey (*Lampetra hubbsi*) as threatened or endangered under the Endangered Species Act. Letter to U.S. Fish and Wildlife Service, Department of the Interior, Washington, D.C.

NMFS (National Marine Fisheries Service). 2002. Biological opinion on interim operations of the Central Valley Project and State Water Project between April 1, 2002 and March 31, 2004, on federally listed threatened Central Valley spring-run Chinook salmon and threatened Central Valley steelhead in accordance with Section 7 of the Endangered Species Act of 1973, as amended. National Marine Fisheries Service, Southwest Region, Long Beach, California.

NMFS. 2005. Endangered and threatened species: designation of critical habitat for seven evolutionarily signification units of Pacific salmon and steelhead in California, final rule. Federal Register 70: 52,488–52,586.

NMFS. 2009a. Designation of Critical Habitat for the threatened Southern Distinct Population Segment of North American Green Sturgeon Final Biological Report. October 2009

NMFS. 2009b. Public Draft Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-Run Chinook Salmon and Central Valley Spring-Run Chinook Salmon, and the Distinct Population Segment of Central Valley Steelhead. October 2009.

NMFS. 2009c. Biological opinion on the long-term Central Valley Project and State Water Project Operations Criteria and Plan. NMFS, Southwest Region, Long Beach, California.

NMFS. 2012. National Oceanic and Atmospheric Administration Status of ESA Listings and Critical Habitat Designations for West Coast Salmon and Steelhead. October.

Orloff, S. 1988. Present Distribution of Ringtails in California. California Fish and Game 74:196–202.

Peven, C. M., R. R. Whitney, and K. R. Williams. 1994. Age and length of steelhead smolts from the Mid-Columbia River basin, Washington. North American Journal of Fisheries Management 14: 77–86.

Pierson, E. D., and W. E. Rainey. 2003. Inventory of bat species in Kings Canyon and Sequoia National Parks: 2002 surveys. Draft Contract report for National Park Service, Ash Mountain, California.

Pierson, E. D., W. E. Rainey, and R. M. Miller. 1996. Night roost sampling: a window on the forest bat community in northern California. Pages 151–163 *in* R. M. R. Barclay and R. M. Brigham, editors. Bats and Forests Symposium, October 19–1, 1995. Victoria, British Columbia, Canada. Working Paper 23/1996. Research Branch, B.C. Ministry of Forests, Victoria, British Columbia.

Pierson, E. D., W. E. Rainey, and C. Corben. 2000. Distribution and status of red bats, *Lasiurus blossevillii* in California. Report to Species Conservation and Recovery Program, Habitat Conservation Planning Branch, California Department of Fish and Game, Sacramento.

Pierson, E. D., W. E. Rainey, and C. Corben. 2001. Seasonal patterns of bat distribution along an altitudinal gradient in the Sierra Nevada. Report to the California Department of Transportation, California State University at Sacramento Foundation, Yosemite Association, and Yosemite Fund.

Pletcher, T. F. 1963. The life history and distribution of lampreys in the Salmon and certain other rivers in British Columbia, Canada. Master's thesis. University of British Columbia, Vancouver.

PRISM (PRISM Climate Group). 2013. Average annual precipitation data: 1981–2010. PRISM Climate Group, Oregon State University, Corvallis, OR. Online data available at: http://prism.oregonstate.edu/normals/ [Accessed February 20, 2014].

Raleigh, R.F., T. Hickman, R.C. Solomon, and P.C. Nelson. 1984. Habitat suitability information: rainbow trout. U. S. Fish and Wildlife Service, Washington, D.C.

Reiser, D. W., and T. C. Bjornn. 1979. Habitat requirements of anadromous salmonids. Influence of forest and rangeland management on anadromous fish habitat in western North America. Edited byW. R. Meehan, 1-54. General Technical Report PNW-96. U.S. Forest Service, Pacific Northwest Forest and Range Experiment Station. Portland, Oregon.

Reynolds, F. L., T. J. Mills, R. Benthin, and A. Low. 1993. Restoring Central Valley streams: a plan for action. California Department of Fish and Game, Inland Fisheries Division, Sacramento, California.

Rich, A. A. 1987. Report on studies conducted by Sacramento County to determine the temperatures which optimize growth and survival in juvenile Chinook salmon (*Oncorhynchus tshawytscha*), for McDonough, Holland and Allen, Sacramento, California.Prepared by A.A. Rich and Associates, San Rafael, California.

Richards, J. E., and F. W. H. Beamish. 1981. Initiation of feeding and salinity tolerance in the Pacific lamprey *Lampetra tridentata.* Marine Biology 63: 73–77.

Ruiz-Campos, G., and S. Gonzalez-Guzman. 1996. First freshwater record of Pacific lamprey, *Lampetra tridentata*, from Baja California, Mexico. California Fish and Game 82: 144–146.

Sacramento County Superior Court. 2002. Notice of entry of second amendment judgment entered in Putah Creek Council v. Solano Irrigation District and Solano County Water Agency.

Sawyer, J. O., T. Keeler-Wolf, and J. M. Evens. 2009. A manual of California vegetation. Second edition. California Native Plant Society Press, Sacramento, California.

Schemel, L.E., T.R. Sommer, A.B. Muller-Solger, and W.C. Harrell. 2004. Hydrologic variability, water chemistry, and phytoplankton biomass in a large floodplain of the Sacramento River, CA, U.S.A. Hydrobiologia 513: 129–139.

Schlorff, R. W., and P. H. Bloom. 1983. Importance of riparian systems to nesting Swainson's hawks in the Central Valley of California.

Sedgwick, J. A. 2000. Willow flycatcher (*Empidonax traillii*). *In* A. Poole, editor. The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York. http://bna.birds.cornell.edu/bna/species/533/articles/introduction.

Sherwin, R., and D. A. Rambaldini. 2005. *Antrozous pallidus* pallid bat. Species account developed for the Western Bat Working Group 1998 Reno Biennial Meeting; updated for the 2005 Portland Biennial Meeting.

Shump, K. A., Jr., and A. U. Shump. 1982. *Lasiurus borealis.* Mammalian Species 183: 1–6.

Small, K., P. Crain, and P. Moyle. 2004. Chinook salmon in Putah Creek, spring, 2004. Report to Lower Putah Creek Coordinating Committee. 2004. Unpublished data.

Solano County Superior Court. 2000. Settlement agreement and stipulation among Solano County Water Agency Solano Irrigation District, Maine Prairie Water District, Cities of Vacaville, Fairfield, Vallejo, and Suisun City, and Putah Creek Council, City of Davis, and the Regents of the University of California.

Sommer, T., R. Baxter, and B. Herbold. 1997. Resilience of splittail in the Sacramento- San Joaquin Estuary. Transactions of the American Fisheries Society 126 961–976.

Sommer, T. R., M. L. Nobriga, W. C. Harrell, W. Batham, and W. J. Kimmerer. 2001a. Floodplain rearing of juvenile Chinook salmon: evidence of enhanced growth and survival. Canadian Journal of Fisheries and Aquatic Sciences 58: 325–333.

Sommer, T. R., W. C. Jarrell, M. L. Mobirga, R. Brown, P. B. Moyle, W. J. Kimmerer, L. Schemel. 2001b. California's Yolo Bypass: evidence that flood control can be compatible with fisheries, wetlands, wildlife, and agriculture. Fisheries 26: 6–16.

Sommer, T. R., W. C. Harrell, M. L. Nobriga and R. Kurth. 2003. Floodplain as habitat for native fish: Lessons from California's Yolo Bypass. Pages 81-87 in P.M. Faber, editor. California riparian systems: Processes and floodplain management, ecology, and restoration.

Sommer, T. R., W. C. Harrell,R. Kurth, F. Feyrer, S. C. Zeug, and G. O'Leary. 2004. Ecological Patterns of Early Life Stages of Fishes in a Large River-Floodplain of the San Francisco Estuary. American Fisheries Society Symposium 39: 111–123.

Sommer, T. R, W. C. Harrell, and M. L. Nobriga. 2005. Habitat use and stranding risk of juvenile chinook salmon on a seasonal floodplain. North American Journal of Fisheries Management 25: 1493-1504.

Stillwater Sciences and Vollmar (Vollmar Natural Lands Consulting). 2014. Habitat assessment for the Lower Putah Creek Restoration Project—Yolo Bypass Wildlife Area Reach. Prepared by Stillwater Sciences, Davis, California and Vollmar Natural Lands Consulting, Nevada City, California for Yolo Basin Foundation, Davis, California.

Stillwater Sciences. 2014. Soils, sediment, and geomorphology assessment for the Lower Putah Creek Restoration Project. Prepared for Yolo Basin Foundation, Davis, California. CDFW ERP Grant Agreement No: E1183015.

Stone, J., and S. Barndt. 2005. Spatial distribution and habitat use of Pacific lamprey (*Lampetra tridentata*) ammocoetes in a western Washington stream. Journal of Freshwater Ecology 20:171–185.

Swales, S., R. B. Lauzier, and C. D. Levings. 1986. Winter habitat preferences of juvenile salmonids in two interior rivers in British Columbia. Canadian Journal of Zoology 64 1,506–1,514.

Swift, C. C., and S. R. Howard. 2009. Current status and distribution of the Pacific lamprey south of Point Conception, Coastal Sourhtern California, USA. Pages 269–278 *in* L. R. Brown, S. D. Chase, M. G. Mesa, R. J. Beamish, and P. B. Moyle, editors. Biology, management, and conservation of lampreys in North America. American Fisheries Society, Symposium 72, Bethesda, Maryland.

Torgersen, C. E., and D. A. Close. 2004. Influence of habitat heterogeneity on the distribution of larval Pacific lamprey (*Lampetra tridentata*) at two spatial scales. Freshwater Biology 49: 614–630.

TRPA (Thomas R. Payne and Associates). 2010. Lower Putah Creek fish sampling, October 2010. Unpublished data.

Truan, M. L., A. Engilis Jr., and J. R. Trochet. 2010. Putah Creek Terrestrial Wildlife Monitoring Program: comprehensive report 1997–2009. Department of Wildlife, Fish, and Conservation Biology, Museum of Wildlife and Fish Biology. University of California, Davis, California.

USACE (U.S. Army Corps of Engineers) and CALFED (Bay-Delta Program). 2002. Habitat Improvement for the Native Fish in the Yolo Bypass. Prepared by Natural Heritage Institute, California Department of Water Resources, California Department of Fish and Game, Yolo Basin

Foundation, Northwest Hydraulic Consultants, Gus Yates, Peter Kiel, and Jones and Stokes. December 2002.

U.S. Environmental Protection Agency. 2003. EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards. EPA 910-B-03-002. Seattle, Washington.

USFWS (U.S. Fish and Wildlife Service). 1997. Formal programmatic consultation permitting projects with relatively small effects on the valley elderberry longhorn beetle within the jurisdiction of the Sacramento Field Office, California. Administration File #572.9/9821, letter dated 11 March.

USFWS. 1999. Conservation guidelines for the Valley elderberry longhorn beetle. U.S. Fish and Wildlife Service, Sacramento, California.

USFWS. 2012. Federal endangered and threatened species that occur in or may be affected by projects in the counties and/or USGS 7 1/2 minute quads requested. USFWS, Endangered Species Program, Sacramento, California. http://www.fws.gov/sacramento/es/ [Accessed on 18 October 2012].

USGS (U.S. Geological Survey). 2014. National Water Information System: web interface. Available at: http://waterdata.usgs.gov/nwis/nwisman/?site_no=11454210&agency_cd=USGS [Accessed February 20, 2014].

van de Wetering, S. J. 1998. Aspects of life history characteristics and physiological processes in smolting Pacific lamprey, *Lampetra tridentate,* in a central Oregon coast stream. Master's thesis. Oregon State University, Corvallis, Oregon.

Wang, J. C. S. 1986. Fishes of the Sacramento-San Joaquin estuary and adjacent waters in California: A guide to the early life histories. Interagency Ecological Study Program for the Sacramento-San Joaquin Estuary. Tech. Rept. 9.

Wang, J. C. S. 1995. Observations of early life stages of splittail (*Pogonichthys macrolepidotus*) in the Sacramento-San Joaquin estuary, 1988 to 1994. Interagency Ecological Program Technical Report 43. California Department of Water Resources, Sacramento, California.

Wedemeyer, G. A., R. L. Saunders, and W. C. Clarke. 1980. Environmental factors affecting smoltification and early marine survival of anadromous salmonids. Marine Fisheries Review 42: 1–14.

Williams, J. G. 2006. Central Valley salmon. a perspective on Chinook and steelhead in the Central Valley of California. San Francisco Estuary and Watershed Science 4: Article 2.

Whipple A.A., R. M. Grossinger, D. Rankin, B. Stanford, and R. A. Askevold. 2012. Sacramento-San Joaquin Delta historical ecology investigation: exploring pattern and process. Prepared for the California Department of Fish and Game and Ecosystem Restoration Program. A report of SFEI-ASC's Historical Ecology Program, Publication #672, Richmond, California.

Yates, G. 2003. Gravel and temperature surveys of lower Putah Creek. Prepared for Lower Putah Creek Coordinating Committee, Vacaville, California.

Yoshiyama, R. M., F. W. Fisher, and P. B. Moyle. 1998. Historical abundance and decline of Chinook salmon in the Central Valley region of California. North American Journal of Fisheries Management 18: 487–521.

Zaugg, W. S. and H. H. Wagner. 1973. Gill ATPase activity related to parr-smolt transformation and migration in steelhead trout (*Salmo gairdneri*): influence of photoperiod and temperature. Comparative Biochemistry and Physiology 45B: 955–965.

Zeiner, D. C., W. F. Laudenslayer Jr., K. E. Mayer, and M. White, editors. 1990a. California's wildlife. Volume II. Birds. California Statewide Habitat Relationships System. California Department of Fish and Game.

Zeiner, D. C., W. F. Laudenslayer Jr., K. E. Mayer, and M. White, editor. 1990b. California's wildlife. Volume III. Mammals. California Statewide Habitat Relationships System. California Department of Fish and Game.

Appendices

Appendix A

Database Query Results for Special-status Plant Species in the Project Region

Table A-1. Special-status plant species documented in the Project region (listed in alphabetical order by scientific name).

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Query source[1]	Family	Life form	Elevation range in meters (feet)[2]	Blooming period[2]	Habitat associations[3]	Potential to occur in assessment area
twig-like snapdragon	*Antirrhinum virga*	–/–/4.3	CNPS	Plantaginaceae	perennial herb	100–2,015 (328–6,611)	Jun–Jul	Found in openings in rocky, often serpentine soils in chaparral and lower montane coniferous forest.	None. Out of elevation range.
modest rockcress	*Arabis modesta*	–/–/4.3	CNPS	Brassicaceae	perennial herb	120–800 (394–2,625)	Mar–Jul	Chaparral and lower montane coniferous forest.	None. Out of elevation range.
depauperate milk-vetch	*Astragalus pauperculus*	–/–/4.3	CNPS	Fabaceae	annual herb	60–1,215 (197–3,986)	Mar–Jun	Vernally mesic, volcanic soils in chaparral, cismontane woodland, and valley and foothill grasslands.	None. Volcanic soils not present.
Ferris' milk-vetch	*Astragalus tener* var. *ferrisiae*	–/–/1B.1	CNPS, CNDDB	Fabaceae	annual herb	2–75 (7–246)	Apr–May	Vernally mesic meadows and seeps, and subalkaline flats in valley and foothill grasslands.	None. Potential habitat including subalkaline flats not present.
alkali milk-vetch	*Astragalus tener* var. *tener*	–/–/1B.2	CNPS, CNDDB	Fabaceae	annual herb	1–60 (3–197)	Mar–Jun	Playas, adobe clay in valley and foothill grasslands, and alkaline vernal pools.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
heartscale	*Atriplex cordulata* var. *cordulata*	–/–/1B.2	CNPS, CNDDB	Chenopodiaceae	annual herb	0–560 (0–1,837)	Apr–Oct	Chenopod scrub, meadows and seeps, and sand, saline or alkaline soils in valley and foothill grasslands.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Query source[1]	Family	Life form	Elevation range in meters (feet)[2]	Blooming period[2]	Habitat associations[3]	Potential to occur in assessment area
brittlescale	*Atriplex depressa*	–/–/1B.2	CNPS, CNDDB	Chenopodiaceae	annual herb	1–320 (3–1,050)	Apr–Oct	Chenopod scrub, meadows and seeps, playas, valley and foothill grasslands, and alkaline or clay vernal pools.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
San Joaquin spearscale	*Atriplex joaquinana*	–/–/1B.2	CNPS, CNDDB	Chenopodiaceae	annual herb	1–835 (3–2,740)	Apr–Oct	Chenopod scrub, meadows and seeps, playas, and alkaline soils in valley and foothill grasslands.	None. Potential habitat including alkaline soils not present.
vernal pool smallscale	*Atriplex persistens*	–/–/1B.2	CNPS, CNDDB	Chenopodiaceae	annual herb	10–115 (33–377)	Jun–Oct	Alkaline vernal pools.	None. Vernal pools not present.
big-scale balsamroot	*Balsamorhiza macrolepis*	–/–/1B.2	CNPS, CNDDB	Asteraceae	perennial herb	90–1,555 (295–5,102)	Mar–Jun	Chaparral, cismontane woodland, and valley and foothill grasslands, sometimes in serpentine soils.	None. Out of elevation range.
narrow-anthered brodiaea	*Brodiaea leptandra*	–/–/1B.2	CNPS, CNDDB	Themidaceae	perennial bulbiferous herb	110–915 (361–3,002)	May–Jul	Volcanic soils in broadleaved upland forest, chaparral, cismontane woodland, lower montane coniferous forest, and valley and foothill grasslands.	None. Out of elevation range.
Brewer's calandrinia	*Calandrinia breweri*	–/–/4.2	CNPS	Montiaceae	annual herb	10–1,220 (33–4,003)	Mar–Jun	Sandy or loamy, disturbed sites and burns in chaparral, and coastal scrub.	None. No suitable habitat present.

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Query source[1]	Family	Life form	Elevation range in meters (feet)[2]	Blooming period[2]	Habitat associations[3]	Potential to occur in assessment area
round-leaved filaree	*California macrophylla*	–/–/1B.1	CNPS, CNDDB	Geraniaceae	annual herb	15–1200 (49–3,937)	Mar–May	Clay soils in cismontane woodland and valley and foothill grasslands.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
bristly sedge	*Carex comosa*	–/–/2.1	CNPS, CNDDB	Cyperaceae	perennial rhizomatous herb	0–625 (0–2,051)	May–Sep	Coastal prairie, lake margins, marshes and swamps, and valley and foothill grasslands.	Moderate. Potentially suitable habitat present.
holly-leaved ceanothus	*Ceanothus purpureus*	–/–/1B.2	CNPS, CNDDB	Rhamnaceae	perennial evergreen shrub	120–640 (394–2,100)	Feb–Jun	Volcanic and rocky soils in chaparral and cismontane woodlands.	None. Out of elevation range.
pappose tarplant	*Centromadia parryi* ssp. *parryi*	–/–/1B.2	CNPS, CNDDB	Asteraceae	annual herb	2–420 (7–1,378)	May–Nov	Often alkaline soils in chaparral, coastal prairie, meadows and seeps, coastal salt marshes and swamps, vernally mesic valley and foothill grasslands.	Moderate. Potentially suitable habitat present. These grasslands are highly disturbed and/or managed, however documented occurrences downstream persist in habitat that is highly managed.

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Query source[1]	Family	Life form	Elevation range in meters (feet)[2]	Blooming period[2]	Habitat associations[3]	Potential to occur in assessment area
Parry's rough tarplant	*Centromadia parryi* ssp. *rudis*	–/–/4.2	CNPS	Asteraceae	annual herb	0–100 (0–328)	May–Oct	Alkaline, vernally mesic, seeps, roadsides, valley and foothill grasslands, and vernal pools.	Moderate. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
hispid bird's-beak	*Chloropyron molle* ssp. *hispidum*	–/–/1B.1	CNPS, CNDDB	Orobanchaceae	annual herb (hemiparasitic)	1–155 (3–509)	Jun–Sep	Alkaline meadows and seeps, playas, and valley and foothill grasslands.	None. Potential habitat including alkaline soils not present.
palmate-bracted bird's-beak	*Chloropyron palmatum* (Cordylanthus palmatus)	FE/CE/ 1B.1	CNPS, CNDDB, USFWS	Orobanchaceae	annual herb (hemiparasitic)	5–155 (16–509)	May–Oct	Chenopod scrub, and alkaline valley and foothill grasslands.	None. Potential habitat including alkaline soils not present.
Bolander's water-hemlock	*Cicuta maculata* var. *bolanderi*	–/–/2.1	CNPS, CNDDB	Apiaceae	perennial herb	0–200 (0–656)	Jul–Sep	Marshes and swamps, and coastal, fresh or brackish water.	Moderate. Potentially suitable habitat present.
subalpine cryptantha	*Cryptantha crymophila*	–/–/1B.3	CNPS	Boraginaceae	perennial herb	2,600–3,200 (8,530–10,499)	Jul–Aug	Volcanic, rocky soils in subalpine coniferous forest.	None. Out of elevation range.
serpentine cryptantha	*Cryptantha dissita*	–/–/1B.2	CNPS, CNDDB	Boraginaceae	annual herb	395–580 (1,296–1,903)	Apr–Jun	Serpentine soils in chaparral.	None. Out of elevation range and serpentine soils not present.
Peruvian dodder	*Cuscuta obtusiflora* var. *glandulosa*	–/–/2.2	CNPS, CNDDB	Convolvulaceae	annual vine (parasitic)	15–280 (49–919)	Jul–Oct	Freshwater marshes and swamps.	Moderate. Potentially suitable habitat present.

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Query source[1]	Family	Life form	Elevation range in meters (feet)[2]	Blooming period[2]	Habitat associations[3]	Potential to occur in assessment area
recurved larkspur	*Delphinium recurvatum*	–/–/1B.2	CNPS, CNDDB	Ranunculaceae	perennial herb	3–790 (10–2,592)	Mar–Jun	Chenopod scrub, cismontane woodland, valley and foothill grasslands in alkaline soils.	None. Potential habitat including alkaline soils not present.
dwarf downingia	*Downingia pusilla*	–/–/2.2	CNPS, CNDDB	Campanulaceae	annual herb	1–445 (3–1,460)	Mar–May	Mesic valley and foothill grasslands, and vernal pools.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
Greene's narrow-leaved daisy	*Erigeron greenei*	–/–/1B.2	CNPS	Asteraceae	perennial herb	80–1005 (262–3,297)	May–Sep	Serpentine or volcanic soils in chaparral.	None. Out of elevation range and serpentine soils not present.
stinkbells	*Fritillaria agrestis*	–/–/4.2	CNPS, CNDDB	Liliaceae	perennial bulbiferous herb	10–1,555 (33–5,102)	Mar–Jun	Clay, sometimes serpentine soils in chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grasslands.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
fragrant fritillary	*Fritillaria liliacea*	–/–/1B.2	CNPS, CNDDB	Liliaceae	perennial bulbiferous herb	3–410 (10–1,345)	Feb–Apr	Cismontane woodland, coastal prairie, coastal scrub, and valley and foothill grasslands, often on serpentine soils.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Query source[1]	Family	Life form	Elevation range in meters (feet)[2]	Blooming period[2]	Habitat associations[3]	Potential to occur in assessment area
adobe-lily	*Fritillaria pluriflora*	–/–/1B.2	CNPS, CNDDB	Liliaceae	perennial bulbiferous herb	60–705 (197–2,313)	Feb–Apr	Chaparral, cismontane woodland, and valley and foothill grasslands, often in adobe soils.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
woolly-headed gilia	*Gilia capitata* ssp. *tomentosa*	–/–/1B.1	CNPS	Polemoniaceae	annual herb	10–220 (33–722)	May–Jul	Coastal bluff scrub, serpentine, rocky outcrops in valley and foothill grasslands.	None. Serpentine soils not present.
Boggs Lake hedge-hyssop	*Gratiola heterosepala*	–/CE/1B.2	CNPS, CNDDB	Plantaginaceae	annual herb	10–2,375 (33–7,792)	Apr–Aug	Marshes and swamps, lake margins, and clay vernal pools.	Moderate. Potentially suitable habitat present.
nodding harmonia	*Harmonia nutans*	–/–/4.3	CNPS	Asteraceae	annual herb	75–975 (246–3,199)	Mar–May	Rocky or gravelly, volcanic soils in chaparral and cismontane woodlands.	None. Out of elevation range.
hogwallow starfish	*Hesperevax caulescens*	–/–/4.2	CNPS	Asteraceae	annual herb	0–505 (0–1,657)	Mar–Jun	Mesic and clay soils in valley and foothill grasslands, and shallow vernal pools.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
two-carpellate western flax	*Hesperolinon bicarpellatum*	–/–/1B.2	CNPS, CNDDB	Linaceae	annual herb	60–1,005 (197–3,297)	May–Jul	Serpentine soils in chaparral.	None. Serpentine soils not present.

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Query source[1]	Family	Life form	Elevation range in meters (feet)[2]	Blooming period[2]	Habitat associations[3]	Potential to occur in assessment area
Brewer's western flax	*Hesperolinon breweri*	–/–/1B.2	CNPS, CNDDB	Linaceae	annual herb	30–900 (98–2,953)	May–Jul	Usually serpentine soils in chaparral, cismontane woodland, and valley and foothill grasslands.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
Napa western flax	*Hesperolinon serpentinum*	–/–/1B.1	CNPS	Linaceae	annual herb	50–800 (164–2,625)	May–Jul	Serpentine soils in chaparral.	None. Serpentine soils not present.
Tehama County western flax	*Hesperolinon tehamense*	–/–/1B.3	CNPS, CNDDB	Linaceae	annual herb	100–1,250 (328–4,101)	May–Jul	Serpentine soils in chaparral, and cismontane woodlands.	None. Out of elevation range and serpentine soils not present.
woolly rose-mallow	*Hibiscus lasiocarpos* var. *occidentalis*	–/–/1B.2	CNPS, CNDDB	Malvaceae	perennial rhizomatous herb	0–120 (0–394)	Jun–Sep	Freshwater marshes and swamps.	Moderate. Potentially suitable habitat present.
Carquinez goldenbush	*Isocoma arguta*	–/–/1B.1	CNPS, CNDDB	Asteraceae	perennial shrub	1–20 (3–66)	Aug–Dec	Alkaline valley and foothill grasslands.	None. Alkaline soils not present.

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Query source[1]	Family	Life form	Elevation range in meters (feet)[2]	Blooming period[2]	Habitat associations[3]	Potential to occur in assessment area
Northern California black walnut	*Juglans hindsii*	–/–/1B.1	CNPS, CNDDB	Juglandaceae	perennial deciduous tree	0–440 (0–1,444)	Apr–May	Riparian forests, and riparian woodlands.	None. Potentially suitable habitat present but one of the documented occurrences (7 miles from the eastern edge of the assessment area) was extirpated and the other (15 miles from the western edge of the assessment area) is in a developed area with lack of space for reproduction; any other black walnuts in the area are likely of hybrid origin and thus not protected
Contra Costa goldfields and Critical Habitat	*Lasthenia conjugens*	FE/–/1B.1	CNPS, CNDDB, USFWS	Asteraceae	annual herb	0–470 (0–1,542)	Mar–Jun	Cismontane woodland, alkaline playas, valley and foothill grasslands, and mesic vernal pools.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed. Critical Habitat not designated in assessment area.

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Query source[1]	Family	Life form	Elevation range in meters (feet)[2]	Blooming period[2]	Habitat associations[3]	Potential to occur in assessment area
Ferris' goldfields	*Lasthenia ferrisiae*	–/–/4.2	CNPS	Asteraceae	annual herb	20–700 (66–2,297)	Feb–May	Alkaline and clay vernal pools.	None. Vernal pools not present.
Delta tule pea	*Lathyrus jepsonii* var. *jepsonii*	–/–/1B.2	CNPS, CNDDB	Fabaceae	perennial herb	0–4 (0–13)	May–Jul(Sep),	Freshwater and brackish marshes and swamps.	Moderate. Potentially suitable habitat present.
Colusa layia	*Layia septentrionalis*	–/–/1B.2	CNPS, CNDDB	Asteraceae	annual herb	100–1095 (328–3,593)	Apr–May	Sandy or serpentine soils in chaparral, cismontane woodland, and valley and foothill grasslands.	None. Out of elevation range.
legenere	*Legenere limosa*	–/–/1B.1	CNPS, CNDDB	Campanulaceae	annual herb	1–880 (3–2,887)	Apr–Jun	Vernal pools.	None. Vernal pools not present.
Heckard's pepper-grass	*Lepidium latipes* var. *heckardii*	–/–/1B.2	CNPS, CNDDB	Brassicaceae	annual herb	2–200 (7–656)	Mar–May	Alkaline flats in valley and foothill grasslands.	None. Alkaline flats not present.
Jepson's leptosiphon	*Leptosiphon jepsonii*	–/–/1B.2	CNPS, CNDDB	Polemoniaceae	annual herb	100–500 (328–1,640)	Mar–May	Usually volcanic soils in chaparral and cismontane woodlands.	None. Out of elevation range.
woolly-headed lessingia	*Lessingia hololeuca*	–/–/3	CNPS	Asteraceae	annual herb	15–305 (49–1,001)	Jun–Oct	Broadleafed upland forest, coastal scrub, lower montane coniferous forest, clay or serpentine soils ni valley and foothill grasslands.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Query source[1]	Family	Life form	Elevation range in meters (feet)[2]	Blooming period[2]	Habitat associations[3]	Potential to occur in assessment area
Mason's lilaeopsis	*Lilaeopsis masonii*	–/CR/1B.1	CNPS, CNDDB	Apiaceae	perennial rhizomatous herb	0–10 (0–33)	Apr–Nov	Brackish or freshwater marshes and swamps, and riparian scrub.	Moderate. Potentially suitable habitat present.
redwood lily	*Lilium rubescens*	–/–/4.2	CNPS	Liliaceae	perennial bulbiferous herb	30–1910 (98–6,266)	Apr–Sep	Sometimes serpentine soils and sometimes roadsides in broadleafed upland forest, chaparral, lower montane coniferous forest, North Coast coniferous forest, and upper montane coniferous forest.	None. No suitable habitat present.
Delta mudwort	*Limosella australis*	–/–/2.1	CNPS, CNDDB	Scrophulariaceae	perennial stoloniferous herb	0–3 (0–10)	May–Aug	Brackish or freshwater marshes and swamps and riparian scrub, usually on mud banks.	Moderate. Potentially suitable habitat present.
Napa lomatium	*Lomatium repostum*	–/–/4.3	CNPS	Apiaceae	perennial herb	90–830 (295–2,723)	Mar–Jun	Serpentine soils in chaparral and cismontane woodlands.	None. Out of elevation range and serpentine soils not present.
green monardella	*Monardella viridis* ssp. *viridis*	–/–/4.3	CNPS	Lamiaceae	perennial rhizomatous herb	100–1,010 (328–3,314)	Jun–Sep	Broadleafed upland forest, chaparral, and cismontane woodlands.	None. Out of elevation range.
little mousetail	*Myosurus minimus* ssp. *apus*	–/–/3.1	CNPS	Ranunculaceae	annual herb	20–640 (66–2,100)	Mar–Jun	Valley and foothill grassland, and alkaline vernal pools.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Query source[1]	Family	Life form	Elevation range in meters (feet)[2]	Blooming period[2]	Habitat associations[3]	Potential to occur in assessment area
Tehama navarretia	*Navarretia heterandra*	–/–/4.3	CNPS	Polemoniaceae	annual herb	30–1,010 (98–3,314)	Apr–Jun	Mesic valley and foothill grasslands, and vernal pools.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
Baker's navarretia	*Navarretia leucocephala* ssp. *bakeri*	–/–/1B.1	CNPS, CNDDB	Polemoniaceae	annual herb	5–1,740 (16–5,709)	Apr–Jul	Cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grasslands, and mesic vernal pools.	High. Potentially suitable habitat present and documented within 200 ft buffer of the assessment area.
few-flowered navarretia and Critical Habitat	*Navarretia leucocephala* ssp. *pauciflora*	FE/CT/ 1B.1	CNPS, CNDDB, USFWS	Polemoniaceae	annual herb	400–855 (1,312–2,805)	May–Jun	Volcanic ash flow in vernal pools.	None. Out of elevation range and volcanic soils not present.
Colusa grass	*Neostapfia colusana*	FT/CE/ 1B.1	CNPS, CNDDB, USFWS	Poaceae	annual herb	5–200 (16–656)	May–Aug	Large, adobe vernal pools.	None. Vernal pools not present.
San Joaquin Valley Orcutt grass	*Orcuttia inaequalis*	FT/CE/1B. 1	CNPS, CNDDB, USFWS	Poaceae	annual herb	10–755 (33–2,477)	Apr–Sep	Vernal pools.	None. Vernal pools not present.
Gairdner's yampah	*Perideridia gairdneri* ssp. *gairdneri*	–/–/4.2	CNPS	Apiaceae	perennial herb	0–610 (0–2,001)	Jun–Oct	Vernally mesic soils in broadleafed upland forest, chaparral, coastal prairie, valley and foothill grasslands, and vernal pools.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Query source[1]	Family	Life form	Elevation range in meters (feet)[2]	Blooming period[2]	Habitat associations[3]	Potential to occur in assessment area
bearded popcorn-flower	*Plagiobothrys hystriculus*	–/–/1B.1	CNPS, CNDDB	Boraginaceae	annual herb	0–274 (0–899)	Apr–May	Mesic valley and foothill grassland, vernal pool margins, and vernal swales.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
California beaked-rush	*Rhynchospora californica*	–/–/1B.1	CNPS, CNDDB	Cyperaceae	perennial rhizomatous herb	45–1,010 (148–3,314)	May–Jul	Bogs and fens, lower montane coniferous forest, meadows and seeps, and freshwater marshes and swamps.	Moderate. Potentially suitable habitat present.
Sanford's arrowhead	*Sagittaria sanfordii*	–/–/1B.2	CNPS, CNDDB	Alismataceae	perennial rhizomatous herb	0–650 (0–2,133)	May–Oct	Assorted shallow freshwater marshes and swamps.	Moderate. Potentially suitable habitat present.
Cleveland's ragwort	*Senecio clevelandii* var. *clevelandii*	–/–/4.3	CNPS	Asteraceae	perennial herb	365–900 (1,198–2,953)	Jun–Jul	Serpentine seeps in chaparral.	None. Out of elevation range and serpentine soils not present.
Napa checkerbloom	*Sidalcea hickmanii* ssp. *napensis*	–/–/1B.1	CNPS, CNDDB	Malvaceae	perennial herb	415–610 (1,362–2,001)	Apr–Jun	Rhyolitic soils in chaparral.	None. Out of elevation range and volcanic soils not present.
Marin checkerbloom	*Sidalcea hickmanii* ssp. *viridis*	–/–/1B.3	CNPS	Malvaceae	perennial herb	50–430 (164–1,411)	May–Jun	Serpentine soils in chaparral.	None. Serpentine soils not present.
Keck's checkerbloom	*Sidalcea keckii*	FE/–/1B.1	CNPS, CNDDB, USFWS	Malvaceae	annual herb	75–650 (246–2,133)	Apr–May(Jun)	Serpentine and clay soils in cismontane woodlands and valley and foothill grasslands.	None. Out of elevation range.

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Query source[1]	Family	Life form	Elevation range in meters (feet)[2]	Blooming period[2]	Habitat associations[3]	Potential to occur in assessment area
slender-leaved pondweed	*Stuckenia filiformis*	–/–/2.2	CNPS, CNDDB	Potamogetonaceae	perennial rhizomatous herb	300–2,150 (984–7,054)	May–Jul	Assorted, shallow freshwater marshes and swamps.	None. Out of elevation range.
Suisun Marsh aster	*Symphyotrichum lentum*	–/–/1B.2	CNPS, CNDDB	Asteraceae	perennial rhizomatous herb	0–3 (0–10)	May–Nov	Brackish and freshwater marshes and swamps.	Moderate. Potentially suitable habitat present.
Napa bluecurls	*Trichostema ruygtii*	–/–/1B.2	CNPS, CNDDB	Lamiaceae	annual herb	30–680 (98–2,231)	Jun–Oct	Chaparral, cismontane woodlands, lower montane coniferous forest, valley and foothill grasslands, and vernal pools.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
two-fork clover	*Trifolium amoenum*	FE/–/1B.1	CNPS, CNDDB, USFWS	Fabaceae	annual herb	5–415 (16–1,362)	Apr–Jun	Coastal bluff scrub, sometimes serpentine soils in valley and foothill grasslands.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
saline clover	*Trifolium hydrophilum*	–/–/1B.2	CNPS, CNDDB	Fabaceae	annual herb	0–300 (0–984)	Apr–Jun	Marshes and swamps, mesic, alkaline valley and foothill grasslands, and vernal pools.	None. Potential habitat including alkaline soils and vernal pools not present.
dark-mouthed triteleia	*Triteleia lugens*	–/–/4.3	CNPS	Themidaceae	perennial bulbiferous herb	100–1,000 (328–3,281)	Apr–Jun	Broadleafed upland forest, chaparral, coastal scrub, and lower montane coniferous forest.	None. Out of elevation range.

Common name	Scientific name	Status[1] (Federal/ State/ CRPR)	Query source[1]	Family	Life form	Elevation range in meters (feet)[2]	Blooming period[2]	Habitat associations[3]	Potential to occur in assessment area
Crampton's tuctoria or Solano grass and Critical Habitat	*Tuctoria mucronata*	FE/CE/1B.1	CNPS, CNDDB, USFWS	Poaceae	annual herb	5–10 (16–33)	Apr–Aug	Mesic valley and foothill grasslands, and vernal pools.	Low. Potentially suitable habitat present, but grasslands are highly disturbed and/or managed. Critical Habitat not designated within assessment area.
oval-leaved viburnum	*Viburnum ellipticum*	–/–/2.3	CNPS, CNDDB	Adoxaceae	perennial deciduous shrub	215–1,400 (705–4,593)	May–Jun	Chaparral, cismontane woodland, and lower montane coniferous forest.	None. Out of elevation range.

[1] Status:

Federal

FE	Federally listed as endangered
FT	Federally listed as threatened
–	No federal status

State

CE	California State listed as endangered
CT	California State listed as threatened
CR	California State listed as rare
–	No state status

California Rare Plant Rank (formerly known as CNPS Lists)

List 1B	Plants rare, threatened, or endangered in California and elsewhere
List 2	Plants rare, threatened, or endangered in California, but more common elsewhere
List 3	More information needed about this plant, a review list
List 4	Plants of limited distribution, a watch list

CNPS Threat Ranks:

0.1	Seriously threatened in California (high degree/immediacy of threat)
0.2	Fairly threatened in California (moderate degree/immediacy of threat)
0.3	Not very threatened in California (low degree/immediacy of threats or no current threats known)

[2] CNPS 2012

[3] CDFG 2012 and CNPS 2012 unless otherwise cited.

Appendix B

CNDDB Query Results for Rare Natural Communities in the Project Region

Table B-1. Rare natural communities documented in the Project region.[1]

Natural community	Rank[2] (Global /State)	Distribution	Site factors	Habitat description	Potential to occur in assessment area
Coastal and Valley Freshwater Marsh	G3/S2.1	Remnant stands most extensive in the upper portion of the Sacramento-San Joaquin River Delta, in river oxbows and other areas on the flood plain. Occasional along the coast, in coastal valleys near river mouths, and around the margins of lakes and springs.	Sites lacking significant current and permanently flooded by fresh water. Prolonged saturation permits accumulation of deep, peaty soils.	Dominated by perennial, emergent monocots including tules (*Scirpus* spp.) and cattails (*Typha* spp.). Often forms completely closed canopies.	High. Tules and cattails are present in the assessment area. *Schoenoplectus acutus* Herbaceous Alliance and/or *Typha* (*angustifolia, domingensis, latifolia*) Herbaceous Alliance are likely to be present in the assessment area. Though these alliances are not considered rare natural communities by CDFW (i.e., MCV2), CDFW still retains some Holland types, including Valley Freshwater Marsh, which is documented in the assessment area in riverine wetland (EDAW 2005).
Elderberry Savanna	G2/S2.1	Spottily scattered among stands of riparian vegetation throughout the Sacramento and northern San Joaquin valleys, as far south as Merced County.	Deep, fine-textured, rich alluvium well back from active river channels, but still subject to flooding during high water.	An open, winter-deciduous shrub savanna dominated by blue elderberry (*Sambucus nigra* subsp. *caerulea* [*S. mexicana* in Hickman 1993]), usually with an understory of introduced annual grasses and forbs.	Moderate. Blue elderberry is documented in the assessment area in Valley Oak Riparian Forest (distributed throughout the assessment area; EDAW 2005) and there may be stands that would be classified as the *Sambucus nigra* ssp. *caerulea* Shrubland Alliance[3].

Natural community	Rank[2] (Global /State)	Distribution	Site factors	Habitat description	Potential to occur in assessment area
Great Valley Cottonwood Riparian Forest	G2/S2.1	Remnant stands distributed along the major low-gradient (depositional) streams throughout the Great Valley, typically below 305 m (1,000 ft) in the north and 914 m (3,000 ft) in the south.	Fine-grained alluvial soils near perennial or nearly-perennial streams that provide subsurface irrigation even when the channel is dry. These sites are inundated yearly during spring, resulting in annual input of nutrients, soil, and new germination sites.	A dense, broadleafed, winter-deciduous riparian forest dominated by Fremont cottonwood (*Populus fremontii)* and Goodding's willow (*Salix goodingii)*, with abundant wild grape (*Vitis californica*) in the canopy. Understories are dense, and scattered seedlings and saplings of shade-tolerant species include box elder (*Acer negundo*) and Oregon ash (*Fraxinus latifolia*).	High. Fremont cottonwood and Goodding's willow are documented in the assessment area in Mixed Riparian Forest (distributed throughout the assessment area EDAW 2005). There are documented stands of *Populus fremontii* Forest Alliance[3] and there may be stands that would be classified as *Salix gooddingii* Woodland Alliance[3].
Northern Claypan Vernal Pool	G1/S1.1	Distributed on lower terraces and basin rims, toward the valley trough compared to Northern Hardpan Vernal Pools. Found in Central San Joaquin Valley north to Glenn and Colusa counties.	Fairly old, circum-neutral to alkaline, Si-cemented hardpan soils. Often more or less saline.	Similar to Northern Hardpan Vernal Pools, but with lower microrelief, and usually lower overall cover. Pools may be small (a few square meters) or quite large (covering several ha).	None. Vernal pools not present.
Northern Hardpan Vernal Pool	G3/S3.1	Distributed in "Red Dirt Hogwallow Lands," primarily on old alluvial terraces on the east side of the Great Valley from Tulare or Fresno County north to Shasta County.	Old, very acidic, Fe-Si cemented hardpan soils. The microrelief on these soils typically is hummocky, with mounds intervening between localized depressions. Winter rainfall perches on the hardpan, forming pools in the depressions and evaporation empties the pools in the spring.	A low, amphibious, herbaceous community dominated by annual herbs and grasses. Germination and growth begin with winter rains, often continuing even when inundated. Rising spring temperatures evaporate the pools, leaving concentric bands of vegetation that colorfully encircle the drying pool.	None. Vernal pools not present.

Natural community	Rank[2] (Global /State)	Distribution	Site factors	Habitat description	Potential to occur in assessment area
Valley Needlegrass Grassland	G3/S3.1	Remnant stands distributed around the Sacramento, San Joaquin, and Salinas Valleys, as well as the Los Angeles Basin.	Usually on fine-textured (often clay) soils, moist or even waterlogged during winter, but very dry in summer.	Mid-height grassland dominated by perennial, tussock-forming purple needle grass (*Stipa pulchra* [*Nassella pulchra*] in Hickman 1993). Native and introduced annuals occur between the perennials, often actually exceeding the bunchgrasses in cover.	None. Suitable habitat not present.
Valley Oak Woodland	G3/S2.1	Distributed in Sacramento and San Joaquin valleys adjacent to the Sierra Nevada foothills and valleys of the Coast Ranges from Lake County to western Los Angeles County, usually below 610 m (2,000 ft).	On deep, well-drained alluvial soils, usually in valley bottoms, apparently with more moisture in summer than in Blue Oak Woodland. Also found on non-alluvial settings in the South Coast and Transverse ranges.	Similar to Oregon Oak Woodland and Blue Oak Woodland, but typically more open, forming a grassy savanna rather than a closed woodland. Valley oak is usually the only tree present; its canopy seldom exceeds 30-40% absolute cover.	High. Valley Oak Riparian Forest is distributed throughout the assessment area (EDAW 2005) and the stands would be classified as *Quercus lobata* Woodland Alliance[3].

[1] Holland 1986 unless otherwise noted.

[2] Status:

Global Rank

G1	Critically Imperiled
G2	Imperiled
G3	Vulnerable

State Rank

S1	Critically Imperiled
S2	Imperiled
S3	Vulnerable

Additional Threat Ranks:

0.1	Very threatened
0.2	Threatened

[3] A rare natural community.

Appendix C

Database Query Results for Special-status Invertebrate, Fish, and Wildlife Species in the Project Region

Table C-1. Special-status invertebrate, fish, and wildlife species documented in the Project region (listed in taxonomic order).

Common Name	Scientific Name	Status[1] (Federal / State)	Source	Distribution in California	Habitat Association	Potential to Occur in Assessment Area
Invertebrates						
Conservancy fairy shrimp	*Branchinecta conservatio*	FE, FX/–	CNDDB USFWS	Disjunct occurrences in Solano, Merced, Tehama, Ventura, Butte, and Glenn counties.	Large, deep vernal pools in annual grasslands.	None. No suitable habitat present.
vernal pool fairy shrimp	*Branchinecta lynchi*	FT, FX/–	CNDDB USFWS	Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County. Isolated populations also in Riverside County.	Vernal pools; also found in sandstone rock outcrop pools; does not occur in areas subject to flooding from large rivers or other waterways.	None. No suitable habitat present.
vernal pool tadpole shrimp	*Lepidurus packardi*	FE, FX/–	CNDDB USFWS	Shasta County south to Merced County.	Occurs in vernal pools and other seasonal wetlands in open grasslands; does not occur in areas subject to flooding from large rivers or other waterways.	None. No suitable habitat present.
California freshwater shrimp	*Syncaris pacifica*	FE/SE	USFWS	Sonoma, Napa, and Marin counties.	Low-elevation, low-gradient perennial or intermittent freshwater streams with perennial pools and structurally diverse banks.	None. Outside of the species' range. Although the western edge of the project site is very near to the Napa County border, the known occurrences are from the far western portion of Napa County.
valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT, FX/–	CNDDB USFWS	Streamside habitats below 3,000 feet throughout the Central Valley, where host plants are present.	Host plant *Sambucus* sp. (blue elderberry) in riparian and oak savanna habitats.	High. *Sambucus* sp. present along sections of Putah Creek. Evidence of species documented (CDFG 2012).

Common Name	Scientific Name	Status[1] (Federal / State)	Source	Distribution in California	Habitat Association	Potential to Occur in Assessment Area
Delta green ground beetle	*Elaphrus viridus*	FT, FX/–	CNDDB USFWS	Only known to occur in Solano County.	Grassland habitat interspersed with vernal pools.	None. No suitable habitat present.
Fish						
Pacific lamprey	*Entoshenus tridentatus*	FSC/–	BDCP	Found in most major rivers that drain to the ocean as far south as the Santa Ana River but large spawning runs are rare south of Monterey Bay.	Pacific Lamprey generally spawn on sand and gravel (lotic environment), but have been observed spawning in stagnant and muddy (lentic) environments (Whyte et al. 1993).	High. Pacific lamprey have been reported to maintain small runs in Putah Creek (Moyle 2002).
river lamprey	*Lampetra ayresi*	–/SSC	BDCP	Lower Sacramento-San Joaquin River system: Napa River, Sonoma Creek, Alameda Creek, tributaries to the San Francisco Bay, and lower Sacramento and San Joaquin rivers.	Spawning adults need clean, gravelly riffles in permanent streams, while the ammocoetes require sandy backwaters or stream edges in which to bury themselves, with temperatures below 25°C.	Low.[2] Observed in the Yolo Bypass (Sommer et al. 2003).
green sturgeon	*Acipenser medirostris*	FT/SSC	USFWS	Found in large river systems from the Sacramento River to the Klamath River. Spawning is expected to be limited to the Sacramento and Klamath river systems.	Freshwater and saltwater habitats; spawns in pools in large freshwater river mainstems with cool water and cobble, clean sand, or bedrock.	Low.[2] Adults, subadults, and juveniles have been observed in the Yolo Bypass in wet years during extended periods of flooding (NMFS 2009a).

Common Name	Scientific Name	Status[1] (Federal / State)	Source	Distribution in California	Habitat Association	Potential to Occur in Assessment Area
Sacramento splittail	*Pogonichthys macrolepidotus*	–/SSC	CNDDB	Lower portions of the Napa, Petaluma, Sacramento and San Joaquin rivers; Sacramento–San Joaquin Delta including Suisun Bay, Suisun Marsh.	Low-elevation mainstem rivers and estuaries with low to moderate salinity (0-18 parts per thousand); shallow, flooded vegetated habitat for spawning and foraging.	Moderate.[2] Within the species known range. Migration and foraging habitat present during extended periods of flooding in the Yolo Bypass. Observed approximately 36 and 38 km downstream of Putah Diversion Dam and in Yolo Bypass (Sommer et al. 2001b, Harrell and Sommer 2003).
Delta smelt	*Hypomesus transpacificus*	FT, FX/SE	USFWS	Upper San Francisco estuary primarily in Suisun Bay, the Lower reaches of the Sacramento-San Joaquin Delta, and the Napa river.	Estuarine or brackish waters with salinity ranging from 2 to 7 ppt, but can be found at salinities ranging from 0 to 18 ppt. Spawn in shallow brackish water upstream of the mixing zone (zone of saltwater-freshwater interface) where salinity is around 2 ppt.	Low.[2] Within the species known range, rearing and migratory habitat present in the Project area, and recent observations are documented within the Yolo Bypass (Sommer et al. 2003)
longfin smelt	*Spirinchus thaleichthys*	FPT/ST	CDFG 2009	San Francisco estuary from Rio Vista or Medford Island in the Delta as far downstream as South Bay; concentrated in Suisun, San Pablo, and North San Francisco bays; historical populations in Humboldt Bay, Eel River estuary, and Klamath River estuary.	Adults in bays, estuaries, and nearshore coastal areas; migrate into freshwater rivers to spawn.	Low.[2] Longfin smelt are rarely observed in the Yolo Bypass. Extensive fish monitoring studies conducted in the Yolo Bypass from 1997 to 2002 only reported observations of longfin smelt during one year (Sommer et al. 2001b, 2003, and 2004, Harrell and Sommer 2003).

Common Name	Scientific Name	Status[1] (Federal / State)	Source	Distribution in California	Habitat Association	Potential to Occur in Assessment Area
Central Valley fall- and late fall- run Chinook salmon	*Oncorhynchus tshawytscha*	FSC/ SSC	USFWS	Sacramento and San Joaquin Rivers and their associated tributaries.	Low- to mid-elevation rivers and streams with cold water and available spawning gravel; typically rear in fresh water for one or more years before migrating to the ocean.	High. Within species known range. Rearing and migratory habitat present in the assessment area with recent observations documented in Yolo Bypass and Putah Creek (Sommer et al. 2001b, Crain and Moyle 2011, Harrell and Sommer 2003).
Sacramento River winter-run Chinook salmon	*Oncorhynchus tshawytscha*	FT, FX/SE	CNDDB	Currently spawns in the mainstem Sacramento River between Red Bluff and Kesiwick Dam.	Mainstem river reaches with cool water and available spawning gravel; rear 5 to 10 months in the river and estuary; migrate to the ocean to feed and grow until sexually mature.	Low.[2] Within species know range. Rearing and migratory habitat present in the Project area with recent observations documented in Yolo Bypass (Sommer et al. 2001b).
Central Valley spring-run Chinook salmon	*Oncorhynchus tshawytscha*	FT, FX/ST	USFWS CNDDB	Sacramento River and its tributaries (Deer, Mill, Antelope, Battle, Beegum, Butte, and Big Chico creeks) and the Feather and Yuba rivers.	Low- to mid-elevation rivers and streams with cold water and available spawning gravel; typically rear in fresh water for one or more years before migrating to the ocean.	Low.[2] Within species know range. Rearing and migratory habitat present in the Project area with recent observations documented in Yolo Bypass (Sommer et al. 2001b).
Central Valley steelhead	*Oncorhynchus mykiss*	FT, FX /–	USFWS	Sacramento and San Joaquin Rivers and their associated tributaries.	Rivers and streams with cold water, and available spawning gravel, typically rear in fresh water for one or more years before migrating to the ocean.	Moderate.[2] Within the species known range. Spawning, rearing, and migratory habitat present in the Project area. No recent confirmed reports of steelhead in Putah Creek (EDAW 2005) but observed in Yolo Bypass (Sommer et al. 2001b).

Common Name	Scientific Name	Status[1] (Federal / State)	Source	Distribution in California	Habitat Association	Potential to Occur in Assessment Area
Sacramento perch	*Archoplites interruptus*	–/SSC	CNDDB	Endemic to Central Valley waters but currently restricted from the majority of its native range. Widespread stocking has led to introduced populations in the Klamath, Pit, Walker, and Owens River basins.	Sloughs, slow moving rivers, and lakes that provide warm water (18°C) during spawning.	Low. Sacramento perch observations in Putah Creek are rare but have been reported near the UC Davis campus where rearing ponds for Sacramento perch are located and connect to the creek through drainage canals. Attempts to reestablish Sacramento perch in Putah Creek occurred in 2005 through stocking efforts in Lake Solano but no fish have been observed since (Crain and Moyle 2011).
Amphibians						
California tiger salamander	*Ambystoma californiense*	FT, FX (central population)/ST	CNDDB USFWS	Central Valley from Butte County south to northeastern San Luis Obispo County and Sierra Nevada foothills, up to approximately 1,000 feet.	Annual grasslands and oak woodlands. Rodent burrows, rock crevices, or fallen logs used by adults for cover during summer dormancy. Breeding habitat includes seasonal ponds, lakes, or vernal pools.	None. No suitable habitat present.
California red-legged frog	*Rana draytonii*	FT, FX/SSC	CNDDB USFWS	Largely restricted to coastal drainages on the central coast from Mendocino County to Baja California; in the Sierra foothills south to Tulare and, possibly, Kern counties; sea level to 8,000 feet.	Still or slow-moving water with emergent and overhanging vegetation, including wetlands, wet meadows, ponds, lakes, and low-gradient, slow-moving stream reaches with permanent pools.	None. Outside of the species' range.

Common Name	Scientific Name	Status[1] (Federal / State)	Source	Distribution in California	Habitat Association	Potential to Occur in Assessment Area
foothill yellow-legged frog	*Rana boylii*	–/SSC	CNDDB	From the Oregon border along the coast to the Transverse Ranges, and south along the western side of the Sierra Nevada Mountains to Kern County; a possible isolated population in Baja California, from sea level to 6,700 feet.	Shallow tributaries and mainstems of perennial streams and rivers with cobble or boulder substrate.	Low. Habitat along Putah Creek in assessment area not suitable for breeding. Low potential for frogs dispersing from suitable tributaries.
Reptiles						
western pond turtle	*Actinemys marmorata*	–/SSC	CNDDB	From the Oregon border along the coast ranges to the Mexican border, and west of the crest of the Cascades and Sierras.	Permanent, slow-moving fresh or brackish water with available basking sites and adjacent open habitats or forest for nesting.	High. Widespread along the creek (Truan et al. 2010).
giant garter snake	*Thamnophis gigas*	FT/ST	CNDDB, USFWS	Central Valley from near Burrel in Fresno County north to near Chico in Butte County; has been extirpated from areas south of Fresno.	Sloughs, canals, low-gradient streams, and freshwater marsh habitats where there is a prey base of small fish and amphibians; also found in irrigation ditches and rice fields; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter.	Low. Habitat along Putah Creek in assessment area is marginally suitable. Species may rarely migrate into assessment area near downstream sections. One CNDDB record from 1976 along Putah Creek at Old Davis Rd., Davis based on CDFW records (CDFG 2012), though no confirmed sightings along Upper Putah Creek since.

Common Name	Scientific Name	Status[1] (Federal / State)	Source	Distribution in California	Habitat Association	Potential to Occur in Assessment Area
Birds						
white-tailed kite	*Elanus leucurus*	–/SFP	CNDDB	Year-round resident; found in nearly all lowlands of California west of the Sierra Nevada mountains and the southeast deserts.	Lowland grasslands and wetlands with open areas; nests in trees near open foraging area.	High. Residents widely distributed along Upper Putah Creek (Truan et al., 2010). Breeding observed. May nest in trees on or near assessment area.
bald eagle	*Haliaeetus leucocephalus*	FD,BGEPA/SE, SFP	CNDDB	Permanent resident and uncommon winter migrant, found nesting primarily in Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity counties.	Large bodies of water or rivers with abundant fish, uses adjacent snags or other perches; nests in advanced-successional conifer forest near open water.	None. No suitable habitat present.
northern harrier	*Circus cyaneus*	–/SSC	Truan et al. 2010	Year-round resident; scattered throughout California; in the northwest, nests largely within coastal lowlands from Del Norte County south to Bodega Head in Sonoma County, inland to Napa County.	Nests, forages, and roosts in wetlands or along rivers or lakes, but also in grasslands, meadows, or grain fields.	High. Found along lower sections of Upper Putah Creek (Truan et al. 2010). Confirmed breeding. However, limited suitable ground nesting habitat within Putah Creek corridor.
Swainson's hawk	*Buteo swainsoni*	–/ST	CNDDB	Summer resident; breeds in lower Sacramento and San Joaquin Valleys, the Klamath Basin, and Butte Valley. Highest nesting densities occur near Davis and Woodland, Yolo County.	Nests in oaks or cottonwoods in or near riparian habitats. Forages in grasslands, irrigated pastures, and grain fields.	High. Known to nest in riparian trees in many locations along Putah Creek (CDFG 2012).
golden eagle	*Aquila chrysaetos*	BGEPA/SFP	CNDDB	Uncommon permanent resident and migrant throughout California, except center of Central Valley.	Open woodlands and oak savannahs, grasslands, chaparral, sagebrush flats; nests on steep cliffs or large trees.	Low. Incidental sightings, generally in winter, along lower reaches (Truan et al. 2010).

Common Name	Scientific Name	Status[1] (Federal / State)	Source	Distribution in California	Habitat Association	Potential to Occur in Assessment Area
American peregrine falcon	*Falco peregrinus anatum*	FD/SD, SFP	CNDDB	Most of California during migrations and in winter; nests primarily in the Coast Ranges, northern Sierra Nevada Mountains, and other mountainous areas of northern California.	Wetlands, woodlands, cities, agricultural lands, and coastal area with cliffs for nesting; often feeds near water.	Low (foraging only). Sightings are rare and historically only in winter and spring. Observed once in lower reaches of Putah Creek (Truan et al. 2010). No nesting habitat.
California clapper rail	*Rallus longirostrus obsoletus*	FE/SE, SFP	USFWS	Predominantly in the marshes of the San Francisco estuary: South San Francisco Bay, North San Francisco Bay, San Pablo Bay, and sporadically throughout the Suisun Marsh area east to Browns Island.	Salt and brackish water marshes, typically dominated by pickleweed (*Salicornia virginica*) and Pacific cordgrass (*Spartina foliosa*).	None. Outside of species' range.
western snowy plover	*Charadrius alexandrinus nivosus*	FT/SSC (interior pop.)	CNDDB USFWS	Nests in locations along the California coast, including the Eel River in Humboldt County; nests in the interior of the state in the Central Valley, the Klamath Basin, Modoc Plateau, and Great Basin, Mojave, and Colorado deserts; winters primarily along coast.	Barren to sparsely vegetated dune-backed beaches, barrier beaches, and salt-evaporation ponds, infrequently on bluff-backed beaches; also nests on gravel bars in rivers with wide flood plains.	None. No suitable habitat.
mountain plover	*Charadrius montanus*	FPT/SSC	CNDDB	Winter visitor; found in the Central Valley south of Yuba County, along the coast in parts of San Luis Obispo, Santa Barbara, Ventura, and San Diego counties; parts of Imperial, Riverside, Kern, and Los Angeles counties.	Occupies open plains or rolling hills with short grasses or very sparse vegetation; nearby bodies of water are not needed; may use newly plowed or sprouting grain fields.	None. No suitable habitat in assessment area.

Common Name	Scientific Name	Status[1] (Federal / State)	Source	Distribution in California	Habitat Association	Potential to Occur in Assessment Area
California least tern	*Sternula antillarum browni*	FE/SE, SFP	USFWS	The Pacific coast, from San Francisco to Baja California.	Sparsely vegetated coastal beaches and estuaries near shallow waters, above high tide line.	None. No suitable habitat present and outside of species' range.
western yellow-billed cuckoo	*Coccyzus americanus*	FT/SE	CNDDB USFWS	Summer resident, breeds in limited portions of the Sacramento River and the South Fork Kern River; small populations may nest in Butte, Yuba, Sutter, San Bernardino, Riverside, Inyo, Los Angeles, and Imperial counties.	Summer resident of valley foothill and desert riparian habitats; nests in mixed cottonwood-willow riparian woodlands with a mix of early and later-successional stages.	Moderate. Rare migrant in Yolo County. Few sightings of single birds along Putah Creek between 2005 and 2007; in 2005, a single bird was documented in Los Rios farms in June, in the Cache Creek Settling Basin in July, and another single bird was noted at Fremont Weir in June and July (Truan et al. 2010). In 2007, a cuckoo was documented near the Dry Creek confluence (Truan et al. 2010).
western burrowing owl	*Athene cunicularia hypugea*	–/SSC	CNDDB	Year-round resident throughout much of the State; Central Valley, northeastern plateau, southeastern deserts, and coastal areas. Rare along south coast.	Level, open, dry, heavily grazed or low- stature grassland or desert vegetation with available burrows.	Low. No suitable habitat within Putah Creek riparian corridor.
northern spotted owl	*Strix occidentalis caurina*	FT/SSC	USFWS	Northwestern California south to Marin County, and southeast to the Pit River area of Shasta County.	Typically in older forested habitats; nests in complex stands dominated by conifers, especially coastal redwood, with hardwood understories; some open areas are important for foraging.	None. No suitable habitat present and outside of species' range.

Common Name	Scientific Name	Status[1] (Federal / State)	Source	Distribution in California	Habitat Association	Potential to Occur in Assessment Area
long-eared owl	*Asio otus*	–/SSC	Truan et al. 2010	Uncommon resident throughout the state, does not occupy the Central Valley and Southern California deserts.	Riparian habitat; nests in dense vegetation close to open grassland, meadows, riparian, or wetland areas for foraging.	Low. Rare. There have been four sightings of long-eared owl during bird surveys conducted between 1997 and 2009; once at the confluence with Dry Creek, twice at the Diversion Dam, and once at Los Rios Farms (Truan et al. 2010).
olive-sided flycatcher	*Contopus cooperi*	–/SSC	Truan et al. 2010	Uncommon to common summer resident found below 9,000 feet throughout California except in deserts, the Central Valley, and other lowland areas.	Breeds in primarily advanced-successional conifer forests with open canopies.	Low (foraging only). A scarce migrant in both spring and fall. During twelve years of bird surveys in along Putah Creek, this species has been detected eight times, usually between Mace Blvd. and Russell Ranch (Truan et al. 2010).
willow flycatcher	*Empidonax traillii*	–/SE	Truan et al. 2010	In the Sierra Nevada and Cascade ranges at elevations between 2,000 and 8,000 feet; nests as far south as San Diego County; confirmed breeding along the Eel River, and in mesic clear-cuts in northern Humboldt County.	Dense brushy thickets within riparian woodland often dominated by willows and/or alder, near permanent standing water; uses brushy, early-succession forests (e.g., clearcuts) in the Pacific Northwest.	Moderate. Migrants documented along Putah Creek corridor (Truan et al. 2010). Very low likelihood of breeding in early successional riparian habitats due to parasitic brown-headed cowbird.
least Bell's vireo	*Vireo bellii pusillus*	FE, FX/SE	CNDDB USFWS	Summer resident; breeds in scattered locations around southern California.	Nests in dense vegetative cover of riparian areas; often nests in willow or mulefat; forages in dense, stratified canopy.	Low. Rare migrant in assessment area (Truan et al 2010).

Common Name	Scientific Name	Status[1] (Federal / State)	Source	Distribution in California	Habitat Association	Potential to Occur in Assessment Area
purple martin	*Progne subis*	–/SSC	CNDDB	Summer resident and migrant; most densely populated in central and northern coastal conifer forests and smaller and more localized areas in the Sierra Nevada, interior foothills, and southern California.	Conifer, valley-foothill, montane-hardwood forests with large snags in open areas; most nest sites located in upper slopes of hilly terrain.	Low (foraging only). Rare in Central Valley away from urban Sacramento, where it has been observed nesting under highway overpasses (Truan et al. 2010).
bank swallow	*Riparia riparia*	–/ST	CNDDB	Summer resident; occurs along the Sacramento River from Tehama County to Sacramento County, along the Feather and lower American Rivers; and in the plains east of the Cascade Range in Modoc, Lassen, and northern Siskiyou Counties. Small populations near the coast from San Francisco County to Monterey County.	Nests in vertical bluffs or banks, usually adjacent to water, where the soil consists of sand or sandy loam.	Low (foraging only). No suitable nesting habitat. Rarely detected foraging in assessment area (Truan et al. 2010).
yellow warbler	*Dendroica petechia*	–/SSC	Truan et al. 2010	Summer resident; nests in most of California with the exception most of the Central Valley, high Sierras, and Mojave and Colorado deserts.	Open-canopy, deciduous riparian woodland in close proximity to water along streams or wet meadows.	Moderate (foraging only). Migrants known to forage in low numbers in riparian habitats along Putah Creek (Truan et al. 2010).
yellow-breasted chat	*Icteria virens*	–/SSC	CNDDB	Summer resident; breeds in scattered locations around southern California; recent sightings in Central Valley.	Nests in dense vegetative cover of riparian areas; often nests in willow or mulefat; forages in dense, stratified canopy.	Low. Rare sightings along Putah Creek (Truan et al. 2010).

Common Name	Scientific Name	Status[1] (Federal / State)	Source	Distribution in California	Habitat Association	Potential to Occur in Assessment Area
grasshopper sparrow	*Ammodramus savannarum*	–/SSC	CNDDB	Summer resident; nests in Mendocino, Trinity, and Tehama counties south, west of the Cascade-Sierra Nevada axis and southeastern deserts, to San Diego County.	Typically found in moderately open grasslands with scattered shrubs.	None. No suitable habitat present.
tricolored blackbird	*Agelaius tricolor*	–/SSC	CNDDB	Permanent residents, but make extensive migrations both in breeding season and winter. Common locally throughout Central Valley and in coastal areas from Sonoma County south.	Feeds in grasslands and agriculture fields; nesting habitat components include open accessible water, a protected nesting substrate (including flooded or thorny vegetation), and a suitable nearby foraging space with adequate insect prey.	Moderate. Breeding colony documented once in a patch of buttonwillows in Tule Ranch Unit outside of assessment area (CDFG et al. 2008). Potential breeding habitat in permanent wetlands in the assessment area.
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	–/SSC	CNDDB	Primarily a migrant and summer resident, though small numbers remain in winter; Central Valley, northeastern California, central and southern coasts, and southern deserts.	Breeds almost entirely in open marshes with relatively deep water and tall emergent vegetation such as such as bulrush (*Schoenoplectus* spp.) or cattails (*Typha* spp.); nests are typically in moderately dense vegetation; forage within wetlands and surrounding grasslands and/or croplands.	Low. Rare to uncommon species along Putah Creek.

Common Name	Scientific Name	Status[1] (Federal / State)	Source	Distribution in California	Habitat Association	Potential to Occur in Assessment Area
Mammals						
western red bat	*Lasiurus blossevillii*	–/SSC	CNDDB	Near the Pacific Coast, Central Valley, and the Sierra Nevada.	Riparian forests, woodlands near streams, fields and orchards.	Moderate. Not documented, but roosting habitat present in riparian forest in assessment area.
pallid bat	*Antrozous pallidus*	–/SSC	CNDDB	Throughout California, except for the high Sierra Nevada and from Del Norte and western Siskiyou counties to northern Mendocino County.	Roosts in trees, caves, crevices, and buildings; feeds in a variety of open habitats.	Moderate. May roost in riparian tree hollows.
American badger	*Taxidea taxus*	–/SSC	CNDDB	Throughout the state except in the humid coastal forests of Del Norte County and northwest portion of Humboldt County.	Shrubland, open grasslands, fields, and alpine meadows with friable soils.	None. No suitable habitat in assessment area.
California ringtail	*Bassariscus astutus raptor*	–/SFP		Widely distributed, though greatest abundance in northern California and Sierra Nevada foothills	Mixture of forest and shrub habitats in association with rocky areas or riparian habitats, low to middle elevations.	Moderate. Suitable habitat present in riparian woodland.
salt marsh harvest mouse	*Reithrodontomys raviventris*	FE/SE, SFP	USFWS	San Francisco Bay and its tributaries.	Saline emergent wetlands, preferably with pickleweed (Salicornia virginica).	None. No suitable habitat present and outside of species' range.

[1] Status:

Federal	**State**
FE = Federally listed as endangered under the ESA	SE = State listed as endangered under the California ESA
FT = Federally listed as threatened under the ESA	ST = State listed as threatened under the California ESA
FPT = Federally proposed as threatened	SSC = CDFW Species of Special Concern
FC = Federal candidate species	SD = State delisted
FSC = Federal species of concern	SFP = State Fully Protected
FD = Federally delisted	– = no status
FX = Federally designated critical habitat	
BGEPA = Federally protected under the Bald and Golden Eagle Protection Act	
– = no status	

[2] Potential for species occurrence is limited to the section of the Upper Reach within the Yolo Bypass (between the County Road 106A stream crossing and the YBWA boundary) during periods when the bypass is at high flood stage resulting in inundation or a potential backwater effect upstream into the channel.

APPENDIX E

Special Status Species Tables

Appendix E

Table E-1 Special Status Plant Species Occurring In or Near the Project Area

Common Name	Scientific Name	Status[1] Fed/State /CRPR	Habitat[2]	Potential to Occur	Rationale[2]
twig-like snapdragon	*Antirrhinum virga*	–/–/4.3	Found in openings in rocky, often serpentine soils in chaparral and lower montane coniferous forest. Found in elevations above 100 meters.	None	Out of elevation range.
modest rockcress	*Arabis modesta*	–/–/4.3	Chaparral and lower montane coniferous forest. Found in elevations above 120 meters.	None	Out of elevation range.
depauperate milk-vetch	*Astragalus pauperculus*	–/–/4.3	Vernally mesic, volcanic soils in chaparral, cismontane woodland, and valley and foothill grasslands.	None	Volcanic soils not present.
Ferris' milk-vetch	*Astragalus tener var. ferrisiae*	--/--/1B.1	Meadows and seeps (vernally mesic), Valley and foothill grassland (subalkaline flats).	None	Potential suitable habitat, including subakaline flats, is not present within the project area. The closest CNDDB record is approximately 2.22 miles from the site on the opposite side of the City of Davis.
alkali milk-vetch	*Astragalus tener var. tener*	--/--/1B.2	Playas, valley and foothill grassland (adobe clay), vernal pools; alkaline habitats. Bloom period is March – June.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed. The nearest CNDDB record is 3.64 miles from the project area.
heartscale	*Atriplex cordulata* var. *cordulata*	--/--/1B.2	Chenopod scrub, meadows and seeps, valley and foothill grassland (sandy); saline or alkaline habitats. Bloom period is April – October.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed. The Closest CNDDB record is approximately 4.04 miles from the site on the opposite side of the City of Davis.
brittlescale	*Atriplex depressa*	--/--/1B.2	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland, vernal pools; alkaline, clay habitats. Bloom period is April – October.	Low	Numerous surveys in the creek have not found this species. However, potentially suitable habitat is present, but grasslands are highly disturbed and/or managed.
vernal pool smallscale	*Atriplex persistens*	--/--/1B.2	Alkaline vernal pools.	None	Vernal pools are not present within the project area.
big-scale balsamroot	*Balsamorhiza macrolepis*	--/--/1B.2	Chaparral, cismontane woodland, and valley and foothill grasslands in elevations about 90 meters. Sometimes in serpentine soils.	None	Out of elevation range.

Common Name	Scientific Name	Status[1] Fed/State /CRPR	Habitat[2]	Potential to Occur	Rationale[2]
narrow-anthered brodiaea	*Brodiaea leptandra*	--/--/1B.2	Volcanic soils in broadleaved upland forest, chaparral, cismontane woodland, lower montane coniferous forest, and valley and foothill grasslands. In elevations above 110 meters.	None	Out of elevation range.
Brewer's calandrinia	*Calandrinia breweri*	–/–/4.2	Sandy or loamy, disturbed sites and burns in chaparral, and coastal scrub.	None	No suitable habitat is present within the project area.
round-leaved filaree	*California macrophylla*	--/--/1B.2	Cismontane woodland, valley and foothill grassland; clay habitats. Bloom period is March – May.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed. The closest CNDDB record is approximately 2 miles from the site.
bristly sedge	*Carex comosa*	--/--/2B.1	Coastal prairie, lake margins, marshes and swamps, and valley and foothill grasslands. Bloom period is May – September.	Low	Potentially suitable habitat present. No known CNDDB occurrences within the Project Area. Or in Solano or Yolo County.
holly-leaved ceanothus	*Ceanothus purpureus*	–/–/1B.2	Volcanic and rocky soils in chaparral and cismontane woodlands in elevations above 120 meters.	None	Out of elevation range.
pappose tarplant	*Centromadia parryi* ssp. *parryi*	–/–/1B.2	Often alkaline soils in chaparral, coastal prairie, meadows and seeps, coastal salt marshes and swamps, vernally mesic valley and foothill grasslands. Bloom period is May – November.	Moderate	Potentially suitable habitat present. These grasslands are highly disturbed and/or managed, however documented occurrences downstream persist in habitat that is highly managed.
Parry's rough tarplant	*Centromadia parryi* ssp. *rudis*	–/–/4.2	Alkaline, vernally mesic, seeps, roadsides, valley and foothill grasslands, and vernal pools. Bloom period is May – October.	Moderate	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
hispid bird's-beak	*Chloropyron molle* ssp. *hispidum*	–/–/1B.1	Alkaline meadows and seeps, playas, and valley and foothill grasslands.	None	Potential habitat including alkaline soils not present.
palmate-bracted bird's-beak	*Chloropyron palmatum*	FE/CE/ 1B.1	Chenopod scrub and alkaline valley and foothill grasslands.	None	Potential habitat including alkaline soils not present.
Bolander's water-hemlock	*Cicuta maculata* var. *bolanderi*	–/–/2.1	Marshes and swamps, and coastal, fresh or brackish water. Blooming period is July – September.	Low	Potentially suitable habitat present. No CNDBB occurrences within or near the Project Area.
subalpine cryptantha	*Cryptantha crymophila*	–/–/1B.3	Volcanic, rocky soils in subalpine coniferous forest in elevations between 2,600 and 3,200 meters.	None	Out of elevation range.

Common Name	Scientific Name	Status[1] Fed/State /CRPR	Habitat[2]	Potential to Occur	Rationale[2]
serpentine cryptantha	*Cryptantha dissita*	–/–/1B.2	Serpentine soils in chaparral in elevations between 395 and 580 meters.	None	Out of elevation range and serpentine soils not present.
Peruvian dodder	*Cuscuta obtusiflora* var. *glandulosa*	–/–/2B.2	Freshwater marshes and swamps. Bloom period is July – October.	Low	Potentially marginal suitable habitat is present. No CNDDB occurrences within or near the Project Area.
recurved larkspur	*Delphinium recurvatum*	–/–/1B.2	Chenopod scrub, cismontane woodland, valley and foothill grasslands in alkaline soils.	None	Potential habitat including alkaline soils not present.
dwarf downingia	*Downingia pusilla*	–/–/2B.2	Mesic valley and foothill grasslands, and vernal pools. Bloom period is March – May.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
Greene's narrow-leaved daisy	*Erigeron greenei*	–/–/1B.2	Serpentine or volcanic soils in chaparral above 80 meters in elevation.	None	Out of elevation range and serpentine soils not present.
San Joaquin spearscale	*Etriplex joaquinana*	--/--/1B.2	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland; alkaline habitats. Bloom period is April – October.	None	Potential habitat including alkaline soils is not present within the project area. The Closest CNDDB record is approximately 1.18 miles from the site.
stinkbells	*Fritillaria agrestis*	–/–/4.2	Clay, sometimes serpentine soils in chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grasslands.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
fragrant fritillary	*Fritillaria liliacea*	–/–/1B.2	Cismontane woodland, coastal prairie, coastal scrub, and valley and foothill grasslands, often on serpentine soils.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
adobe-lily	*Fritillaria pluriflora*	–/–/1B.2	Chaparral, cismontane woodland, and valley and foothill grasslands, often in adobe soils. Bloom period is February – April.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
woolly-headed gilia	*Gilia capitata* ssp. *tomentosa*	–/–/1B.1	Coastal bluff scrub, serpentine, rocky outcrops in valley and foothill grasslands.	None	Serpentine soils not present.
Boggs Lake hedge-hyssop	*Gratiola heterosepala*	–/CE/1B.2	Clay soils in or near shallow water such as margins of vernal pools and lakes. Bloom period is April – August.	Low	No vernal pool or lake habitat is present. May contain some marginal suitable habitat within freshwater marsh pockets in the project area.
nodding harmonia	*Harmonia nutans*	–/–/4.3	Rocky or gravelly, volcanic soils in chaparral and cismontane woodlands.	None	Out of elevation range.
hogwallow starfish	*Hesperevax caulescens*	–/–/4.2	Mesic and clay soils in valley and foothill grasslands, and shallow vernal pools.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
two-carpellate western flax	*Hesperolinon bicarpellatum*	–/–/1B.2	Serpentine soils in chaparral.	None	Serpentine soils not present.

Common Name	Scientific Name	Status[1] Fed/State /CRPR	Habitat[2]	Potential to Occur	Rationale[2]
Brewer's western flax	*Hesperolinon breweri*	–/–/1B.2	Cismontane woodland, chaparral, valley and foothill grassland; usually serpentinite habitats. Bloom period is May – July.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed. CNDDB closest documented observation of this species is approximately 1.05 miles from the site.
Tehama County western flax	*Hesperolinon tehamense*	–/–/1B.3	Serpentine soils in chaparral, and cismontane woodlands in elevations over 100 meters.	None	Out of elevation range and serpentine soils not present.
woolly rose-mallow	*Hibiscus lasiocarpos* var. *occidentalis*	–/–/1B.2	Freshwater marshes and swamps, sides of levees. Moist roadside ditches, moist disturbed areas, wet fields. Blooming is June – September.	Low	Potentially suitable habitat present. The closest CNDDB record is approximately 8.42 miles from the site on the other side of Highway 80.
Carquinez goldenbush	*Isocoma arguta*	–/–/1B.1	Alkaline valley and foothill grasslands.	None	Alkaline soils not present.
Northern California black walnut	*Juglans hindsii*	–/–/1B.1	Riparian forests and riparian woodlands.	None	Potentially suitable habitat present but one of the documented occurrences (7 miles from the eastern edge of the assessment area) was extirpated and the other (15 miles from the western edge of the assessment area) is in a developed area with lack of space for reproduction; any other black walnuts in the area are likely of hybrid origin and thus not protected.
Contra Costa goldfields	*Lasthenia conjugens*	FE/–/1B.1	Cismontane woodland, alkaline playas, valley and foothill grasslands, and mesic vernal pools.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed. Critical Habitat not designated in assessment area.
Ferris' goldfields	*Lasthenia ferrisiae*	–/–/4.2	Alkaline and clay vernal pools.	None	Vernal pools not present.
Delta tule pea	*Lathyrus jepsonii* var. *jepsonii*	–/–/1B.2	Freshwater and brackish marshes and swamps.	Low	Potentially marginal suitable habitat present, but usually only found within tidal freshwater and brackish marshes.
Colusa layia	*Layia septentrionalis*	–/–/1B.2	Cismontane woodland, chaparral, valley and foothill grassland; sandy, serpentinite habitats. Bloom period is April – May.	None	No suitable habitat and no CNDDB observations near the Project Area.
legenere	*Legenere limosa*	–/–/1B.1	Vernal pools.	None	Vernal pools not present.
Heckard's pepper-grass	*Lepidium latipes var. heckardii*	–/–/1B.2	Valley and foothill grassland (alkaline flats). Bloom period is March – May.	None	No suitable habitat is present. The closest CNDDB record is approximately 4.82 miles from the site on the opposite side of the City of Davis.

Common Name	Scientific Name	Status[1] Fed/State /CRPR	Habitat[2]	Potential to Occur	Rationale[2]
Jepson's leptosiphon	*Leptosiphon jepsonii*	–/–/1B.2	Cismontane woodland, chaparral; usually volcanic habitats between 100 – 500 meters in elevation. Bloom period is March – May.	None	Out of elevation range of the species.
woolly-headed lessingia	*Lessingia hololeuca*	–/–/3	Broadleafed upland forest, coastal scrub, lower montane coniferous forest, clay or serpentine soils in valley and foothill grasslands.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
Mason's lilaeopsis	*Lilaeopsis masonii*	–/CR/1B.1	Brackish or freshwater marshes and swamps, and riparian scrub.	Low	Potentially marginal suitable habitat present, but usually only found in tidal wetlands and no known occurrences within the Project Area.
redwood lily	*Lilium rubescens*	–/–/4.2	Sometimes serpentine soils and sometimes roadsides in broadleafed upland forest, chaparral, lower montane coniferous forest, North Coast coniferous forest, and upper montane coniferous forest.	None	No suitable habitat present.
Delta mudwort	*Limosella australis*	–/–/2B.1	Brackish or freshwater marshes and swamps and riparian scrub, usually on mud banks.	Low	Potentially marginal suitable habitat present, but usually only found in tidal wetlands and no known occurrences within the Project Area.
Napa lomatium	*Lomatium repostum*	–/–/4.3	Serpentine soils in chaparral and cismontane woodlands.	None	Out of elevation range and serpentine soils not present.
green monardella	*Monardella viridis*	–/–/4.3	Broadleafed upland forest, chaparral, and cismontane woodlands in elevations between 100 – 1,010 meters in elevation	None	None. Out of elevation range.
little mousetail	*Myosurus minimus* ssp. *apus*	–/–/3.1	Valley and foothill grassland, and alkaline vernal pools.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
Tehama navarretia	*Navarretia heterandra*	–/–/4.3	Mesic valley and foothill grasslands, and vernal pools.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
Baker's navarretia	*Navarretia leucocephala ssp. bakeri*	–/–/1B.1	Cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, vernal pools; mesic habitats. Bloom period is April – July.	Moderate	Potentially suitable habitat present and documented near the Project Area. Numerous surveys in the Putah Creek corridor have not found this species.
few-flowered navarretia	*Navarretia leucocephala* ssp.	FE/CT/ 1B.1	Volcanic ash flow in vernal pools between 400 and 855 meters in elevation.	None	Out of elevation range and volcanic soils not present.

Common Name	Scientific Name	Status[1] Fed/State /CRPR	Habitat[2]	Potential to Occur	Rationale[2]
	pauciflora				
Colusa grass	*Neostapfia colusana*	FT/CE/ 1B.1	Vernal pools (adobe, large). Bloom period is May – August.	None	No suitable habitat and no CNDDB observations near the Project Area.
San Joaquin Valley Orcutt grass	*Orcuttia inaequalis*	FT/CE/ 1B.1	Vernal pools.	None	Vernal pools not present.
Gairdner's yampah	*Perideridia gairdneri* ssp. *gairdneri*	–/–/4.2	Vernally mesic soils in broadleafed upland forest, chaparral, coastal prairie, valley and foothill grasslands, and vernal pools.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
bearded popcornflower	*Plagiobothrys hystriculus*	–/–/1B.1	Mesic valley and foothill grassland, vernal pool margins, and vernal swales.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
California beaked-rush	*Rhynchospora californica*	–/–/1B.1	Bogs and fens, lower montane coniferous forest, meadows and seeps, and freshwater marshes and swamps.	Low	Potentially suitable habitat present. No known CNDDB occurrences within or near the Project Area.
Sanford's arrowhead	*Sagittaria sanfordii*	–/–/1B.2	Assorted shallow freshwater marshes and swamps.	Low	Potentially suitable habitat present. No known CNDDB occurrences within or near the Project Area.
Cleveland's ragwort	*Senecio clevelandii* var. *clevelandii*	–/–/4.3	Serpentine seeps in chaparral.	None	Out of elevation range and serpentine soils not present.
Napa checkerbloom	*Sidalcea hickmanii* ssp. *napensis*	–/–/1B.1	Rhyolitic soils in chaparral at elevations between 415 and 610 meters.	None	Out of elevation range and volcanic soils not present.
Marin checkerbloom	*Sidalcea hickmanii* ssp. *viridis*	–/–/1B.3	Serpentine soils in chaparral.	None	Serpentine soils not present.
Keck's checkerbloom	*Sidalcea keckii*	FE/–/1B.1	Cismontane woodland, valley and foothill grassland; serpentinite, clay habitats. Bloom period is April – June.	None	Out of elevation range. Numerous surveys have also not observed the species in or near the Project Area.
slender-leaved pondweed	*Stuckenia filiformis*	–/–/2B.2	Assorted, shallow freshwater marshes and swamps in elevations above 300 meters.	None	Out of elevation range.
Suisun Marsh	*Symphyotrichum*	–/–/1B.2	Tidal marshes (brackish and freshwater)	Low	Tidal marsh habitat not present. The closest CNDDB

Common Name	Scientific Name	Status[1] Fed/State /CRPR	Habitat[2]	Potential to Occur	Rationale[2]
aster	*lentum*		Blooming period is May-November.		record is approximately 3.00 miles from the site.
Napa bluecurls	*Trichostema ruygtii*	–/–/1B.2	Chaparral, cismontane woodlands, lower montane coniferous forest, valley and foothill grasslands, and vernal pools.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
two-fork clover	*Trifolium amoenum*	FE/–/1B.1	Coastal bluff scrub, sometimes serpentine soils in valley and foothill grasslands.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed.
saline clover	*Trifolium hydrophilum*	–/–/1B.2	Marshes and swamps, mesic, alkaline valley and foothill grasslands, and vernal pools.	None	Potential habitat including alkaline soils and vernal pools not present.
dark-mouthed triteleia	*Triteleia lugens*	–/–/4.3	Broadleafed upland forest, chaparral, coastal scrub, and lower montane coniferous forest. Found between 100-1,000 meters in elevation.	None	Out of elevation range.
Solano grass	*Tuctoria mucronata*	FE/CE/ 1B.1	Valley and foothill grassland, vernal pools. Bloom period is April-August.	Low	Potentially suitable habitat present, but grasslands are highly disturbed and/or managed. Critical Habitat not designated within assessment area. The Closest CNDDB record is approximately 17.56 miles from the site.
oval-leaved viburnum	*Viburnum ellipticum*	–/–/2B.3	Chaparral, cismontane woodland, and lower montane coniferous forest in elevations above 215 meters.	None	Out of elevation range.

[1]STATUS CODES:

Federal:
FE: Federally listed as Endangered
FT: Federally listed as Threatened

State:
CE: State of California listed as Endangered
CT: State of California listed as Threatened
CR: State of California listed as Rare

California Rare Plant Rank:
1A: Presumed extinct in California
1B: Rare, Threatened, or Endangered in California and elsewhere
2: Rare, Threatened, or Endangered in California, but more common elsewhere
3: Plants about which more information is needed – a review list.
4: Plants of limited distribution – a watch list.

An extension reflecting the level of threat to each species is appended to each rarity category as follows:
.1 = Seriously endangered in California.
.2 = Fairly endangered in California.
.3 = Not very endangered in California.

-- = no status

POTENTIAL TO OCCUR

Low = Habitat not present and/or few occurrence in the region.
Moderate = Marginal habitat present and/or some occurrences in the region.
High = Good habitat present and nearby occurrences or species is known to occur based on CNDDB occurrences or field surveys.

[2] Many species habitat descriptions and potential to occur rationale was provided by Stillwater Sciences and Vollmar Natural Lands Consulting. 2015. *Habitat Assessment for the Lower Putah Creek Restoration Project—Upper Reach.* Prepared for Yolo Basin Foundation.

Table E-2 Special Status Wildlife Species Occurring In or Near the Project Area

Common Name	Scientific Name	Status[1] Fed/ State	Habitat[2]	Potential to Occur	Rationale[2]
Invertebrates					
Conservancy fairy shrimp	*Branchinecta conservatio*	FE/--	Vernal pools in grass or mud-bottomed swales or basalt flow depression pools in unplowed grasslands.	None	No suitable habitat and no CNDDB observations near the Project Area.
vernal pool fairy shrimp	*Branchinecta lynchi*	FT/--	Vernal pools and swales, alkali pools, seasonal drainages, stock ponds.	None	No suitable habitat present. CNDDB maps this species near the Project Area (approximately 0.5 miles; however, the occurrence is physically separated from the Project Area by urban development.
vernal pool tadpole shrimp	*Lepidurus packardi*	FE/--	Vernal pools ranging from Shasta County to Tulare County.[i]	None	CNDDB maps this species near the Project Area (approximately 2.2 miles; however, the occurrence is physically separated from the Project Area by urban development, and suitable habitat does not exist on-site.
California freshwater shrimp	*Syncaris pacifica*	FE/SE	Low elevation, low gradient streams with undercut banks, and exposed live root systems of willow or alder.[ii]	None	No suitable habitat and no CNDDB observations near the Project Area. The only observations for the species are above Lake Berryessa in small coastal streams.
valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT/--	Riparian habitats and associated upland habitats where elderberry (*Sambucus* spp.) grows.	High	CNDDB maps this species within the Project Area; and the species' host plant (i.e., suitable habitat) exists throughout the site. It is likely valley elderberry longhorn beetle would be present on-site.
Delta green ground beetle	*Elaphrus viridus*	FT/–	Grassland habitat interspersed with vernal pools.	None	No suitable habitat is present.
Fish					
Pacific lamprey	*Entoshenus tridentatus*	FSC/SSC	Cold, clear water for spawning and incubation. Require gravel to build nests, and soft sediment to burrow during rearing	High	Pacific lamprey have been reported to maintain small runs in Putah Creek. Ammocoetes and juveniles are expected to be present year-round upstream of approximately Highway 505.
river lamprey	*Lampetra ayresi*	--/SSC	Spawning adults need clean, gravelly riffles in permanent streams, while the ammocoetes require sandy backwaters or stream edges in which to bury themselves, with temperatures below 25°C.	Low	Observed in the Yolo Bypass.

Common Name	Scientific Name	Status[1] Fed/ State	Habitat[2]	Potential to Occur	Rationale[2]
green sturgeon	*Acipenser medirostris*	FT/SSC	Inhabits main river systems, including the Sacramento-San Joaquin Estuary. Not directly associated with small freshwater Delta tributaries.	Low	Green sturgeon do not enter Putah Creek, however adults, subadults, and juveniles have been observed in the Yolo Bypass in wet years during extended periods of flooding.
Sacramento splittail	*Pogonichthys macrolepidotus*	--/SSC	Low-elevation mainstem rivers and estuaries with low to moderate salinity (0-18 parts per thousand); shallow, flooded vegetated habitat for spawning and foraging.	Low	Sacramento splittail do not enter Putah Creek, however migration and foraging habitat is present during extended periods of flooding in the Yolo Bypass.
Delta smelt	*Hypomesus transpacificus*	FT/SE	Brackish to freshwater, depending on life stage. Occurs primarily in main waterbodies and sloughs of the Delta and Suisun Bay. Not directly associated with small stream systems.	Low	Delta smelt do not enter Putah Creek, but recent observations are documented within the Yolo Bypass.
longfin smelt - Bay-Delta Distinct Population (DPS)	*Spirinchus thaleichthys*	FC/ST, SSC	Inhabits main waterbodies of San Francisco, San Pablo, and Suisun bays. Migrates upstream to freshwater areas for spawning in winter. Not directly associated with small seasonal tributaries.	Low	The Bay-Delta DPS of longfin smelt do not enter Putah Creek. Longfin smelt are rarely observed in the Yolo Bypass.
Chinook salmon – fall- and late fall-run	*Oncorhynchus tshawytscha*	FSC/SSC	Low- to mid-elevation rivers and streams with cold water and available spawning gravel; typically rear in fresh water for one or more years before migrating to the ocean.	High	Within species known range. Rearing and migratory habitat present in the assessment area with some observations documented in Yolo Bypass and Putah Creek.
Chinook salmon - Sacramento River winter-run ESU	*Oncorhynchus tshawytscha*	FE/SE	Inhabits larger river systems, primarily the Sacramento River below Shasta Dam. Juveniles require cool water over the summer period for rearing. Not directly associated with seasonal tributaries.	Low	Central Valley winter-run chinook salmon do not enter Putah Creek. Recent observations have occurred within the Yolo Bypass.
Chinook salmon - Central Valley spring-run ESU	*Oncorhynchus tshawytscha*	FT/ST	Inhabits larger stream and river systems. Adults require large, deep pool habitats in which to over-summer. Not directly associated with small, low-flow tributaries.	Low	Central Valley spring-run chinook salmon do not enter Putah Creek. Recent observations have occurred within the Yolo Bypass.
Central Valley steelhead	*Oncorhynchus mykiss irideus*	FT/--	Inhabits larger stream and river systems. Adults require large, deep pool habitats in which to over-summer. Not directly associated with small, low-flow tributaries.	Low	Central Valley steelhead are not known to enter Putah Creek. Recent observations have occurred within the Yolo Bypass.

Common Name	Scientific Name	Status[1] Fed/ State	Habitat[2]	Potential to Occur	Rationale[2]
Sacramento perch	*Archoplites interruptus*	--/SSC		Not Present	Sacramento perch do not enter Putah Creek. It is unlikely this species would be present on-site.
Amphibians					
California red-legged Frog	*Rana draytonii*	FT/SSC	Still, permanent bodies of freshwater, such as ponds, lakes, marshes, or slow flowing sections of creeks and streams. Traverse through, grasslands, riparian woodlands, oak woodlands, and coniferous forests.	Low	No suitable habitat in the site area: due to deeply incised channel, the area is riverine and lacks significant internal wetlands. There are few pond features within or nearby the project area, including stock ponds, to be available for habitat. Occasional bullfrogs have been observed in the project area. There are no CNDDB observations near the Project Area. The nearest critical habitat for the species is approximately 8.1 miles to the southwest.
California tiger salamander	*Ambystoma californiense*	FT/ST, SCC	Annual grassland, and occasionally along stream courses in valley-foothill riparian habitats. Subterranean refugia, especially burrows of California ground squirrels.[iii]	None	No suitable habitat is present and the nearest CNDDB observation near the Project Area is approximately 2.35 miles across the City of Davis.
foothill yellow-legged frog	*Rana boylii*	--/SSC	Gentle flowing, low-gradient stream sections, with variable substrate predominated by cobble and boulder.[iv]	Low	Site conditions are unsuitable for breeding. There is marginal dispersal habitat present, however the Project Area is outside the foothill yellow-legged frog range as identified by the California Wildlife Habitat Relationship [ds 589] from the CNDDB.
Reptiles					
giant garter snake	*Thamnophis gigas*	FT/ST	Marshes, sloughs, drainage canals, and irrigation ditches, especially around rice fields, and occasionally in slow-moving creeks. Locations with vegetation close to the water for basking.	Low	Most habitat within the Project Area is not suitable for giant garter snake. CNDDB maps this species near the Project Area with the majority of occurrences being approximately 12 miles to the north. The closest observation occurred in 1976 from an "unknown source."
western pond turtle	*Actinemys marmorata*	--/SSC	Calm waters, such as streams or pools, with vegetated banks and log or rock basking sites.[v]	High	Habitat is suitable for western pond turtle nesting and foraging. CNDDB maps this species within the Project Area. It is possible that western pond turtle will be present at the Project location.

Common Name	Scientific Name	Status[1] Fed/ State	Habitat[2]	Potential to Occur	Rationale[2]
Birds					
white-tailed kite	*Elanus leucurus*	--/FP	Oak woodlands or trees along marsh edges. Typical trees include eucalyptus, cottonwoods, toyons, and coyote brush.[vi]	High	Habitat is not ideal, forage in area. CNDDB maps this species within the Project Area. It is possible that this species may be present on-site and may nest in trees on or near the Project Area.
bald eagle	*Haliaeetus leucocephalus*	FD, BGEPA/ SE, SFP	Large bodies of water or rivers with abundant fish, uses adjacent snags or other perches; nests in advanced-successional conifer forest near open water.	None	No suitable habitat present.
northern harrier	*Circus cyaneus*	--/SSC	Nests, forages, and roosts in wetlands or along rivers or lakes, but also in grasslands, meadows, or grain fields.	Moderate	Found along lower sections of Upper Putah Creek. [vii] Limited suitable ground nesting habitat within Putah Creek Corridor.
Swainson's hawk	*Buteo Swainsoni*	--/ST	Open grassland areas with scattered trees. Nesting occurs in trees and shrubs that are isolated, clumped or part of shelterbelts.[viii]	High	Habitat is suitable for Swainson's hawk nesting and foraging. CNDDB maps multiple recorded occurrences of this species within the Project Area.
golden eagle	*Aquila chrysaetos*	BGEPA/ SFP	Open woodlands and oak savannahs, grasslands, chaparral, sagebrush flats; nests on steep cliffs or large trees.	Low	Marginal suitable habitat present. Incidental sightings, generally along lower reaches.
American peregrine falcon	*Falco peregrinus anatum*	FD/SFP	Nests on ledges of large cliff faces, cavities of coastal redwoods, buildings and bridges. Winter habitats include wetlands, woodlands, and other forested habitats.[ix]	Low	Foraging habitat is present, but no nesting habitat is present. Sightings are rare and historically only in winter and spring. The closest CNDDB record is approximately 5.74 miles from the site.
Ridgeway's rail	*Rallus obsoletus*	FE/SE, SFP	Salt and brackish water marshes, typically dominated by pickleweed and Pacific cordgrass.	None	No suitable habitat present and project area us outside of species range.
western snowy plover	*Charadrius alexandrinus nivosus*	FT/SSC	Primarily coastal beaches, sand pits, dune-backed beaches, sparsely-vegetated dunes, beaches at creek and river mouths, and dredged material disposal sites.[x]	None	No suitable habitat. The closest CNDDB record is approximately 5.52 miles from the site.
mountain plover	*Charadrius montanus*	--/SSC	Occupies open plains or rolling hills with short grasses or very sparse vegetation; nearby bodies of water are not needed; may use newly plowed or sprouting grain fields.	None	No suitable habitat is present.

Common Name	Scientific Name	Status[1] Fed/ State	Habitat[2]	Potential to Occur	Rationale[2]
California least tern	*Sternula antillarum browni*	FE/SE, SFP	Sparsely vegetated coastal beaches and estuaries near shallow waters, above high tide line.	None	No suitable habitat is present.
western yellow-billed cuckoo	*Coccyzus americanus*	FT/SE	Summer resident of valley foothill and desert riparian habitats; nests in mixed cottonwood-willow riparian woodlands with a mix of early and later-successional stages.	Moderate	Rare migrant in Yolo County. Few sightings of single birds along Putah Creek between 2005 and 2007, but was not documented nesting within the Project Area
burrowing owl	*Athene cunicularia*	--/SSC	Burrow sites occur in open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation; subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.[xi]	Low	No suitable habitat is present within the Putah Creek riparian corridor. CNDDB has mapped this species to within five miles of the site. Just outside of the riparian corridor numerous California ground squirrel burrows occur, but no signs characteristic of burrowing owl activity.
northern spotted owl	*Strix occidentalis caurina*	FT/SC, SSC	Large trees with many layers of branch cover. Hardwood forests with existing nest structure.[xii]	None	No suitable habitat and no CNDDB observations near the Project Area.
long-eared owl	*Asio otus*	–/SSC	Riparian habitat; nests in dense vegetation close to open grassland, meadows, riparian, or wetland areas for foraging.	Low	Rare sightings - there have been four sightings of long-eared owls during surveys between 1997 and 2009.
song sparrow (Modesto population)	*Melospiza melodia*	--/SSC	Dense vegetation, water source, semi-open canopies to allow light, and exposed ground or leaf litter.[xiii]	High	CNDDB has mapped this species to within 1 mile of the site. Habitat at the Project location is suitable for use by this species. Therefore, it is possible that *Melospiza melodia* would be present at the Project location.
olive-sided flycatcher	*Contopus cooperi*	–/SSC	Breeds in primarily advanced-successional conifer forests with open canopies.	Low	Only foraging habitat is present.
willow flycatcher	*Empidonax traillii*	–/SE	Dense brushy thickets within riparian woodland often dominated by willows and/or alder, near permanent standing water; uses brushy, early-succession forests (e.g., clearcuts) in the Pacific Northwest.	Low	Migrants documented along Putah Creek corridor. Very low likelihood of breeding in early successional riparian habitats due to parasitic brown-headed cowbird.
least Bell's vireo	*Vireo Bellii pusillus*	FE/SE	Dense riparian shrubs near flowing water or dry watercourses in the desert.[xiv]	Low	CNDDB has mapped this species to within 1 mile of the site. Habitat at the Project location is suitable for use by this species. However, this species was observed downstream of the most downstream portion of the Project Area. While possible this species may be

Common Name	Scientific Name	Status[1] Fed/ State	Habitat[2]	Potential to Occur	Rationale[2]
					observed downstream of I-80 to Old Davis Road, it is not likely to occur upstream of that reach due to habitat restrictions.
purple martin	*Progne subis*	--/SSC	Open, grassy areas and forest openings near streams, rivers, marshes, ponds, or lakes. [xv]	Low	Foraging habitat only. CNDDB nearest observation of purple martin's is approximately 7.52 miles away. It is possible that purple martin's will be present at the Project locations.
bank swallow	*Riparia riparia*	--/ST	Nests in vertical bluffs or banks, usually adjacent to water, where the soil consists of sand or sandy loam.	Low	Foraging habitat only. No suitable nesting habitat. Rarely detected foraging within the Project Area.
yellow warbler	*Dendroica petechia*	--/SSC	Open-canopy, deciduous riparian woodland in close proximity to water along streams or wet meadows.	Low	Suitable foraging habitat is present. Migrants known to forage, but not nest along Putah Creek.
yellow-breasted chat	*Icteria virens*	--/SSC	Nests in dense vegetative cover of riparian areas; often nests in willow or mulefat; forages in dense, stratified canopy	Low	Rare sightings along Putah Creek. Marginal suitable habitat is present.
grasshopper sparrow	*Ammodramus savannarum*	--/SSC	Typically found in moderately open grasslands with scattered shrubs.	None	No suitable habitat present.
tricolored blackbird	*Agelaius tricolor*	--/SC, SSC	Open accessible water, protected nesting substrate, and foraging space.[xvi]	Moderate	Habitat is suitable for tricolored blackbird nesting and foraging. CNDDB maps occurrences of this species within the 1 mile of Project Area. It is unlikely that tricolored blackbird will be present at the Project locations. If present, the location will most likely be at the far eastern extent of the Project Area.
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	–/SSC	Breeds almost entirely in open marshes with relatively deep water and tall emergent vegetation such as such as bulrush or cattails; nests are typically in moderately dense vegetation; forage within wetlands and surrounding grasslands and/or croplands.	Low	Rare to uncommon species along Putah Creek.
Mammals					
American badger	*Taxidea taxus*	--/SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats; needs sufficient food, friable soils and open, uncultivated ground; preys on burrowing rodents; digs burrows.[xvii]	None	No suitable habitat is present. The closest CNDDB record is approximately 2.27 miles from the site.

Common Name	Scientific Name	Status[1] Fed/ State	Habitat[2]	Potential to Occur	Rationale[2]
pallid bat	*Antrozous pallidus*	--/SSC	Coniferous forests, brushy terrain, rocky canyons, open farm land, and desert. Primarily oak tree habitat in Northern California.[xviii]	Moderate	May roost in riparian tree hollows. The closest CNDDB record is approximately 2.26 miles from the site.
western red bat	*Lasiurus blossevillii*	--/SSC	Riparian forests, woodlands near streams, fields and orchards.	Moderate	Not documented, but roosting habitat present in riparian forest in assessment area
California ringtail	*Bassariscus astutus raptor*	--/SFP	Mixture of forest and shrub habitats in association with rocky areas or riparian habitats, low to middle elevations.	Low	Suitable habitat present in riparian woodland.
salt marsh harvest mouse	*Reithrodontomys raviventris*	FE/SE, SFP	Saline emergent wetlands, preferably with pickleweed.	None	No suitable habitat present and outside of species' range.

[1] Status Codes:

Federal:
FE = Federally listed as endangered under the ESA
FT = Federally listed as threatened under the ESA
FC = Federal candidate species
FSC = Federal species of concern
FD = Federally delisted
BGEPA = Federally protected under the Bald and Golden Eagle Protection Act
-- = no status

State
SE = State listed as endangered under the California ESA
ST = State listed as threatened under the California ESA
SC = State candidate species
SSC = CDFW Species of Special Concern
SD = State delisted
SFP = State Fully Protected
-- = no status

[2] Many species habitat descriptions and potential to occur rationale was provided by Stillwater Sciences and Vollmar Natural Lands Consulting. 2015. *Habitat Assessment for the Lower Putah Creek Restoration Project—Upper Reach.* Prepared for Yolo Basin Foundation.

[i] CDPR, 2014. Endangered Species Project: Vernal Pool Shrimp. (http://www.cdpr.ca.gov/docs/endspec/espdfs/vpool1.pdf) web accessed April 7, 2014.

[ii] EPA, 2010. Endangered Species Facts: California Freshwater Shrimp. (http://www.epa.gov/espp/factsheets/ca-fw-shrimp.pdf) web accessed April 7, 2014.

[iii] CWHR, 1997. California Wildlife Habitat Relationships System: California Tiger Salamander. Updated August 2005.

[iv] USFS, 2013. United States Forest Service: Foothill Yellow-legged Frog. (http://www.fs.fed.us/psw/topics/wildlife/herp/rana_boylii/ecology.shtml#Habitat) web accessed April 7, 2014.

[v] Stanford University, 2012. Stanford University Habitat Conservation Plan: Western Pond Turtle. (http://hcp.stanford.edu/turtle.html) web accessed April 7, 2014.

[vi] CDFWS, 1995. Stanislaus River Report: White Tailed Kite. (http://www.dfg.ca.gov/delta/reports/stanriver/sr4311.asp) web accessed April 3, 2014.

[vii] Truan, M.L., A. Engilis Jr., and J.R. Trochet. 2010. Putah Creek Terrestrial Wildlife Monitoring Program: Comprehensive Report 1997-2009. Department of Wildlife, Fish, and Conservation Biology, Museum of Wildlife and Fish Biology. University of California, Davis, CA.

[viii] Dechant, J. A., M. F. Dinkins, D. H. Johnson, L. D. Igl, C. M. Goldade, and B. R. Euliss. 2003. Effects of management practices on grassland birds: Swainson's Hawk. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Online. http://www.npwrc.usgs.gov/resource/literatr/grasbird/swha/swha.htm (Version 12DEC2003).

[ix] Defenders of Wildlife, 2014. Peregrine Falcon Fact Sheet. (http://www.defenders.org/peregrine-falcon/basic-facts) web accessed April 2, 2014.

[x] USFWS, 2014. Western Snowy Plover Species Profile. (http://www.fws.gov/arcata/es/birds/wsp/plover.html) web accessed April 3, 2014.

[xi] DFG (California Department of Fish and Game), 2012. Staff Report on Burrowing Owl Mitigation. State of California, Natural Resources Agency, Department of Fish and Game, Sacramento, California. March 7, 2012.

[xii] National Park Service: Muir Woods National Monument, Life of Spotted Owls, 2014. (http://www.nps.gov/muwo/naturescience/life-of-spotted-owls.htm) web accessed April 1, 2014.

[xiii] Shuford, W.D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: Modesto Song Sparrow Species Account.

[xiv] California Department of Pesticide Regulation, 2014. Least Bell's Vireo. (http://www.cdpr.ca.gov/docs/endspec/espdfs/lbv_bio.pdf) web accessed April 1, 2014.

[xv] Department of Energy and Environmental Protection: Purple Martin, 2011. (http://www.ct.gov/deep/cwp/view.asp?A=2723&Q=475076) web accessed April 3, 2014.

[xvi] Shuford, W.D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: Tricolored Blackbird Species Account.

[xvii] Williams, D.F., 1986 Mammalian Species of Special Concern in California. California Department of Fish and Game Report, Sacramento, California.

[xviii] Bolster, B.C., Ed., 1998. Terrestrial Mammal Species of Special Concern in California; Pallid Bat, *Antrozous pallidus. (*http://www.dfg.ca.gov/wildlife/nongame/ssc/docs/mammal/species/08.pdf) web accessed April 1, 2014.

APPENDIX F

Air Quality and Greenhouse Gas

Putah Creek Restoration Projects – Upper Reach Program EIR
Air Quality, GHG Emissions, and Energy
Appendix

Road Construction Emissions Model, Version 9.0. (9 pages)

Energy Usage Estimates (1 page)

RCHGROUP
planning & environmental consulting

Road Construction Emissions Model, Version 9.0.0

Daily Emission Estimates for -> Putah Creek Upper Reach Program EIR

Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	2.79	26.65	37.99	21.56	1.56	20.00	5.26	1.10	4.16	0.16	16,177.29	1.81	1.57	16,689.21
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (pounds/day)	2.79	26.65	37.99	21.56	1.56	20.00	5.26	1.10	4.16	0.16	16,177.29	1.81	1.57	16,689.21
Total (tons/construction project)	0.18	1.76	2.51	1.42	0.10	1.32	0.35	0.07	0.27	0.01	1,067.70	0.12	0.10	1,101.49

Notes:

Project Start Year ->	2023
Project Length (months) ->	6
Total Project Area (acres) ->	60
Maximum Area Disturbed/Day (acres) ->	1
Water Truck Used? ->	No

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Grubbing/Land Clearing	0	0	0	0	0	0
Grading/Excavation	106	0	2,520	0	800	0
Drainage/Utilities/Sub-Grade	0	0	0	0	0	0
Paving	0	0	0	0	0	0

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> Putah Creek Upper Reach Program EIR

Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	Total PM10 (tons/phase)	Exhaust PM10 (tons/phase)	Fugitive Dust PM10 (tons/phase)	Total PM2.5 (tons/phase)	Exhaust PM2.5 (tons/phase)	Fugitive Dust PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	0.18	1.76	2.51	1.42	0.10	1.32	0.35	0.07	0.27	0.01	1,067.70	0.12	0.10	999.26
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (tons/phase)	0.18	1.76	2.51	1.42	0.10	1.32	0.35	0.07	0.27	0.01	1067.70	0.12	0.10	999.26
Total (tons/construction project)	0.18	1.76	2.51	1.42	0.10	1.32	0.35	0.07	0.27	0.01	1067.70	0.12	0.10	999.26

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.

Road Construction Emissions Model
Data Entry Worksheet

Version 9.0.0

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells D10 through D24, E28 through G35, and D38 through D41 for all project types.
Please use "Clear Data Input & User Overrides" button first before changing the Project Type or begin a new project.

To begin a new project, click this button to clear data previously entered. This button will only work if you opted not to disable macros when loading this spreadsheet.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Input Type

Project Name	Putah Creek Upper Reach Program EIR	
Construction Start Year	2023	Enter a Year between 2014 and 2040 (inclusive)
Project Type For 4: Other Linear Project Type, please provide project specific off-road equipment population and vehicle trip data	4	1) New Road Construction : Project to build a roadway from bare ground, which generally requires more site preparation than widening an existing roadway 2) Road Widening : Project to add a new lane to an existing roadway 3) Bridge/Overpass Construction : Project to build an elevated roadway, which generally requires some different equipment than a new roadway, such as a crane 4) Other Linear Project Type: Non-roadway project such as a pipeline, transmission line, or levee construction
Project Construction Time	6.00	months
Working Days per Month	22.00	days (assume 22 if unknown)
Predominant Soil/Site Type: Enter 1, 2, or 3 (for project within "Sacramento County", follow soil type selection instructions in cells E18 to E20 otherwise see instructions provided in cells J18 to J22)	2	1) Sand Gravel : Use for quaternary deposits (Delta/West County) 2) Weathered Rock-Earth : Use for Laguna formation (Jackson Highway area) or the Ione formation (Scott Road, Rancho Murieta) 3) Blasted Rock : Use for Salt Springs Slate or Copper Hill Volcanics (Folsom South of Highway 50, Rancho Murieta)
Project Length	2.00	miles
Total Project Area	60.00	acres
Maximum Area Disturbed/Day	1.00	acre
Water Trucks Used?	2	1. Yes 2. No

Please note that the soil type instructions provided in cells E18 to E20 are specific to Sacramento County. Maps available from the California Geologic Survey (see weblink below) can be used to determine soil type outside Sacramento County.

http://www.conservation.ca.gov/cgs/information/geologic_mapping/Pages/googlemaps.aspx#regionalseries

Material Hauling Quantity Input

Material Type	Phase	Haul Truck Capacity (yd^3) (assume 20 if unknown)	Import Volume (yd^3/day)	Export Volume (yd^3/day)
Soil	Grubbing/Land Clearing	0.00	0.00	0.00
	Grading/Excavation	10.00	81.00	25.00
	Drainage/Utilities/Sub-Grade	0.00	0.00	0.00
	Paving			
Asphalt	Grubbing/Land Clearing			
	Grading/Excavation			
	Drainage/Utilities/Sub-Grade			
	Paving			

Mitigation Options

On-road Fleet Emissions Mitigation	
Off-road Equipment Emissions Mitigation	

Select "2010 and Newer On-road Vehicles Fleet" option when the on-road heavy-duty truck fleet for the project will be limited to vehicles of model year 2010 or newer
Select "20% NOx and 45% Exhaust PM reduction" option if the project will be required to use a lower emitting off-road construction fleet. The SMAQMD Construction Mitigation Calculator can be used to confirm compliance with this mitigation measure (http://www.airquality.org/Businesses/CEQA-Land-Use-Planning/Mitigation).
Select "Tier 4 Equipment" option if some or all off-road equipment used for the project meets CARB Tier 4 Standard

The remaining sections of this sheet contain areas that require modification when 'Other Project Type' is selected.

Note: The program's estimates of construction period phase length can be overridden in cells D50 through D53, and F50 through F53.

Construction Periods	User Override of Construction Months	Program Calculated Months	User Override of Phase Starting Date	Program Default Phase Starting Date
Grubbing/Land Clearing	0.00	0.60	1/1/2023	1/1/2023
Grading/Excavation	6.00	2.70	4/1/2023	1/1/2023
Drainage/Utilities/Sub-Grade	0.00	1.80	11/1/2023	7/3/2023
Paving	0.00	0.90	12/1/2023	7/3/2023
Totals (Months)	6			

Note: Soil Hauling emission default values can be overridden in cells D61 through D64, and F61 through F64.

Soil Hauling Emissions User Input	User Override of Miles/Round Trip	Program Estimate of Miles/Round Trip	User Override of Truck Round Trips/Day	Default Values Round Trips/Day	Calculated Daily VMT
Miles/round trip: Grubbing/Land Clearing	0.00		0	0	0.00
Miles/round trip: Grading/Excavation	60.00		42	11	2520.00
Miles/round trip: Drainage/Utilities/Sub-Grade	0.00		0	0	0.00
Miles/round trip: Paving	0.00		0	0	0.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Draining/Utilities/Sub-Grade (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grubbing/Land Clearing (grams/trip)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Grading/Excavation	0.16	2.25	16.98	0.62	0.27	0.09	9,527.89	0.01	1.50	9,974.38
Tons per const. Period - Grading/Excavation	0.01	0.15	1.12	0.04	0.02	0.01	628.84	0.00	0.10	658.31
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons per construction project	0.01	0.15	1.12	0.04	0.02	0.01	628.84	0.00	0.10	658.31

Note: Asphalt Hauling emission default values can be overridden in cells D91 through D94, and F91 through F94.

Asphalt Hauling Emissions User Input	User Override of Miles/Round Trip	Program Estimate of Miles/Round Trip	User Override of Truck Round Trips/Day	Default Values Round Trips/Day	Calculated Daily VMT
Miles/round trip: Grubbing/Land Clearing	0.00		0	0	0.00
Miles/round trip: Grading/Excavation	0.00		0	0	0.00
Miles/round trip: Drainage/Utilities/Sub-Grade	0.00		0	0	0.00
Miles/round trip: Paving	0.00		0	0	0.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Draining/Utilities/Sub-Grade (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grubbing/Land Clearing (grams/trip)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons per construction project	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Worker commute default values can be overridden in cells D121 through D126.

Worker Commute Emissions	User Override of Worker Commute Default Values	Default Values		
User Input				
Miles/ one-way trip	20		Calculated Daily Trips	Calculated Daily VMT
One-way trips/day	2			
No. of employees: Grubbing/Land Clearing	0		0	0.00
No. of employees: Grading/Excavation	20		40	800.00
No. of employees: Drainage/Utilities/Sub-Grade	0		0	0.00
No. of employees: Paving	0		0	0.00

Emission Rates	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Grubbing/Land Clearing (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/mile)	0.02	0.91	0.07	0.05	0.02	0.00	317.66	0.00	0.01	319.68
Draining/Utilities/Sub-Grade (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grubbing/Land Clearing (grams/trip)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	1.04	2.75	0.29	0.00	0.00	0.00	68.26	0.07	0.03	79.50
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Grading/Excavation	0.12	1.85	0.15	0.08	0.03	0.01	566.28	0.01	0.01	570.83
Tons per const. Period - Grading/Excavation	0.01	0.12	0.01	0.01	0.00	0.00	37.37	0.00	0.00	37.68
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons per construction project	0.01	0.12	0.01	0.01	0.00	0.00	37.37	0.00	0.00	37.68

Note: Water Truck default values can be overridden in cells D153 through D156, I153 through I156, and F153 through F156.

Water Truck Emissions	User Override of Default # Water Trucks	Program Estimate of Number of Water Trucks	User Override of Truck Round Trips/Vehicle/Day	Default Values Round Trips/Vehicle/Day	Calculated Trips/day	User Override of Miles/Round Trip	Default Values Miles/Round Trip	Calculated Daily VMT
User Input								
Grubbing/Land Clearing - Exhaust								0.00
Grading/Excavation - Exhaust								0.00
Drainage/Utilities/Subgrade								0.00
Paving								0.00

Emission Rates	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Grubbing/Land Clearing (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Draining/Utilities/Sub-Grade (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grubbing/Land Clearing (grams/trip)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons per construction project	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Fugitive dust default values can be overridden in cells D183 through D185.

Fugitive Dust	User Override of Max Acreage Disturbed/Day	Default Maximum Acreage/Day	PM10 pounds/day	PM10 tons/per period	PM2.5 pounds/day	PM2.5 tons/per period
Fugitive Dust - Grubbing/Land Clearing			0.00	0.00	0.00	0.00
Fugitive Dust - Grading/Excavation			20.00	1.32	4.16	0.27
Fugitive Dust - Drainage/Utilities/Subgrade			0.00	0.00	0.00	0.00

Values in cells D195 through D228, D246 through D279, D297 through D330, and D348 through D381 are required when 'Other Project Type' is selected.

Off-Road Equipment Emissions

Grubbing/Land Clearing

Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Excavators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment

If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Grubbing/Land Clearing	pounds per day	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Grubbing/Land Clearing	tons per phase	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grading/Excavation

Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Excavators	0.19	3.34	1.59	0.08	0.07	0.01	512.77	0.17	0.00	518.29
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Generator Sets	0.31	3.67	2.72	0.13	0.13	0.01	623.04	0.03	0.00	625.12
			Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00			Model Default Tier	Off-Highway Trucks	1.05	6.82	7.40	0.27	0.25	0.03	2,655.29	0.86	0.02	2,683.88
2.00			Model Default Tier	Other Construction Equipment	0.68	5.27	6.85	0.26	0.24	0.02	1,798.95	0.58	0.02	1,818.31
			Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Rubber Tired Loaders	0.28	3.45	2.30	0.12	0.11	0.01	493.08	0.16	0.00	498.40
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grading/Excavation	pounds per day	2.51	22.55	20.85	0.86	0.80	0.06	6,083.13	1.79	0.05	6,144.00
Grading/Excavation	tons per phase	0.17	1.49	1.38	0.06	0.05	0.00	401.49	0.12	0.00	405.50

Drainage/Utilities/Subgrade Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier		ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Excavators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Drainage/Utilities/Sub-Grade	pounds per day	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drainage/Utilities/Sub-Grade	tons per phase	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Paving Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Excavators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles		Equipment Tier	Type		ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Paving		pounds per day		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Paving		tons per phase		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emissions all Phases (tons per construction period) =>					0.17	1.49	1.38	0.06	0.05	0.00	401.49	0.12	0.00	405.50

Equipment default values for horsepower and hours/day can be overridden in cells D403 through D436 and F403 through F436.

Equipment	User Override of Horsepower	Default Values Horsepower	User Override of Hours/day	Default Values Hours/day
Aerial Lifts		63		8
Air Compressors		78		8
Bore/Drill Rigs		221		8
Cement and Mortar Mixers		9		8
Concrete/Industrial Saws		81		8
Cranes		231		8
Crawler Tractors		212		8
Crushing/Proc. Equipment		85		8
Excavators	162.00	158		8
Forklifts		89		8
Generator Sets	84.00	84		8
Graders		187		8
Off-Highway Tractors		124		8
Off-Highway Trucks	417.00	402		8
Other Construction Equipment	255.00	172		8
Other General Industrial Equipment		88		8
Other Material Handling Equipment		168		8
Pavers		130		8
Paving Equipment		132		8
Plate Compactors		8		8
Pressure Washers		13		8
Pumps		84		8
Rollers		80		8
Rough Terrain Forklifts		100		8
Rubber Tired Dozers		247		8
Rubber Tired Loaders	165.00	203		8
Scrapers		367		8
Signal Boards		6		8
Skid Steer Loaders		65		8
Surfacing Equipment		263		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes	97.00	97		8
Trenchers		78		8
Welders		46		8

END OF DATA ENTRY SHEET

Construction Fuel Usage Diesel	Construction Fuel Usage Gasoline
965 MT CO2	34 MT CO2
10.16 kg/CO2/gal	8.89 kg/CO2/gal
94,987 gals Diesel	3,846 gals Gas

Source: U.S. Energy Information Administration, Carbon Dioxide Emissions Coefficients, February 2, 2016. https://www.eia.gov/environment/emissions/co2_vol_mass.php

Carbon Dioxide Emissions Coefficients by Fuel

Carbon Dioxide (CO_2) Factors:	Pounds CO_2 Per Unit of Volume or Mass	Kilograms CO_2 Volume or Mass	Pounds CO_2 Million Btu	Kilograms CO_2 Million Btu
For homes and businesses				
Propane	12.70/gallon	5.76/gallon	139.05	63.07
Butane	14.80/gallon	6.71/gallon	143.20	64.95
Butane/Propane Mix	13.70/gallon	6.21/gallon	141.12	64.01
Home Heating and Diesel Fuel (Distillate)	22.40/gallon	10.16/gallon	161.30	73.16
Kerosene	21.50/gallon	9.75/gallon	159.40	72.30
Coal (All types)	4,631.50/short ton	2,100.82/short ton	210.20	95.35
Natural Gas	117.10/thousand cubic feet	53.12/thousand cubic feet	117.00	53.07
Gasoline	19.60/gallon	8.89/gallon	157.20	71.30
Residual Heating Fuel (Businesses only)	26.00/gallon	11.79/gallon	173.70	78.79
Other transportation fuels				
Jet Fuel	21.10/gallon	9.57/gallon	156.30	70.90
Aviation Gas	18.40/gallon	8.35/gallon	152.60	69.20

APPENDIX G

Environmental HazardAssessment

SCREENING LEVEL ENVIRONMENTAL HAZARD ASSESSMENT
APPROXIMATELY 24.2-MILE STRETCH OF LOWER PUTAH CREEK

EXECUTIVE SUMMARY

BSK Associates (BSK) performed this screening-level Environmental Hazard Assessment of the approximately 24.2-mile proposed project area identified as Putah Creek extending from the downstream face of the Putah Diversion Dam (PDD) to the western boundary of the Yolo Bypass Wildlife Area (YBWA). This evaluation, encompasses the entire proposed project area including the creek's riparian area, banks, terraces, adjacent wetlands, and adjacent seasonally flooded riparian forest. Surrounding properties were screened to evaluate any potential impacts to the project area or associated site restoration activities from a known or an indicated release of hazardous substance or petroleum products. This assessment does not mean that these properties have had a release, or if they have, that that release may have contaminated the project area, simply that there is some potential for impact. Non-point sources were not considered in the evaluation since the objective of the document is to identify potential point source release and there is no indication of non-point source releases.

The project area throughout history has been used for agriculture purposes. Agriculture uses a variety of hazardous materials including fuel and maintenance fuels for farm equipment, fertilizers, herbicides, and insecticides. Common chemicals used for agricultural purposes, especially before 1970, have the potential to leave residual contaminants in the soils that can persist for decades. Inorganic chemicals containing heavy metals, including arsenic, lead, and mercury, were used prior to the 1950's and have the potential to accumulate in soil. In addition to agricultural chemicals, are aerially-deposited lead common with urban areas and adjacent to major roadways. Rail lines also contain a variety of chemicals associated with rail ballast, herbicides to control weeds, and diesel from spills. Older buildings have the potential to contain lead, asbestos, and PCBs associated with building materials or transformers.

PURPOSE

The purpose of the screening level-Environmental Hazard Assessment is to evaluate the potential for environmental conditions that would indicate a presence or likely presence of any hazardous substances or petroleum products in, on, or at a property due to any release to the environment, under conditions indicative of a release to the environment, or conditions that pose a material threat of a future release to the environment. This assessment was not completed under ASTM E 1527-13 so it does not qualify for due diligence requirements under the All Appropriate Inquiries standard (40 CFR Part 312). Rather, this assessment is limited to evaluating current conditions that could represent a potential release to the project area.

Property Vicinity and General Characteristics

Two urban area areas, the Cities of Davis and Winters, are located in proximity to the project area. Other land uses along the project are include open land, orchards, vineyards, single family farmsteads, residential community, row crops, and dry farming. The two urban areas have had a number of activities such as spills or leaks that could pose a potential threat to the project areas. Known activities include former leaking underground fuel storage tanks at gas stations and the landfill located at the UC Davis campus. These major threats appear to have been addressed, as discussed below.

ASSESSMENT PROCESS

Agency Record Review

BSK reviewed websites for the following regulatory agencies to obtain reasonably ascertainable and practically reviewable documentation regarding environmental conditions present at the subject property and nearby properties. Databases reviewed include:

- State Water Resources Control Board (SWRCB), GeoTracker Web Site
- Department of Toxic Substances Control (DTSC), EnviroStor Web Site and Record Search

1. Lowrie Truck: 9 Main Street E, Winters CA.

This was a Leaking Underground Storage Site (LUST) Cleanup Site located in downtown Winters, approximately 700 feet north of the Site (Figure 2). According to GeoTracker, an online database managed by the Central Valley Regional Water Quality Control Board (RWQCB), a leak from the underground gasoline storage tank was discovered in 1987. The Yolo County Department of Public Health issued a Site Closure letter on May 1, 1991. The letter stated the Site requires no further action (NFA) following the remediation of a former underground storage tank.

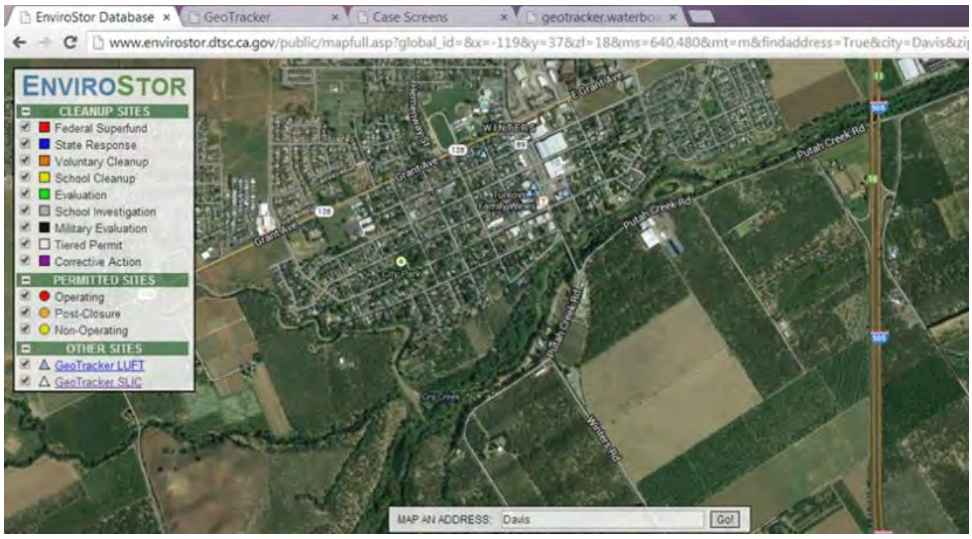


Figure 1: EnviroStor Database of Downtown Winters

2. Barbos'a Auto Center, 400 Railroad Ave, Winters California. Status: LUST Cleanup Site. Located in downtown Winters, 715 feet north of the Site. Three underground fuel storage tanks were removed in February 1995. As a result of a leak in at least one of the tanks, petroleum hydrocarbons were identified in the soil that resulted in numerous soil and groundwater investigations. Remedial efforts were taken that included soil excavation and treatment of the groundwater using ozone air sparging. Groundwater treatment was conducted from October 2006 to October 2010 and resulted in a decrease of the petroleum hydrocarbons. In June 2012 the RWQCB issued a NFA letter for the completion of the site investigation and remedial action.

3. Winters Fire Department 10 Abbey Street, Winters

Status: LUST Cleanup Site. Located in downtown Winters, 725 feet north of the Site. A leak was of detected at the property and as a result, in May 1994 one 550-gallon diesel and one 3,000-gallon gasoline UST were removed. Since the tanks and a significant amount of soil contamination were removed, the residual contamination was determined to pose a low risk. In December 1999, the RWQCB issued a NFA for the completion of a site investigation and remedial action of the UST release.

4. Laboratory for Energy-Related Health Research (LEHR), Old Davis Road, Davis

Status: Federal Superfund Site, Active. Site is undergoing remediation.

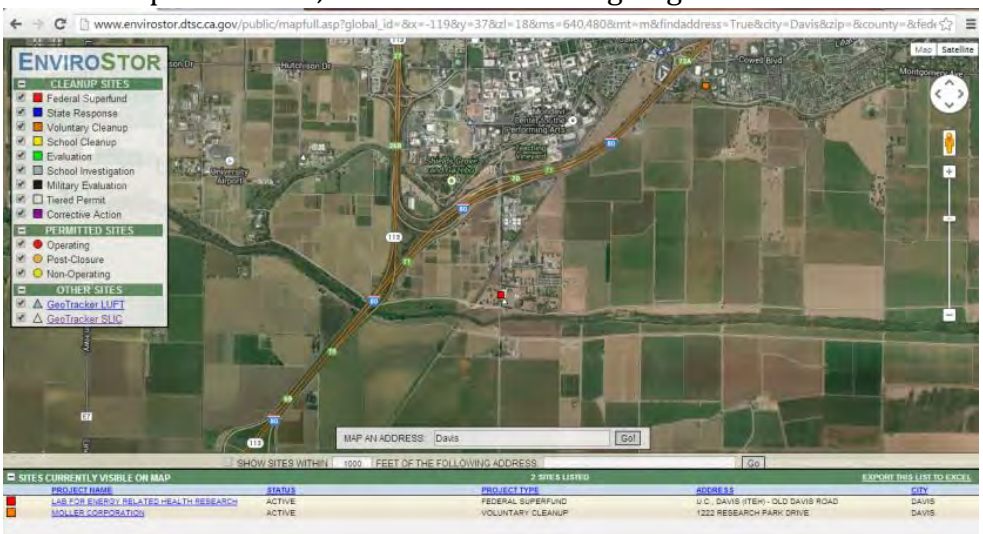


Figure 3: Location of LEHR Site (EnviroStor DTSC, 2014)

Located in south Davis, 355 feet north of the Site on approximately 15 acres. The LEHR Health Research/Old Campus Landfill (LEHR) site was placed on the federal superfund list in May 1994. Located south of the main campus, it is bounded by Putah Creek. The University of California at Davis (UCD) disposed of University wastes in separate landfills and trenches from 1940s through the mid-1960s. For approximately 35 years, Department of Energy (DOE) conducted radiological studies on laboratory animals (primarily dogs). Laboratory and animal wastes generated by those experiments were disposed of in trenches, pits, and septic systems. Soil and groundwater is contaminated in various areas, including the dog pens.

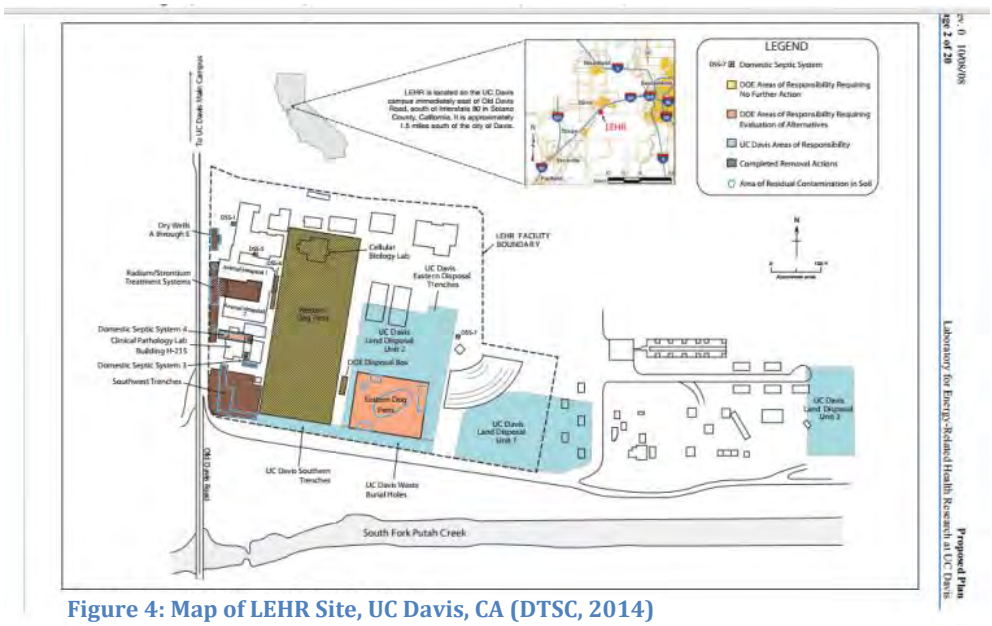


Figure 4: Map of LEHR Site, UC Davis, CA (DTSC, 2014)

Initial remedial actions to address the contamination included the removal of "bioparts," waste sludge and other radioactive materials and containers. Approximately 8,500 cubic yards of contaminated soil and debris were removed by 2008. The DOE and UCD are the responsible parties and have entered into agreements with state and federal environmental agencies (DTSC, RWQCB, and Environmental Protection Agency [EPA]) to address the contamination. DOE remains responsible for the areas impacted by the research. Following the soil removal, small areas of residual contamination remain. Constituents of concern include chromium, hexavalent chromium, mercury, molybdenum, selenium, cesium-137, stronium-90, radium-226, nitrate, dieldrin, and carbon-14. Contaminants of concern in the groundwater include chloroform, 1,2-dichloroprpane, and tetrachloroethene. A chloroform-contaminated groundwater plume is migrating in a northeast direction away from Putah Creek. Treatment of the groundwater consists of extraction and treatment and in-situ treatment. Institutional controls (including deed restrictions and a soil management plan), as well as monitoring with contingent remediation continue to be in effect to address and monitor the contamination. UCD is responsible for the cleanup of the three closed landfills, buried pits, and groundwater contamination.

Other Areas of Potential Concern

An assessment of nearby or adjacent properties was conducted by evaluating aerial images of properties bordering Putah Creek. Google Earth imagery dating from 1994 to 2013 were evaluated for land use activities that potentially represent an environmental impact and which may warrant additional evaluation, including site reconnaissance to determine if hazardous substance or petroleum products are used. There are a few locations that were visible features on the banks above the project site which may be storage tanks for agricultural refueling or chemical storage. Older farms often used fuel tanks, chemicals to repair and clean equipment, pesticides, and lead-based paints and asbestos-containing

building materials. The project does not propose to impact the upper banks or excavate earth from these areas. However, materials could be dumped into the creek or be located along access routes to the Creek.

CONCLUSIONS

BSK performed a screening–level Environmental Hazard Assessment of an approximately 24.2 mile stretch of Putah Creek, extending from the downstream face of the Putah Diversion Dam (PDD) to the western boundary of the Yolo Bypass Wildlife Area. This assessment has revealed historic environmental conditions related to former leaking underground storage tank sites located in the downtown Winters and the LEHR site in Davis. Additionally, environmental conditions may exist with farms located adjacent to the Putah Creek. While no documentation indicates a release, further assessment may be required at the locations to identify the existence of hazardous substances.

References: Yolo County 2030 General Plan EIR, Chapter IV. Setting Impacts, and Mitigation Measures M. Hazards and Hazardous Materials. LSA Associates, Inc. April 2009.