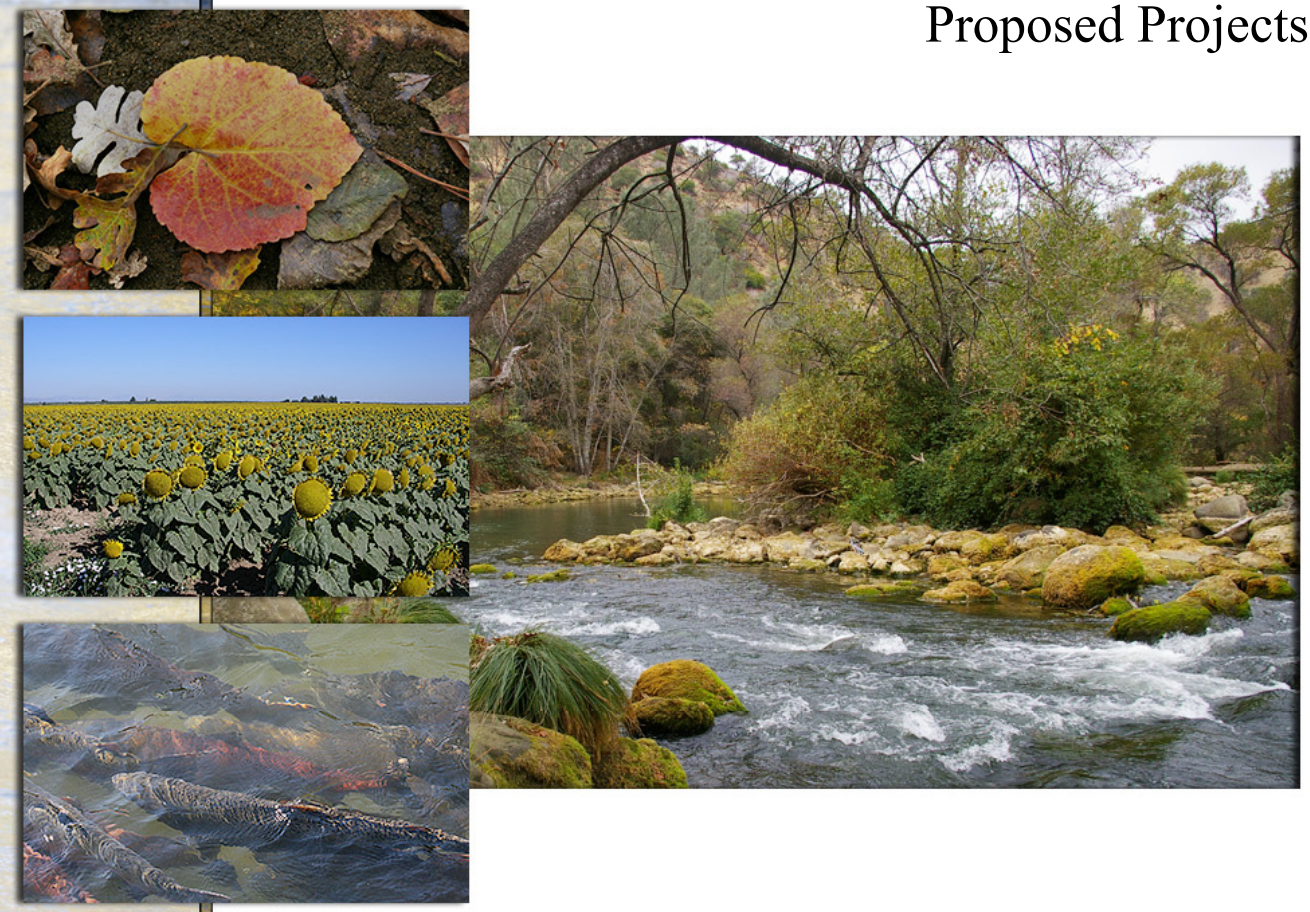
Lower Putah Creek
Watershed Management Action Plan

Proposed Projects



January 2008

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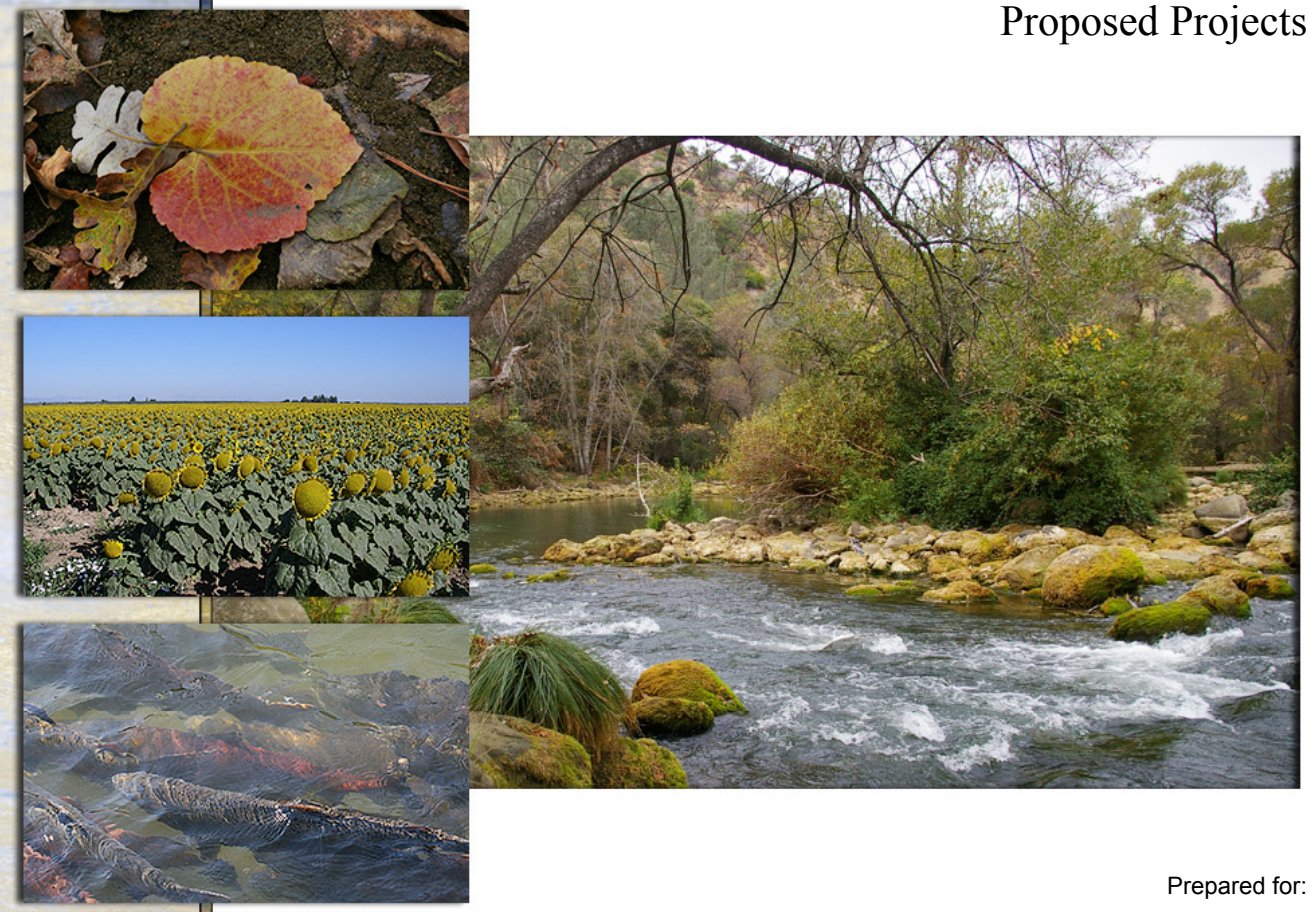

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The Lower Putah Creek Coordinating Committee (LPCCC) acknowledges the CALFED Watershed Program and the State Water Resources Control Board for their support and administration of this project with funds from the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002 (Prop 50). Without their support this important watershed resource enhancement document would not have been possible.

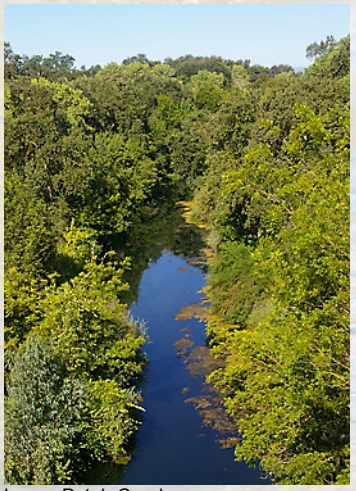
EXECUTIVE SUMMARY

The Lower Putah Creek Watershed Management Action Plan – Proposed Projects (WMAP – Projects) is the companion document to the Lower Putah Creek Watershed Management Action Plan – Resource Assessments (WMAP – Resource Assessments). Together they provide the resource information and stakeholder input to guide implementation of projects to enhance and restore the lower Putah Creek watershed.

The WMAP – Projects is intended for use by the Lower Putah Creek Coordinating Committee (LPCCC), landowners and land managers, and stakeholders concerned about the lower Putah Creek watershed. Chapter 4 presents a list of over 60 proposed projects on private and public properties along the creek that contribute to the **Overarching Goal** of the WMAP:

Restore and enhance the lower Putah Creek watershed to a self-sustaining ecological condition.

Chinook salmon are returning to lower Putah Creek



Lower Putah Creek

The proposed projects address resource issues discussed in Chapter 3, such as stream channel condition, invasive plants, and illegal dumping. Additionally, as described in Chapter 4, all of the proposed projects adhere to a set of seven guiding principles and are consistent with a list of five primary project types that are based on the findings of the resource assessments and consensus among stakeholders. In addition to the current list of proposed projects, it is expected that new project opportunities will continuously be identified and tiered according to the same ranking criteria established by stakeholders.

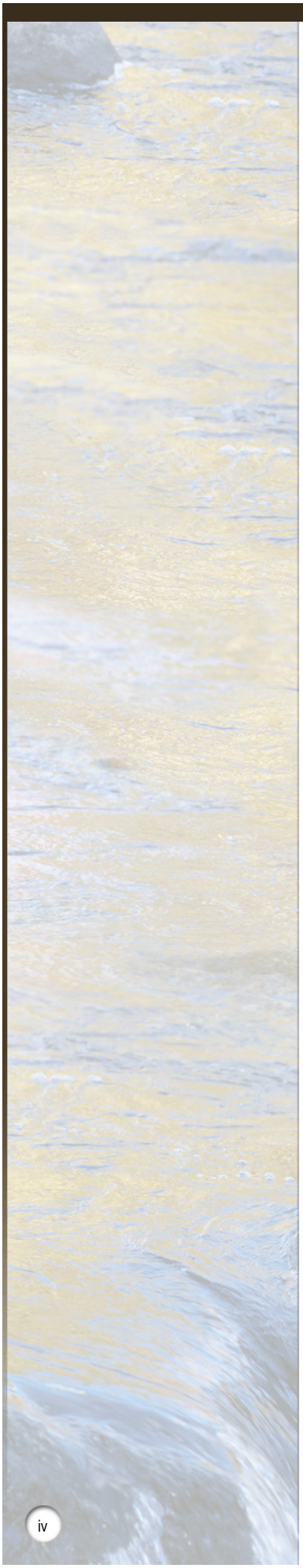
GUIDING PRINCIPLES

- Respect Private Property Rights
- Actions Only with Willing Participants
- Respect Local Knowledge
- Manage the Creek as a Community Asset
- Improve and Enhance Lower Putah Creek
- Consider a Wide Variety of Improvement and Enhancement Activities
- Employ Actions Consistent with Current Regulations and Policies

PROJECT TYPES

- Channel Restoration
- Bank Stabilization
- Habitat Enhancement
- Invasive Plant Removal
- Trash Cleanup

The WMAP – Projects is the culmination of 6 years of study and analysis. It presents the action plan for improving and enhancing the lower Putah Creek watershed for the next 5-10 years. Much work has already been done to improve and enhance the lower Putah Creek watershed. A selection of successfully completed projects is presented in Chapter 2. In addition to presenting resource issues and proposed projects, the WMAP – Projects outlines steps for successful project implementation (Chapter 4). Information about monitoring efforts in the watershed and a process for adaptive management is found in Chapter 5. Chapter 6 guides the process for future updates to the WMAP. Appendix A



summarizes the stewardship process (i.e., stakeholder input), and Appendices B – E provide information and resources to plan and implement the stakeholder selected and science-driven watershed restoration and enhancement projects along lower Putah Creek.

CHAPTER 1

INTRODUCTION

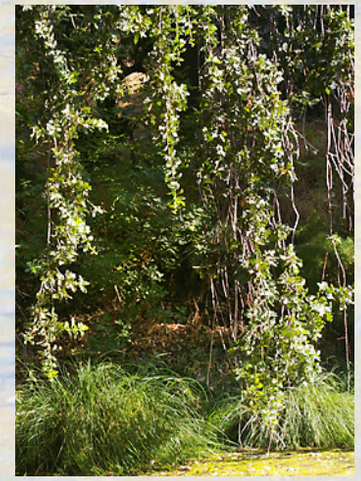
The lower Putah Creek watershed[1] is a prominent feature in the natural, social, and economic life of the people of Yolo and Solano counties. It provides water and natural resources that are essential to hundreds of thousands of farmers, residents, and businesses. It also provides significant habitat for hundreds of fish and wildlife species dependent on the rich natural plant communities and water in the Putah Creek riparian corridor.

The Lower Putah Creek Coordinating Committee (LPCCC) was established in 2000 as part of a historic water accord to provide water sufficient for fish, wildlife, and human needs. The LPCCC serves as the watershed group joining several primary stakeholders together to oversee implementation of the Putah Creek Water Accord (Accord), and to support planning for the enhancement and protection of Putah Creek's resources. The members of the committee include a riparian landowner; the cities of Davis, Fairfield, Suisun City, Vacaville, Vallejo, and Winters; counties of Solano and Yolo; Maine Prairie Water District; Putah Creek Council; Solano County Water Agency, Solano Irrigation District; and the University of California, Davis.

The LPCCC developed a Lower Putah Creek Watershed Management Action Plan (WMAP) to provide a comprehensive initial assessment of lower Putah Creek's resources and to determine, with input from watershed stakeholders, priority restoration and enhancement opportunities that would improve the health of the watershed and riparian corridor. Through the WMAP, the LPCCC pursues a scientifically based, community supported, comprehensive approach to watershed resource protection and enhancement that respects private property rights and values local knowledge.

While the LPCCC is primarily focused on Lower Putah Creek, it takes into consideration upstream and downstream issues that are of interest and relevance to lower Putah Creek, such as control of invasive species. The LPCCC coordinates with the Upper Putah Creek Stewardship on upstream issues including weed control and aquatic invertebrate studies. The LPCCC participates in the Lake Berryessa Partnership on annual cleanup events and water quality issues, and works with the Yolo Basin Foundation downstream on issues, such as the proposed fish bypass channel through the Yolo Wildlife Area. The LPCCC collaborates with the Sacramento River Watershed Program (SRWP) on issues of common interest and participates in regional planning through the Solano and Yolo Integrated Regional Watershed Management Plan (IRWMP).

This document represents Phase II (Proposed Projects) in the three-phase WMAP development process, as described below.

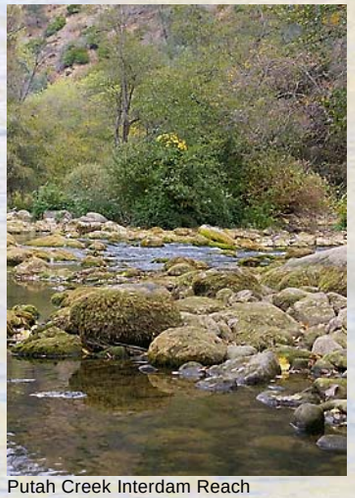


The Putah Creek riparian forest hosts many wildlife species including at least 199 bird, 31 mammal, 24 butterfly and 14 reptile and amphibian species.

The community recognizes the creek as an important local asset to protect.

[1] "Lower Putah Creek" is defined in this document as the main channel and riparian corridor of Putah Creek from Monticello Dam to the Yolo Bypass. The "lower Putah Creek watershed" includes the tributaries of the main channel. Pursuant to the 2000 Putah Creek Accord, the parties and LPCCC define "lower Putah Creek" solely as the main channel of Putah Creek from the Putah Diversion Dam to the Yolo Bypass, with the reach between Monticello Dam and Putah Diversion Dam referred to as the "interdam reach". The core area of responsibility for the LPCCC, as defined in the Accord, is the lower Putah Creek watershed from the Putah Diversion Dam to the Yolo Bypass. However, parties to the Accord have agreed that many issues such as siltation and invasive plant control cannot be adequately addressed without including the interdam reach and its tributaries. The LPCCC and the parties to the Accord have, therefore, agreed to include interdam reach projects in the WMAP on a case-by-case basis and to use the term "lower Putah Creek" to include the interdam reach in this document.

Dutchman's pipevine (*Aristolochia californica*) gets its name from the distinctive shape of the flower. It also hosts the pipevine swallowtail butterfly (*Battus philenor*)



Putah Creek Interdam Reach

1.1 Purpose and Organization of the Watershed Management Action Plan

The WMAP describes the existing and historical resources in the lower Putah Creek watershed, identifies stakeholders' goals and objectives for resource management and restoration, and proposes to implement those actions that are consistent with landowner interests to restore ecological processes (i.e. ecosystem) and enhance aquatic and terrestrial habitats. The lower Putah Creek riparian corridor is one of the largest remaining tracts of high-quality wildlife habitat in Yolo and Solano counties and is home to a unique assemblage of fish and wildlife species native to the Central Valley. However, it suffers from substantial invasive plant infestations, eroding banks, habitat loss and degradation, flood control related impacts, non-point source (NPS) pollution (chiefly sediment), and other problems. The WMAP identifies a unique opportunity to optimize benefits to fish, wildlife, and other resources in a manner compatible with and driven by landowner interests, goals, and objectives.

The WMAP is a dynamic plan that landowners and land managers throughout the watershed can use as a framework to restore and enhance the lower Putah Creek watershed ecosystem and resources for the next 5 to 10 years. It provides a blueprint for actions to protect and enhance resources in the lower Putah Creek watershed in a manner that is compatible with landowner priorities, interests, and concerns, especially respect for private property. Development and implementation of the WMAP is divided into three phases.

1.1.1 Phase I – Resource Assessments

Phase I of the WMAP consisted of comprehensive resource assessments, including cultural resources, land ownership and land use, water quality, geomorphology, hydrology, fisheries, vegetation and wildlife, and invasive weeds. The results of these assessments are summarized in Chapter 3 of this document. These and future assessments provide baseline conditions and methods for measuring future changes, the success of stewardship actions, and the need for modifying management approaches or assessing additional resources. Two documents were prepared in Phase I, the Watershed Management Action Plan – Resource Assessments (Volume 1) and the Watershed Management Action Plan – Map Volume (Volume 2). These are collectively referred to in this document as WMAP – Resource Assessments.

1.1.2 Phase II – Proposed Projects

Phase II of the WMAP focused on presenting the key findings and resource management questions identified in the Phase I resource assessments to stakeholders. Stakeholder responses and input to the Phase I findings were combined to develop scientifically-based, landowner-supported principles, goals, objectives, and project ideas for management of the lower Putah Creek watershed. Phase II culminated in the development of this document, the WMAP – Proposed Projects (WMAP – Projects).

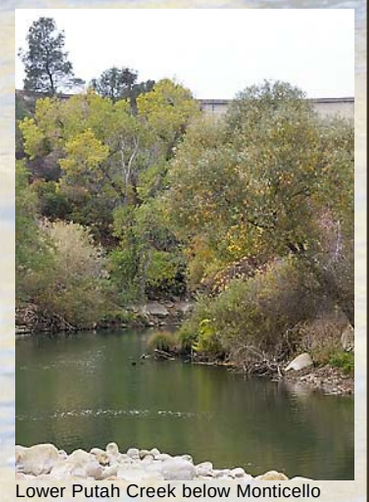
1.1.3 Phase III - Implementation

Phase III implements the WMAP. Implementation follows the recommended goals, objectives, and project ideas in the WMAP - Projects, depending on: funding, stewardship actions of landowners and management entities, permits and regulatory approvals, and the support of resource agencies and other stakeholders.

1.2 Approach and Organization of the WMAP – Proposed Projects

A series of stewardship meetings were conducted during spring and summer 2006 in Winters, California that involved as many as 100 stakeholders to develop a framework and process for selecting and prioritizing projects along lower Putah Creek, based on the findings of the WMAP – Resource Assessments. Chapter 2 presents a selection of

successful projects, and provides a means for tracking new projects and achievement of the goals and objectives of the WMAP. The WMAP will be informed by new data on a regular basis. Chapter 3 of this document includes a summary of the Resource Assessments. Chapter 4 describes the stewardship process and the resulting operating principles, goals, and objectives for the watershed, and prioritization of projects for implementation. Chapter 5 discusses the purpose of monitoring and adaptive management, and provides recommendations for project- and watershed-level monitoring efforts. Chapter 6 describes the process by which future WMAP updates will be considered and conducted. New project ideas will be developed for inclusion in future versions of the WMAP that arise from new assessments; completion, monitoring, and analysis of existing enhancement projects; ongoing input and interest from landowners; and guidance from resource experts. In this way, the WMAP will be continuously evaluated and adjusted through expanding community understanding of the creek and its resources. Appendix A summarizes the stewardship process (i.e., stakeholder input). Appendices B – E provide information and resources to plan and implement watershed restoration and enhancement projects along lower Putah Creek.



Lower Putah Creek below Monticello Dam

1.3 BRIEF HISTORY OF THE CHANGES TO LOWER PUTAH CREEK

Prior to the construction of Monticello Dam and the completion of the Solano Project in 1959, the lower Putah Creek watershed was subject to periodic flooding that affected Davis and Winters. The construction of an artificial channel, the South Fork of Putah Creek, between the 1870s and 1940s protected Davis from flooding, but Winters continued to flood as recently as the 1940s. Meanwhile, widespread overdraft of groundwater in Solano County threatened the viability of farms and municipal water supplies. The Solano Project, consisting of Monticello Dam, Putah Diversion Dam, and Putah South Canal, substituted surface water for groundwater supplies and provided water security for farms, cities, and industries. The resulting flows released from Putah Diversion Dam into lower Putah Creek were considerably less than prior to the Solano Project. The Accord, implemented in 2000, provided for regular year-round flows in lower Putah Creek below the Putah Diversion Dam. Today, the Solano Project provides water for 300,000 municipal water users; 70,000 acres of farmland; and perennial flows for lower Putah Creek. Since the early 1990s, many groups have formed and taken steps to improve the health of the creek. Major events in the history of lower Putah Creek are presented in Exhibit 1-1.

Putah Creek and Berryessa Valley prior to construction of Monticello Dam

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Approximately 1850-1930

TRENDS & CHALLENGES

- Agriculture development
- Urban development
- Flooding
- Erosion
- Property damage
- Introduction of nonnative vegetation
- Introduction of nonnative fish
- Mercury mining in the upper watershed

ACTIONS

- Widening of the channel
- Vegetation management
- South Fork excavation (1870s-1940s)
- Introduction of nonnative erosion control plants (e.g., Arundo)

RESULT

- Reduced flooding
- Reduced floodplain
- Reduced native and increased nonnative vegetation
- Reduced native fish habitat and fisheries
- Increased nonnative fisheries
- Loss and narrowing of riparian corridor

Approximately 1930-1980

TRENDS & CHALLENGES

- Increased urban and agricultural growth and water demands
- Increased use of groundwater; groundwater depletion
- Channel incising
- In-channel gravel mining

ACTIONS

- Percolation Dam built, 1938
- Monticello Dam built, 1957
- Solano Irrigation District formed
- Putah Diversion Dam built, 1957

RESULT

- Surface water for urban and agricultural use
- Reduced flows below Diversion Dam
- Creek dry in some years
- Reduced native fisheries and spawning habitat
- Reduced native vegetation
- Increased nonnative vegetation, fish, and wildlife

Approximately 1980-Present

TRENDS & CHALLENGES

- Drought years; substantially declining water storage
- Creek dried up without flows
- Erosion
- Accelerated channel incision
- Loss of fisheries
- Increasing nonnative vegetation and fish
- Loss of native riparian habitat

ACTIONS

- Putah Creek Council formed
- Lawsuit and Accord
- LPCCC formed; Stream-keeper hired
- U.S. Fish and Wildlife Service assessment
- WMAP resource assessment
- Stewardship planning meetings

RESULT

- Year-round flows in Putah Creek
- Planning and restoration grants obtained
- Invasive vegetation removal
- Habitat restoration
- Improved fisheries

Future

Without the WMAP

Creek as an ongoing maintenance issue:

- Nonnative vegetation and fish dominate
- Continued erosion and sedimentation
- Limited native fish habitat and populations

With the WMAP

Creek as community/regional asset:

- Primarily native vegetation
- Healthy riparian habitat
- Increased native fish community
- Increased diversity of native species
- Increased bird and wildlife populations

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Source: Data compiled by EDAW 2007

Major Events in the History of Putah Creek
Exhibit 1-1

CHAPTER 2

PROJECT DOCUMENTATION

The WMAP – Projects proposes to implement over 60 specific projects in the lower Putah Creek watershed over the next 5 to 10 years (Exhibit 4-2). In addition to conducting watershed monitoring to assess resource changes over time (see Chapter 5), the LPCCC is documenting completed projects. Multiple benefits are achieved by documenting and sharing project information. This chapter presents these benefits and discusses the type of information to be included in a project summary report.

A project summary report has many uses. The LPCCC can use these reports to demonstrate past successes when preparing proposals for funding. Innovative approaches and lessons learned during the planning and implementation of a project can be shared and used by others to better implement future projects. Together, the project summary reports tells the story of actions taken to improve the health of the lower Putah Creek watershed.

Project summary reports are intended to be succinct and focus on the major points of the project. The following is a list of components to include in a project summary report.

- **Project context and purpose** – Briefly describe the context, or background, and purpose of the project, including goals, objectives, and issues being addressed.
- **Project description** – Summarize the major points of the project, from planning and design through implementation and monitoring. Be sure to acknowledge the funding source(s) that funded the project and who was involved in the various project steps.
- **Photographs** – Before and after photographs document and convey the impact of a project. Include in the photographs areas adjacent to the project, but that will not be affected by the project, and mark that location for easy reference for later photos.
- **Project results and lessons learned** – Summarize the project success, the project actions and elements that worked well, and the things that did not go as planned or required modification. Focus on sharing the information that will help others better implement their projects.

Since 2001, the LPCCC has supported and coordinated a number of projects in the lower Putah Creek watershed. These projects have successfully addressed many of the issues discussed in the WMAP – Projects. The following section provides several examples of project summary reports prepared by the LPCCC.

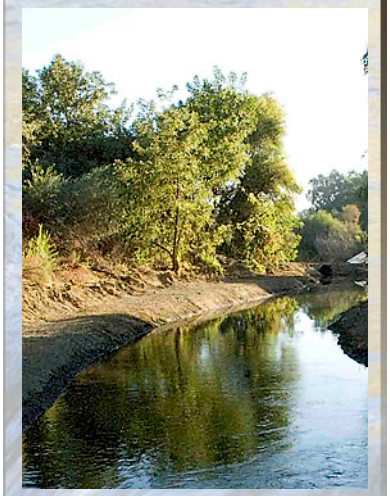
2.1 PROJECT SUMMARY REPORTS

2.1.1 DRY CREEK CONFLUENCE

History

The earliest known planting of arundo (false bamboo) in the lower Putah Creek watershed was on Hoskins Ranch, on the Pleasants Creek tributary, in the early 1960s. The planting was intended to control erosion on the banks of the creek that greatly accelerated after the completion of Monticello Dam. Experience at Dry Creek Confluence shows how arundo was unintentionally spread throughout the watershed and accelerated erosion by congesting the channel and causing the creek to severely erode the south bank. Prior to 1997, the low-flow channel of Putah Creek meandered through the center of the 600-foot-wide greater channel at the confluence of Dry Creek. By 1997, arundo was well established on the edges of the low-flow channel, trapping sediments in high flows and creating an unnatural levee that constricted flows. Due to overgrowth of arundo, the creek

Dry Creek Confluence Project



Dry Creek Confluence Project

abandoned this channel and began flowing up against the south bank. From 1997 to 2005, the creek continuously undermined the south bank threatening to undercut Putah Creek Road.

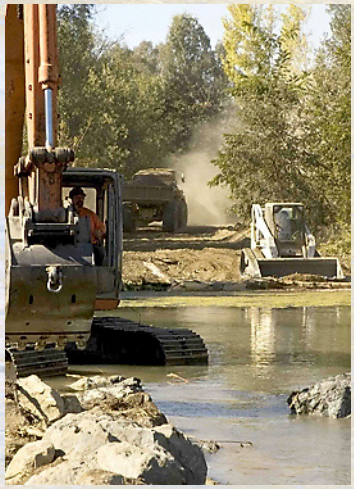
Action

In 2002, the LPCCC mowed the arundo and began treating it with aquatic-safe herbicides. The arundo was substantially eradicated by 2005 but the damage had been done and the high mounds that constricted the former channel were still there. The LPCCC hired Streamwise, a company specializing in bank stabilization to develop a plan for restoring the creek to its prior course.

In 2004, Solano County Public Works agreed to help fund the restoration of the channel as a comprehensive solution to protect Putah Creek Road from washing out. The California Wildlife Conservation Board (WCB) and the Department of Water Resources (DWR) Urban Streams Restoration Program also contributed funding that enabled the LPCCC to realign the channel of Putah Creek back into its pre-1997 course.

Result

Work was completed in 2005 just weeks ahead of a near-record high-flow event (12,500 cfs). The newly restored bank withstood this peak event and sustained high flows through May 2006. If the project had not been completed, Putah Creek Road likely would have collapsed into the channel necessitating costly repairs and leaving the channel in poor condition. In addition to providing security for Putah Creek Road, the project mobilizes gravel from Dry Creek to replenish salmon spawning habitat and provides over 3 acres of restored wildlife habitat.



Construction during the Hasbrook-Kilkenny Channel Restoration Project

Completed rock W-weir at the Hasbrook-Kilkenny Project site

2.1.2 Hasbrook-Kilkenny Channel Restoration

History

John Hasbrook built the first rock weir across Putah Creek as part of a low-water crossing that was also intended to improve fish habitat. Pacific lamprey spawned in the constructed riffle above the weir, one of only two known spots where lampreys have spawned in Putah Creek. The Hasbrook-Kilkenny Project began as a U.S. Fish and Wildlife Service (USFWS) Partners for Wildlife Grant to improve the rock weir by shaping it in a more stable ‘w’ pattern that would deflect flows away from the bank and concentrate flows in the center of the channel, creating a persistent scour hole. At bank full flows (about 600 cfs), the weir forms two distinct eddy patterns, each in the form of a ‘v’ pointed downstream. This indicates convergent flows creating two scour holes below the structure. At higher flows, the eddy lines converge into a single ‘v’ pattern pointing farther downstream. Even when the entire weir is submerged, the flows continue to be deflected away from the bank protecting the crossing and creating a single, larger scour hole extending farther downstream.

Action

The two scour holes created by w-weirs have become prime fish habitat on Putah Creek. The Hasbrook weir is the most downstream reach where salmon and trout have been found in late summer. The highly oxygenated pool below the weir compensates for relatively high water temperatures in late summer that these fish could not otherwise survive.

In 2004, the WCB agreed to extend the project to the adjacent Kilkenny property downstream with two additional w-weirs and eucalyptus log revetments to narrow the creek to more functional dimensions. Eucalyptus trees were removed from the Hasbrook and Kilkenny properties and processed into root wads: trunks and stubs of major limbs

with root ball attached. These were placed parallel to the bank and counter-weighted with rock to narrow the channel and improve fish habitat.

Result

In spring 2006, flows reached the second highest peak in 30 years (12,500 cubic feet per second), and high flows were sustained from January through early May as the Glory Hole spilled continuously for all but one day. The rock weirs and log revetments withstood this extreme test, remaining intact except for some minor pockets of scour on the upstream end. Techniques such as rock weirs and log revetments can be used to narrow over-widened reaches and increase the diversity of fish habitat wherever depths are suitable (less than 3 feet).

2.1.3 Hoskins Ranch Project

History

The current owner of Hoskins Ranch, Ethel Hoskins, is descended from the original settlers of the area. She recalls her grandfather planting arundo (false bamboo) in the early 1960s at the recommendation of the Soil Conservation Service (now Natural Resources Conservation Service [NRCS]) along the banks of Pleasants Creek to deter erosion. The banks began to erode soon after Monticello Dam was completed due to the effect of water storage on the tributary channels including Pleasants Creek. The arundo spread across the floor of the channel obstructing flows and eventually making the bank erosion much worse as water was deflected into the bank, causing undermining and collapse of the banks due to gravity.

Action

Thanks to grants from the USFWS, the NRCS, and the WCB, the arundo was eventually eradicated and the banks restored to stable slopes. The stream channel was realigned and rock vanes were installed to deflect high flows from the previously eroding bank.

Result

The arundo has been removed and the slopes are better protected against future erosion. The rock vanes at the outer edge of the meander bend protect the bank against scour, even when overtopped at high flows.

2.1.4 Solid Waste Clean-up

History

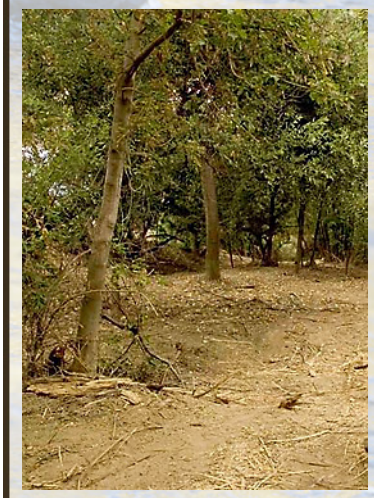
Solid waste has been dumped on the banks of Putah Creek since before there were public landfills. Pockets of solid waste are often found in old gullies where irrigation water had escaped from agricultural fields and washed a hole in the bank. Other sites were old burn dumps where trash was accumulated and burned. These legacy sites have been largely cleaned up with assistance of the Cal-EPA Integrated Waste Management Board under grants from the Farm and Ranch Clean-up Program.

Illegal dumping is an ongoing problem at sites where public roads provide access to the top of the bank or where unauthorized vehicles can enter the creek channel. Putah Creek Road below Highway 505 has had a chronic problem with illegal dumping that has largely abated since vehicle barriers were installed to prevent unauthorized vehicle access. Stevenson's Bridge remains one of the worst sites for illegal dumping in spite of clean-up events two and three times per year.

Hoskins Ranch on Pleasants Creek before restoration

Hoskins Ranch after restoration

Creek Clean-up Day along Putah Creek



Riparian forest after removal of Himalayan blackberries during the Yolo Housing Authority Creek Restoration Project

Eucalyptus logs cut on site were used to stabilize the bank for the Yolo Housing Authority Creek Restoration Project

Action

Spring and fall clean-up events and other focused clean-up events are organized by Putah Creek Council. The LPCCC, with funding from the CALFED Watershed Program and local implementation partners including Putah Creek Council, Winters Audubon, Center for Land-Based Learning, Solano Resource Conservation District (RCD), and Yolo County RCD, will be planting the edge of Putah Creek Road where it runs along the top of the bank to provide a vegetative barrier to illegal dumping and unauthorized vehicle access.

2.1.5 Yolo Housing Authority Creek Restoration Project

History

The Yolo Housing Authority (YHA) site is a public housing facility ¾ mile east of Highway 505 on Russell Blvd in Winters. It has 8 acres of riparian habitat that was mostly neglected until 2002. CALFED and the State Water Resources Control Board awarded a grant to remove weeds and trash, restore native vegetation, and improve fish habitat. Residents of the housing facility participated in all phases of the project with assistance from U.C. Davis Public Service Research Program and Audubon-California.

Action

The project removed 60 mature eucalyptus trees from a steep bank using benches cut into the slope to allow access by heavy equipment without disturbing the edge of the creek. The project also removed 2.5 acres of Himalayan blackberry and hundreds of stems of tree-of-heaven. The blackberries were sprayed in early winter when the intermingled native vegetation was dormant and unaffected. The next spring, the native vegetation sprouted with no sign of herbicide injury and there was nearly complete control of the blackberries.

Result

Eucalyptus logs were reused on site to hold the edge of the lower bench against erosion, leaving behind a permanent equipment access in what had been a steep and inaccessible slope. Use of the logs on site also reduced the cost of eucalyptus removal by half. Slash was chipped and spread on the site as mulch. The project removed over 150 stems of tree of heaven and stacked the slash in piles for burning.

Silt that had been trapped by the blackberries scoured away exposing long buried trash. Ten dump truck loads of trash were removed. After the dead canes were removed, and the floodplain had scoured down to more functional elevation, native vegetation sprouted naturally from seed in the new clearings.

The fish habitat was improved by installing two rock weirs to diversify fish habitat and hold back spawning gravels and narrowing over-widened reaches of the channel to create more favorable flow velocities.

CHAPTER 3

RESOURCE ASSESSMENTS

This chapter briefly describes the Putah Creek watershed and summarizes the findings of the resource assessments completed in Phase I. These findings, combined with stakeholder input, were used to inform the development of project ideas and priorities discussed in Chapter 4, "Watershed Enhancements."

3.1 WATERSHED DESCRIPTION

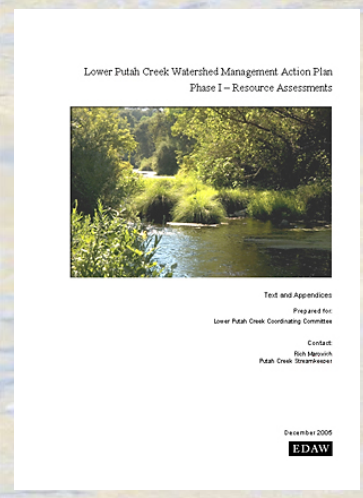
The lower Putah Creek watershed is a significant element in the natural, social, and economic life of the people of Yolo and Solano counties. It provides water and natural resources to hundreds of thousands of residents, farmers, and businesses in Solano County, including municipal water for Fairfield, Suisun City, Benicia, Vacaville, and Vallejo, and irrigation water to farms throughout Solano County and to farms along Putah Creek in Yolo County. The watershed also provides essential habitat for hundreds of fish and wildlife species dependent on the rich natural plant communities and water in the Putah Creek riparian corridor, including many obligate riparian species that occur only in the scarce riparian habitat. The greater Putah Creek watershed begins in the Coast Ranges of Lake County and drains about 600 square miles of steep Coast Range mountains. Flows converge on Lake Berryessa, which was formed by construction of Monticello Dam in a narrow pass called Devil's Gate. Regionally, the Putah Creek watershed is part of northern California's extensive Sacramento River watershed. It is located adjacent to the Cache Creek watershed, which drains the Coast Ranges north of the Putah Creek watershed. The lower Putah Creek watershed includes all of Putah Creek and its major tributaries between the Monticello Dam at Lake Berryessa and the Toe Drain of the Yolo Basin (or Bypass) that connects Putah Creek to the Sacramento-San Joaquin Delta and the Pacific Ocean (Exhibit 3-1).

3.2 FINDINGS OF THE RESOURCE ASSESSMENTS

The information in this chapter comes from the WMAP - Resource Assessments (LPCCC 2005) and the experience and knowledge of people who live and work in the lower Putah Creek watershed. Findings to be discussed include: land ownership, land use, and private property issues; public access and recreation on lower Putah Creek; Illegal dumping and solid waste removal; invasive plants and weed management; stream channel and floodplain condition; riparian corridor condition; wildlife and wildlife habitat condition; fish and fish habitat condition; and cultural resources.

3.2.1 LAND OWNERSHIP, LAND USE, AND RESPECT FOR PRIVATE PROPERTY

More than three-fourths of the land along the lower Putah Creek corridor remains in private ownership. Therefore, much of the stream corridor is not accessible to the general public. Private land uses adjacent to the riparian corridor include primarily agricultural production and rural residences. Urban residential land uses adjacent to the riparian corridor are concentrated in the City of Winters. Public land ownership adjacent to Putah Creek includes the City of Winters – Putah Creek Park; City of Davis – South Davis Preserve and Los Rios Farms Preserve; Lake Solano County Park; U.C. Davis – Stebbins Cold Canyon Natural Reserve and Putah Creek Riparian Preserve; and California Department of Fish and Game (DFG) – Putah Creek Wildlife Area, Fishing Accesses 1 through 5, and Yolo Basin Wildlife Area. Public recreational opportunities vary by public land area and include: hiking, fishing, hunting, swimming, non-motorized boating, and wildlife viewing.

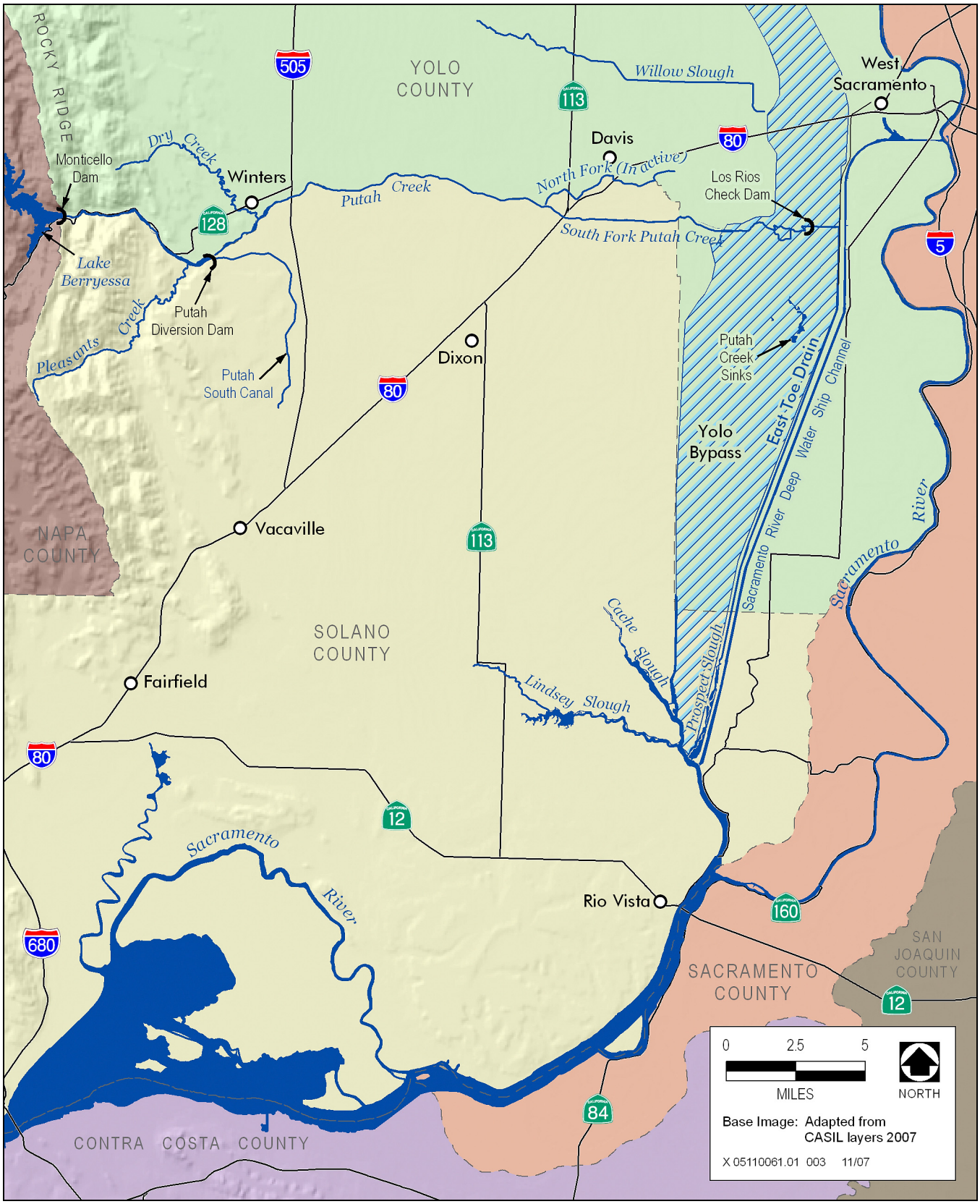


Lower Putah Creek Watershed Management Action Plan-Resource Assessments was completed December 2005

The WMAP - Resource Assessments included

- Land Ownership, Land Use, and Resource Management Programs
- Geomorphology, Hydrology, and Water Quality
- Fisheries
- Vegetation and Wildlife
- Invasive Weeds
- Cultural Resources

Trespass is an issue of concern for land owners on Putah Creek



Source: Data compiled by EDAW 2007

Lower Putah Creek Watershed **Exhibit 3-1**

Respect for private property is the most important issue along lower Putah Creek. Landowners who choose to participate in creek restoration projects grant limited access for project purposes. Creek restoration would not be possible without their permission. The LPCCC practices and promotes respect for private property and joins with landowners to deter trespass. Trespass diminishes privacy and security of private lands. Trespass also leads to secondary problems including: damage associated with unauthorized vehicle access, theft, wildfire and illegal dumping.

3.2.2 Public Access and Recreation on Public Lands

The lower Putah Creek watershed is uniquely situated between the Sacramento region and Bay Area. Population growth in the lower Putah Creek watershed and the greater Sacramento-Bay Area region places increased pressure for recreational opportunities on public lands along lower Putah Creek. Development of recreational opportunities on public lands helps to deter unauthorized access to private lands.

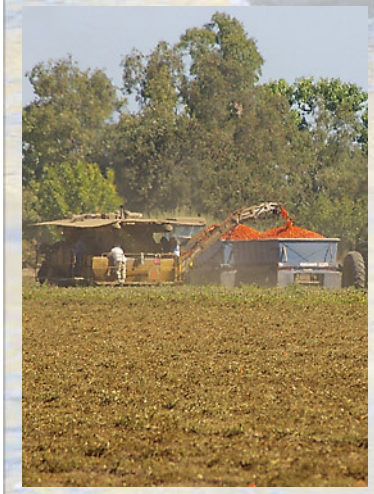
The level of development of recreational facilities and intensity of use varies on lower Putah Creek. Greater development and intensity of use occurs in the interdam reach, between Monticello and Putah Diversion Dams, which is the uppermost reach of lower Putah Creek. A developed trail system draws many hikers to the University of California Natural Reserve System's Stebbins Cold Canyon Reserve, just downstream of Monticello Dam. The interdam reach also supports a popular coldwater fishery. Anglers access Putah Creek through five DFG-owned fishing access points that are managed by Yolo County Parks Department. Camping, picnicking, swimming, non-motorized boating, fishing, and other activities are accommodated at Lake Solano County Park located off Highway 128 on the south side of Putah Creek. The park is managed by Solano County.

The level of development of recreational facilities and opportunities for varied recreational opportunities decreases downstream of the Putah Diversion Dam. Winters Putah Creek Park, managed by the City of Winters, occupies most of a 1-mile riparian corridor adjacent to Winters, and provides limited opportunities for recreation due to overgrowth of weeds and the primitive condition of trails. Primary uses include swimming, fishing, picnicking, and nature viewing. The City of Winters has updated its master plan for the park, formed a Winters Putah Creek Park Committee, and is controlling weeds and developing better access in cooperation with the LPCCC. Farther downstream, the U.C. Davis Putah Creek Riparian Reserve on the U.C. Davis campus offers users limited opportunities for hiking, biking, fishing, boating, picnicking, and nature viewing. Public uses along this 4-mile stretch of Putah Creek can be restricted due to the use of the reserve for research purposes. In the reach farthest downstream, the City of Davis manages the South Fork Preserve, east of Mace Blvd. Recreational opportunities include hiking and nature viewing. Below this, Putah Creek flows into and through the DFG-managed Yolo Bypass Wildlife Area. The extensive wildlife area offers the public further opportunities for hiking, nature viewing (bird watching is a primary activity), and hunting.

The Putah Creek Discovery Corridor Cooperative is an association of public agencies led by the U.C. Davis Public Service Research Program that is coordinating access to public lands and educational opportunities.

3.2.3 Solid Waste Removal

Finding solutions to ongoing illegal dumping and cleaning up legacy solid waste dump sites are consensus issues. Illegal dumping is an ongoing issue on both public and private property, especially where Putah Creek Road provides access to the top of the bank. Illegal dumping and legacy dump sites are a blight on the natural beauty of the creek. Solid wastes are considered "gross pollutants" whether or not they significantly impact water quality. Even inert items like waste concrete interfere with restoration projects and



Agricultural production adjacent to the Putah Creek riparian corridor

Lake Solano County Park

Putah Creek Nature Park near Winters

must be removed before other work can proceed. Frequently, solid wastes are obscured by vegetation overgrowth and are not discovered until projects are well underway. There is time value to removing solid wastes since extant piles of trash tend to invite more illegal dumping. Through the efforts of the LPCCC and others, all of the known legacy solid waste dump sites have been removed. However, undiscovered or unreported legacy solid waste dump sites may still exist along Putah Creek.

3.2.4 Invasive Plants

Many plants have been introduced to California and to the Central Valley region, but proportionately few are considered to be invasive. Plants are considered invasive if they exhibit one or more of the following characteristics: invasive and habitat transforming, a threat to native species biodiversity, a threat to infrastructure, or not naturalized. The establishment and spread of many invasive plants (weeds) within the Putah Creek watershed have had substantial adverse effects on the ecosystem.

A total of 21 invasive plant species have been mapped in the lower Putah Creek riparian corridor. Invasive plant infestations cover over 200 acres, or about 10% of the lower Putah Creek riparian corridor (LPCCC 2005, Marovich 2007 pers. comm). The most abundant invasive plants within the riparian corridor are arundo, eucalyptus, Himalayan blackberry, Eurasian watermilfoil, perennial pepperweed, tamarisk, tree-of-heaven, and yellow starthistle. Eucalyptus is the most extensive, with 302 infestations covering 24 acres, while arundo exhibits the largest number of infestations (406) covering 21 acres. Invasive plant infestations have reduced native plant and animal species presence in certain areas, decreased diversity of plant species, contributed to bank erosion and elevation of floodplains, and have played a role in spreading wildfires.

Additional invasive plant species occur along Putah Creek which were too extensive or remote to map, including herbaceous weeds and hybridized black walnut trees. Hybrid black walnuts are considered to have extensively colonized Putah Creek from adjacent walnut orchards' rootstock. Solutions for removing invasive plants and restoring native riparian habitat are discussed in Chapter 4.

3.2.5 Stream Channel and Floodplain Condition

Lower Putah Creek has been subject to substantial human modification since the late 1800s. The most significant change to the watershed was the completion of the Solano Project (Monticello Dam, Putah Diversion Dam, and Putah South Canal) in 1959. The Solano Project substituted surface water for diminishing groundwater supplies to the agricultural and municipal uses in Solano County. Although the Solano Project was not designed nor managed for flood protection, it provides incidental benefits by capturing or attenuating peak flood flows. When the Glory Hole is spilling, peak inflows are buffered by Lake Berryessa, resulting in longer intervals of lower flows below the dam. Water storage at Lake Berryessa inverted the ratio of flows from the main channel compared with the tributary channels such as Pleasants Creek and Dry Creek when the Glory Hole is not spilling. Prior to Monticello Dam, 95% or more of flows came from the upper watershed (because it drains a vastly larger area) and 5% or less of flows came from tributaries below the dam. Following construction of Monticello Dam and currently, tributaries typically account for 95% or more of the flows and the main channel accounts for 5% or less of flows (except when the Glory Hole is spilling). This inverted relationship of main channel flows to tributary flows created a steeper slope of the water surface flowing from the tributaries to the main channel than was historically present. The steeper slope creates higher velocities and more erosive power. The U.S. Army Corps of Engineers (USACE) estimated that the peak flood stage on Putah Creek since Monticello Dam was built is about 20 feet lower than prior to the dam. Since the dam was completed, tributary

Arundo along Putah Creek

Invasive Plants

Values and benefits of removing invasive plants

- Self-sustaining stream channel
- Improved fish and wildlife habitat
- Increased habitat for native pollinators and beneficial insects
- Reduced long-term weed management costs

Yellow starthistle is a common invasive weed in the watershed

channels have eroded downward by approximately the same 20 feet (Marovich 2007 pers. comm.). Since 1959, the tributaries have approximately tripled in width and depth compared with their prior condition. Historic structures and heritage oaks have been lost to the widening channel on Pleasants Creek. Roads have washed out or required emergency repairs, and bridges have become obsolete in half of their expected life as the creek widened and deepened out from under the span and supporting piers. The incision of tributary channels has a compound effect because they can no longer dissipate the energy of high flows by spreading out over the surrounding landscape, and they are disconnected from their historic floodplains. Instead, all of the water's energy is confined within incised channels, thus maximizing the erosive effect. Further, Lake Solano, which was 14 feet deep in 1959, is now essentially full of sediment from the erosion of tributary channels.

There were other lesser effects on the main channel, mostly associated with pre-dam flood protection and gravel mining. Beginning as early as the late-1800s, landowners and public agencies began changing lower Putah Creek. Significant modifications included removal of riparian vegetation and straightening and widening of the channel between Winters and the Yolo Basin. The primary purpose for these activities was to improve the flood flow capacity and control flooding in Davis. Farmers carved a new channel, the South Fork of Putah Creek, in the 1870s. By the late 1940s, the USACE had enlarged the South Fork, strengthened the levees, and blocked off the natural North Fork channel. While the South Fork channel was successful in protecting Davis from flooding, the straighter path of the channel resulted in a steeper gradient by creating a shorter path between starting and ending elevations. The steeper gradient accelerated flows and increased the erosive power of the channel. The most direct measure of the amount of erosion is at the base of the Railroad Bridge in Winters. The bridge support that sits on the floor of the channel shows 3 feet of poured concrete that is exposed below the formed pillar indicating 3 feet of erosion over the 100 years since the bridge was built.

Gravel mining operations in Putah Creek west of Winters during the 1940s

Gravel mining compounded the effect of straightening the channel. Prior to the Solano Project, gravels that were mined from Putah Creek were naturally replenished from upstream sources. Gravel mining continued after the completion of the Putah Diversion Dam and these gravels were not replenished. Many gravel extraction sites remain as overly deep and wide pools that have not filled in by natural sedimentation. These remain the most challenging sites for stream restoration.

Severe bank erosion on Pleasants Creek

Erosion caused the failure of a bridge over Pleasants Creek.

Values and Benefits

- Municipal and domestic water supply
- Agricultural water supply
- Recreation – swimming, fishing, boating
- Warm freshwater habitat for fish rearing and spawning
- Aesthetic beauty
- Wildlife habitat
- Cold freshwater habitat for fish rearing and spawning

Osprey along Putah Creek

The hydrologic conditions in lower Putah Creek have changed significantly since the completion of the Solano Project. The amount and timing of peak flows (both low and high) are now highly regulated by the Solano Project. Historically, Putah Creek would experience high peak flows during winter and spring storm events, and low flows during the dry summer months. Following the Solano Project, high peak flows from the upper watershed were captured in Lake Berryessa and releases from Monticello Dam were more even throughout the year to accommodate diversions to the Putah South Canal for agricultural and municipal uses. Flows into lower Putah Creek were and still are considerably less than prior to the Solano Project. This changed slightly when the Accord was implemented in 2000.

The purpose of the Accord is to create as natural a flow regime as feasible and to maintain a living stream for the benefit of fish, wildlife, and plants from the Putah Diversion Dam to the Yolo Basin (California Superior Court 2000). The focus of the Accord is on the protection and enhancement of native resident and anadromous fish populations and maintenance of riparian vegetation. Most importantly, the Accord provided for regular year-round flows in lower Putah Creek below the Putah Diversion Dam. While the regular flows have been successful in attracting and supporting native and anadromous fish in lower Putah Creek, they have also created the opportunity for native riparian vegetation to become reestablished.

The human and natural modifications to lower Putah Creek and its tributaries over the past 150+ years have resulted in a stream channel, floodplain, and hydrology that are unlike its historic natural condition. Furthermore, these modifications have created a situation of abnormal stream processes that are out of balance and not functioning properly. For example, the size and shape of the channel in much of lower Putah Creek is straighter, wider, and deeper than it needs to be to accommodate the current flow regime. This impacts the ability of native riparian vegetation to become established and remain healthy. Solutions for reconciling current channel and floodplain conditions with the current flow regime to restore and enhance natural stream processes are discussed in Chapter 4.

3.2.6 Riparian Corridor Condition

Historically, when Putah Creek regularly overtopped its banks and flooded the surrounding landscape, the vegetation along Putah Creek consisted of up to a 1.5-mile wide riparian corridor that extended from the Coast Ranges to the Putah Creek sinks (Katibah et al. 1984). The lower Putah Creek riparian corridor is characterized by a mixture of riparian communities presently dominated by mixed riparian forest and valley oak riparian forest, but also including foothill riparian woodland, riparian scrub, riverine wetland, open water, disturbed riparian woodland, and ruderal (disturbed or dominated by herbaceous weeds) areas. This complex vegetation mosaic was created by a dynamic stream system and together these community types support an abundance of resident and migratory wildlife species.

Modifications to the watershed have drastically altered the riparian corridor from its historic conditions. Dam construction, invasive plants, channel realignment, vegetation removal, development of adjacent lands, and other activities have affected the natural stream processes, resulting in changes in the stream's ability to support native riparian vegetation. Vegetation in the riparian corridor is typically stream-dependent, relying on the presence of surface water or shallow groundwater. Historically, lower Putah Creek and its floodplain supported extensive valley oak woodlands that extended out from the creek, but these were harvested and the land was cleared for agricultural uses during the late 1800s. Today, the combination of disfunctioning creek processes, channel incision and adjacent land uses has resulted in a stream that is disconnected from its historic floodplain, and a substantially narrowed riparian corridor that is limited throughout its length to the bed and

Vegetation and Wildlife

Values and Benefits

- Habitat for wildlife
- Wildlife corridor
- Outdoor recreation
- 12 special-status wildlife species
- 1 special-status plant species
- Ecologically important plant communities
- Habitat for native pollinators and beneficial insects
- Wildlife and bird watching
- Recreational and subsistence hunting

bank of the creek. In the lowest reaches, the South Fork portion of the creek widens out and is confined to levees, within which most of the land use is farmland interspersed with some restored riparian woodland.

As discussed previously, the stream channel was straightened, widened, deepened, and the South Fork of Putah Creek was constructed beginning in the late 1800s. The resulting loss of native riparian vegetation and increased erosion enabled the rapid spread of introduced invasive species. Some invasive species, such as arundo and tamarisk, were planted for erosion control. Others, such as Himalayan blackberry and yellow starthistle, were well adapted to becoming established in disturbed areas such as gravel pits. The earliest known occurrence of arundo in the lower Putah Creek watershed was planted along Pleasants Creek soon after the completion of the Solano Project in response to erosion of the tributaries. It has since spread throughout Pleasants and Putah creeks.

Despite the many changes to lower Putah Creek, the existing riparian corridor is overall in relatively good condition. However, it covers at best only one-tenth of its historic area. Restoration of the riparian habitats within the riparian corridor relies on restoring and/or enhancing the stream channel and floodplains to conditions that support natural stream processes. Removing and managing invasive species within the riparian corridor is vital to establish a self-sustaining riparian corridor. These actions are discussed in Chapter 4.

3.2.7 Wildlife and Wildlife Habitat Condition

The complex mixture of riparian communities in the lower Putah Creek riparian corridor supports an abundance of resident and migratory wildlife species. Despite the many modifications and changes made over the years, Putah Creek still provides substantial refuge for remaining wildlife populations. The majority of wildlife habitats along lower Putah Creek are of moderate quality for most wildlife species, although low and high quality habitat areas also exist. While reduced in size and invaded by nonnative species, there is a fairly intact riparian corridor that connects the Central Valley floor to the Coast Range. This rare habitat corridor provides shelter, cover, and forage that enables dispersal and exploratory movement by birds and mammals through a landscape dominated by agricultural and urban land uses. A diverse group of wildlife species are found in the Putah Creek corridor and greater watershed, such as deer, raccoons, river otters, beavers, skunks, opossums, turtles, frogs, and a number of raptors, scavengers, and song birds. Less commonly, black bears and cougars have been spotted as well.

Riparian habitat is one of the richest habitat types for wildlife species because of its diverse mixture of vegetation, water, food, and shelter. Riparian habitat is especially important to animals and plants dependent on the availability of summer water. Wildlife in the lower Putah Creek watershed will benefit from restoring and enhancing the riparian vegetation communities within the riparian corridor.

3.2.8 Fish and Fish Habitat Condition

Lower Putah Creek serves as habitat for a variety of fish assemblages comprised of native and nonnative species (listed in sidebar). Historically, Putah Creek supported populations of all native resident fishes of the Sacramento Valley in such assemblages. However, the fish species present within the creek have changed dramatically since the late 1800s. In general, these changes have resulted in a decline in native species abundance and an increase in nonnative species abundance. Construction of dams, realignment of the channel, vegetation removal, development of adjacent lands, and other activities have adversely impacted native fish species and their habitats. Putah Diversion Dam and Monticello Dam completely block fish migration into historic spawning and rearing areas in the interdam reach and upper watershed. The Los Rios Check Dam in the Yolo Bypass acts as a barrier to fish passage during the irrigation season (i.e., spring to fall).

Chinook salmon

Fish found in Putah Creek:

Native

- Steelhead trout
- Chinook salmon
- Hardhead
- Hitch
- Pacific lamprey
- Prickly sculpin
- Rainbow trout
- Riffle sculpin
- Sacramento blackfish
- Sacramento perch
- Sacramento pikeminnow
- Sacramento splittail
- Sacramento sucker
- Sacramento-San Joaquin roach
- Speckled dace
- Thicktail chub
- Tule perch

Nonnative

- American shad
- Bigscale logperch
- Black bullhead
- Black crappie
- Bluegill
- Brown bullhead
- Brown trout
- Channel catfish
- Common carp
- Fathead minnow
- Golden shiner
- Goldfish
- Green sunfish
- Inland silverside
- Largemouth bass
- Pumpkinseed
- Red shiner
- Redear sunfish
- Smallmouth bass
- Striped bass
- Threadfin shad
- Warmouth
- Western mosquitofish
- White catfish
- White crappie
- Yellowfin goby

FISHERIES

Values and Benefits

- Diverse historic native fishery
- Seven special-status species
- Recreational fishery
- Ecologically important valuable functions
- Food source for wildlife

Lower Putah Creek remains subject to a nonnatural flow regime regulated by the Solano Project. This created the popular cold water trout habitat in the interdam reach, but also allowed many nonnative fish species to invade the stream and persist, out-competing the native species in the lower reaches of the stream. Overall, the stream can be characterized by cold water and a high number of native species in the upper reaches. Straightening, widening, and deepening of the channel, adverse effects to native riparian vegetation that provides shade over the stream, and cumulative effects of solar exposure have resulted in warmer temperatures, allowing nonnative species to dominate in the lower reaches.

Since the Accord, the stream receives a higher baseline flow, migration flows for Chinook salmon in the fall, and native fish spawning pulse flows in February-March (for 3 consecutive days). The flows provided by the Accord have allowed Chinook salmon to enter the stream to spawn in greater frequency and numbers in recent years, and have increased the numbers and distribution of other native species downstream in the lower reaches of Putah Creek. Recently, stream channel restoration activities, including installation of instream fish habitat features and infusions of spawning gravel, have improved fish habitat. Increasing native fish populations, such as the Chinook salmon, will rely on further restoration and enhancement of the stream channel and riparian vegetation, including instream fish habitat structures.

Stevensons Bridge over Putah Creek

3.2.9 CULTURAL RESOURCES

Though small in scale relative to the major watersheds of California, Putah Creek has an exceptionally rich cultural history. From the earliest Native Americans (Southern Patwin) who inhabited the watershed for thousands of years to those farming and residing there today, lower Putah Creek and its tributaries have influenced the quality of human life for centuries. Traces of historic activities can be found throughout the watershed and range from village sites to homesteads, farms, and bridges.

In addition to protecting recorded sites, as required by law, there may be undiscovered cultural remains in the watershed that could be adversely affected by future restoration activities. Cultural resource survey data and protocols to protect cultural resources that may be uncovered during restoration activities ensure the protection of cultural resources along lower Putah Creek.

CHAPTER 4

WATERSHED ENHANCEMENT

This chapter presents a framework to help willing landowners and land managers implement the WMAP. Chapter 3 introduced and summarized the issues within lower Putah Creek and its tributaries that were identified in the WMAP – Resource Assessments (Phase I). Private and public landowners reviewed these issues with members of the public representing public land stakeholders. The WMAP - Projects (Phase II) is a synthesis of scientific findings and landowner conclusions. This chapter summarizes the stewardship process that evaluated landowner and community creek enhancement priorities informed by the resource assessments. The stewardship framework includes guiding principles, goals and objectives, primary project types, and a proposed action plan. The chapter concludes with a description of suggested steps to successfully implement projects.

4.1 STEWARDSHIP PROCESS

Since the early 1990's, many groups have formed representing landowner and community interests in the health and protection of lower Putah Creek and its resources. Groups have formed around such issues as water rights, bank stabilization, public land management, habitat enhancement, and environmental education. Many of these groups continue to be active and collaborate to achieve common goals and leverage funding for projects.

The LPCCC formed in 2000 and has since worked with many of these organizations to build positive working relationships and implement projects that improve the health of lower Putah Creek and its tributaries. Many of these projects were initiated at the request of private landowners and public agencies needing help addressing urgent issues, such as repairing a severely eroded bank undercutting a public road, or removing legacy trash heaps. During Phase II of the WMAP, the LPCCC brought together primary stakeholders and interested community members—many of whom have participated in previous stewardship efforts—to evaluate the opportunities and constraints for resource restoration and enhancement within the watershed, and to develop a comprehensive and coordinated approach to restoration and enhancement activities in the watershed. The process encouraged broad participation while providing opportunities for in-depth discussion first in separate meetings of public and private landowners and then in combined plenary meetings. Details are contained in the LPCCC's Report to the Community (Appendix A).

Stakeholders participated in a series of community meetings, working groups, and a project tour. These events provided an opportunity for the whole community to learn about the information gathered during the Phase I resource assessments, and to actively participate in setting a course for future restoration and enhancement activities. The result was consensus on guiding principles, goals and objectives, priority project types, and an action plan that includes project selection criteria and a prioritized list of proposed projects. These points of consensus are discussed below.

4.2 GUIDING PRINCIPLES

Guiding principles were developed by all stakeholders in the first plenary meeting. The guiding principles serve as a broad philosophy intended to guide planning and implementation of the WMAP over time. The guiding principles inform decision-making during planning and continue to provide high level guidance for subsequent actions. The guiding principles allow new community stakeholders to participate with an understanding of the philosophy with which the WMAP was developed.

Community meeting

Guiding Principles

- Respect Private Property Rights
- Actions Only with Willing Participants
- Respect Local Knowledge
- Manage the Creek as a Community Asset
- Improve and Enhance Lower Putah Creek
- Consider a Wide Variety of Improvement and Enhancement Activities
- Employ Actions Consistent with Current Regulations and Policies

Stakeholders agreed to the following guiding principles:

- *Respect Private Property Rights.* The stewardship process respects the rights of the landowner.
- *Actions Only with Willing Participants.* The stewardship process involves willing participants. Restoration and enhancement activities will be directed to sites on private or public lands where the landowner or public land manager is willing to participate.
- *Respect Local Knowledge.* Local knowledge should be sought and considered as an indispensable element of the stewardship process.
- *Manage the Creek as a Community Asset.* Positive actions achieved at individual locations provide benefits to the entire creek and the broader community.
- *Improve and Enhance Lower Putah Creek.* Actions identified through the stewardship process will enhance riparian restoration and maintenance of lower Putah Creek, including tributaries (Dry Creek below Highway 128, Pleasants Creek below Miller Canyon, Proctor Draw, and other tributaries that influence or are influenced by lower Putah Creek).
- *Consider a Wide Variety of Improvement and Enhancement Activities.* The stewardship process will consider a wide range of activities including but not limited to: invasive plant removal, trash clean-ups, bank stabilization, erosion control, fish and wildlife habitat improvements, water quality improvements, and others.
- *Employ Actions Consistent with Current Regulations and Policies.* Actions recommended to restore and enhance the creek must be implemented in a manner that is consistent with local, state, and federal regulations, and within the limits of the specific funding source used for each action.

4.3 WMAP Goals and Objectives

Based on the findings of the resource assessment (Phase I), the results of the stewardship process (Phase II), and project experience gained by the Putah Creek Streamkeeper and the LPCCC, the following overarching goal was identified.

Overarching Goal:

Restore and enhance the lower Putah Creek watershed to a self-sustaining ecological condition.

This goal is based on the premise that creeks are natural systems that exist in a dynamic balance of form and function. As the form of the creek is reconciled with current flows, the channel will exhibit certain ratios of width, depth and meander intervals that are common to all naturally formed waterways. As the shape of the channel is brought into natural form, then the channel will become self-forming thereafter. Floodplains will exist at natural elevations and riparian vegetation will become self-renewing. Wildlife that depend on natural vegetation will be sustained with decreasing requirements for human intervention (such as nest boxes). Native fish that depend on natural processes of stream renewal will flourish. Native vegetation will naturally resist weed invasions. Improving the ecological health of the lower Putah Creek watershed will reduce the need for long-term maintenance and management of the ecosystem. As the resource issues described in Chapter 3 are addressed, and ecological health improves, fewer projects will be required and long-term maintenance and management costs will decrease.

Lower Putah Creek and its tributaries have been drastically altered from their pre-1800s conditions, and there is no going back to the high flows and historic flood patterns that gave rise to the original form of the creek. Restoring and enhancing the creek therefore depends

on creating a scaled-down form that matches current flows, rather than restoring the historic form of the channel. Exhibit 1-1 summarizes some of the major events in Putah Creek's history that have impacted the form and function of lower Putah Creek. In many reaches, the lower Putah Creek channel is wider and deeper than historic conditions, flows are now controlled by dams, and invasive vegetation has become established throughout the riparian corridor. Additionally, tributaries to lower Putah Creek experience increasing rates of streambank erosion. The objectives identified for the project types described in Section 4.4 address these elements of form and function that have been impacted. Improved health of the lower Putah Creek ecosystem depends on implementation of these projects.

A healthy ecosystem results in benefits not only to plants and wildlife, but also to humans. Consider the issue of streambank erosion. In addition to the obvious loss of property, erosion causes sedimentation of the stream which degrades fish habitat and results in a loss of native vegetation that degrades wildlife habitat. Erosion also degrades water quality and increases the cost of maintaining water delivery systems and processing raw water into municipal water supplies. Consider the benefits that result from a stable streambank. These benefits not only improve ecological health, but also improve the security and economy of water supplies. When an individual landowner stabilizes his or her eroding streambank the benefits go beyond protecting the affected property. The project also reduces sediment entering the stream and incrementally reduces the cost of processing municipal water. It provides a stable condition for the establishment of native plant communities that compete with nonnative invasive plants that otherwise require constant management. It also helps provide a greater regional benefit of sustainable fish and wildlife populations.

4.4 Project Types

Stakeholders identified, discussed, and agreed on five primary project types to improve the resources and functions of the lower Putah Creek ecosystem and guide the LPCCC and the watershed community in achieving a sustainable ecosystem. Appendices B – E provide useful resources for planning and implementing these projects.

4.4.1 Channel Restoration

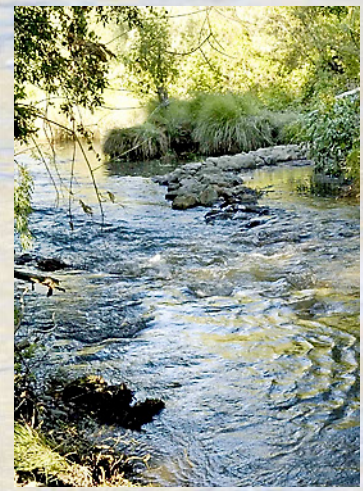
The lower Putah Creek channel has been altered by past human actions, including channel straightening and widening, instream gravel mining, and dam construction and operation. Restoring functional channel dimensions in many reaches of lower Putah Creek is a prerequisite to achieving other objectives. For these reaches, channel restoration should be considered the first step toward a healthy ecosystem (see Exhibit 4-1).

4.4.2 Bank stabilization

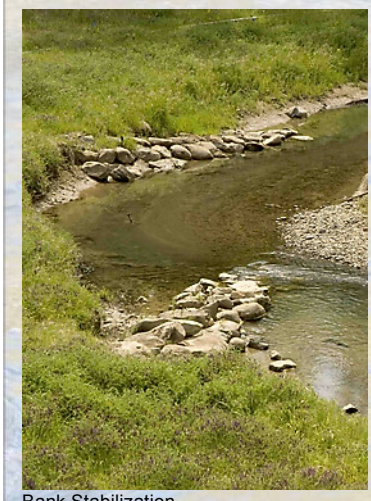
Stable banks are the foundation of all stewardship and water quality protection efforts along the creek. Bank erosion is the primary source of sedimentation in the creek, and contributes to declining water quality and degradation of fish and wildlife habitat. The stability of many banks has been compromised by the presence of invasive plants, some of which were originally introduced and planted with the intention of improving bank stability. Because invasive plant removal and bank stability are intertwined at many sites along the creek, it is critical that these two activities be planned and implemented concurrently. Priority will also be given to other bank stabilization activities, such as weir installation, as long as they help achieve multiple benefits at the site.

Project Types

- Channel Restoration
- Bank Stabilization
- Habitat Enhancement
- Invasive Plant Removal
- Trash Clean-up



Channel Restoration



Bank Stabilization

Key:

① **Valley Oak Savannah**
② **Mixed Riparian Forest**
③ **Freshwater Marsh**
④ **Low-Flow Channel**
⑤ **Invasive Vegetation**

Historic Condition

- Small flow channel
- Wide floodplain
- Floodplain frequently inundated during storm events

Existing Impacted Condition

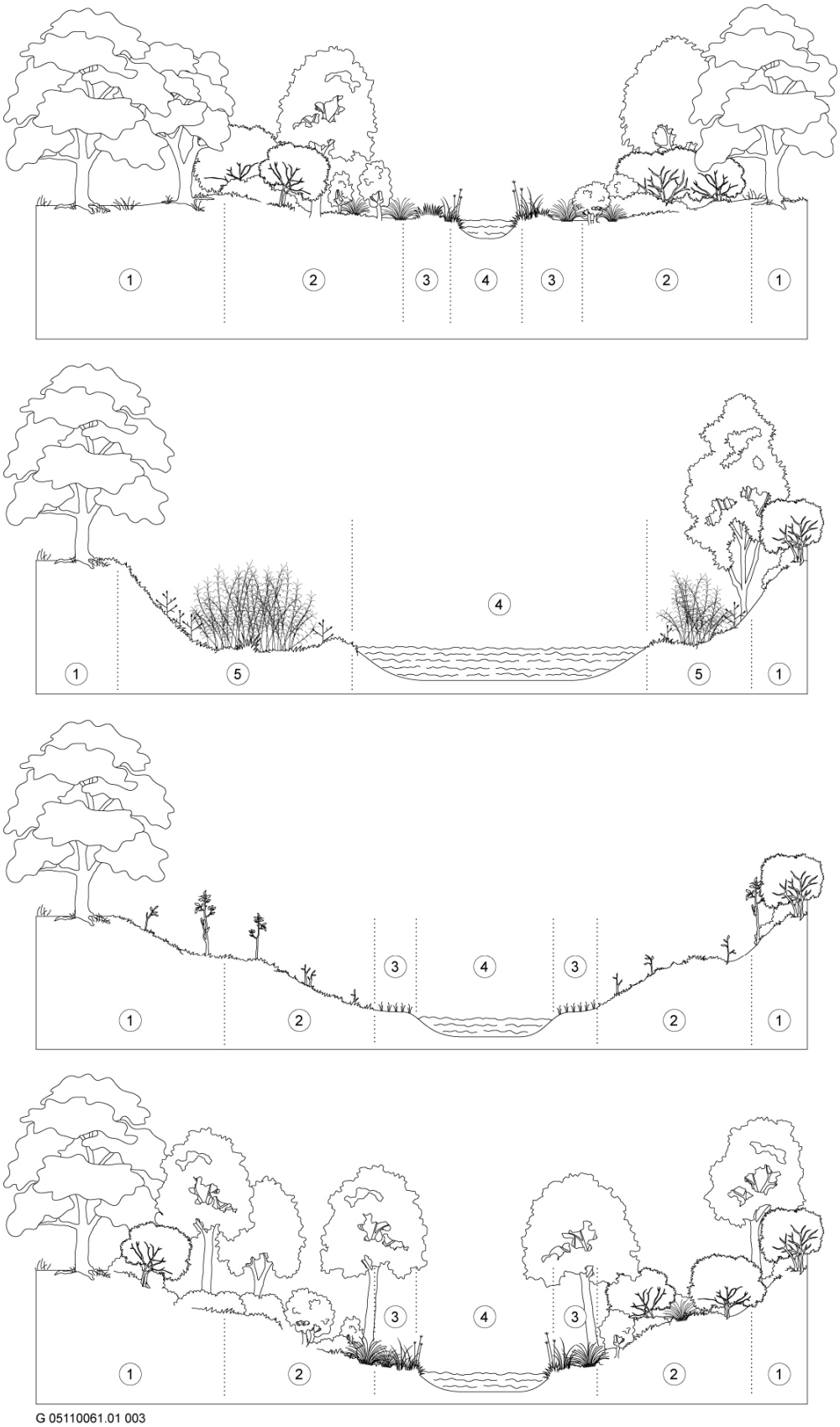
- Incised, overwidened channel
- Limited active floodplain
- Disconnected historic floodplain
- Steep eroding banks
- Invasive vegetation (e.g., arundo, tamarisk, starthistle, eucalyptus, blackberry)

Restoration Implementation

- Restore channel dimension (based on current flow regime)
- Stabilize/recontour streambanks
- Restore active floodplain
- Remove invasive plants
- Revegetate with native plants
- Install instream fish habitat features
- Remove trash

Future Restored Condition

- Self-sustaining, weed resistant native vegetation
- Functioning floodplain
- Stable banks
- Shaded channel
- Restored wildlife/bird/aquatic habitat



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Historic, Impacted, and Restored Conditions for a Typical Reach of Lower Putah Creek **Exhibit 4-1**

4.4.3 Habitat Enhancement

Protecting salmon habitat was a catalyst for many of the issues addressed by the Accord and restoring native fish habitat remains a priority objective. Providing fish passage around existing barriers (i.e., Los Rios Check Dam, Putah Diversion Dam) will improve access to restored and protected habitat. Additionally, restoring and enhancing native plant communities in the riparian corridor will improve and protect habitat for native wildlife, fish, birds, reptiles, and insects. Appendix B provides a list of Putah Creek native plants and their uses. Appendix C provides nursery sources and Appendix D is a list of landscape plants to avoid. Appendix E lists useful resource enhancement documents for more information.

4.4.4 Invasive Plant Removal

Projects are needed to remove invasive plants responsible for geomorphic change (altered patterns and rates of scour, deposition, and erosion), increased fire hazard, and degraded habitat quality. Invasive plants such as arundo, tamarisk, and Himalayan blackberry are known to cause adverse changes to channel form and function. Invasives such as eucalyptus, tamarisk, and arundo increase fire risk and displace native plants. Sustainable invasive plant removal projects must also include reestablishment of native plant communities that compete with invasive plants and provide weed resistant landscapes with reduced maintenance costs over time.

4.4.5 Trash Clean-up

Historically, the creek was used as a dumpsite and many landowners inherited significant debris on their property. Some of the large debris has been there many years, and the items (abandoned cars, old appliances, etc.) often require heavy equipment and skilled operators to remove them. Removing these “gross pollutants” improves the appearance of the creek and is a requisite for all further enhancement work. Debris removal also reminds potential dumpers that this practice is no longer acceptable, and that keeping the creek free of debris is a priority for landowners and the community.

4.5 Proposed Action Plan

4.5.1 Selection Criteria and Project Tiers

Stakeholders determined objectives and criteria that support a sustainable ecosystem. Objectives were expressed as the primary project types discussed above. Selection criteria listed below were used to help identify and prioritize potential projects. The criteria give added value to projects that provide multiple benefits. Projects that also systemically benefit the creek by restoring natural form and function and reduce costs of maintaining resources over time will also compete most favorably for public funding.

Selection Criteria

- *High level of landowner cooperation.* Projects will only be implemented on private lands if the landowner supports the WMAP and is cooperative during all stages of the project including planning, implementation and maintenance. Priority is given to landowners with existing agreements with the LPCCC.
- *Landowner commitment to long-term maintenance*. The landowner commits to supporting project maintenance and providing access for monitoring and follow-up activities by LPCCC until project goals are met.
- *On-site availability of materials for restoration.* The availability of on-site materials can greatly reduce project costs. For example, downed eucalyptus trees on-site can be used as revetments for bank stabilization activities.

Project Types

Habitat Enhancement

Invasive Plant Removal

Trash Clean-up Event Poster

Selection Criteria

- High level of landowner cooperation
- Landowner commitment to long-term maintenance
- On-site availability of materials for restoration
- Project qualifies for available/multiple funding sources
- Project is on lands contiguous with other restoration or enhancement projects
- Project location allows for public education
- Project is located upstream
- Project includes multiple project types

- *Project qualifies for available/multiple funding sources.* Accomplishment of most restoration activities will require support received from competitive public and private grant sources and the most competitive projects will draw on multiple funding sources.
- *Project is on lands contiguous with other restoration or enhancement projects.* Cumulative project benefits can be achieved when restoration efforts are contiguous.
- *Project location allows for public education.* Projects that are visible from public access points, such as a bridge or nearby public lands, can be used to inform others about the benefits and value of these projects. Projects with demonstration value have enhanced priority, such as those with public or private landowners willing to allow scheduled visits.
- *Project is located upstream.* Some activities, such as erosion control or invasive plant removal, will benefit all downstream landowners and resources. This gives upstream sites priority when other factors are equal.
- *Project includes multiple project types.* Properties where multiple project types can be accomplished in one location are preferred.

PROJECT TIERS

Stakeholders grouped projects into three tiers based on the number of selection criteria met by each project. Tier 1 projects met most primary project types and most selection criteria. Tier 2 projects feature several of the primary project types and several of the selection criteria. Tier 3 project feature a few of the primary project types and a few of the selection criteria. Tier 1 projects receive higher priority for funding and implementation; however, Tier 2 and Tier 3 projects may be considered earlier if resources or opportunities allow for these projects to be implemented in a cost effective manner.

4.5.2 PROPOSED PROJECTS

Sixty-three (63) specific projects were identified for the lower Putah Creek watershed. The proposed projects were evaluated for consistency with the guiding principles, and rated based on primary project types and selection criteria. Proposed projects were divided into three tiers based on the level to which they addressed the primary project types and selection criteria. The proposed projects are listed in Exhibit 4-2. In addition to the current list of proposed projects, it is expected that new project opportunities will be identified continuously and tiered according to the same ranking criteria established by stakeholders.

4.5.3 ANNUAL PROJECT ACTION PLAN

The proposed projects listed in Exhibit 4-2 vary in their level of readiness to proceed. Some of the proposed projects have been planned and designed and are awaiting funding for implementation. Others are part of ongoing programs (e.g., invasive plant removal). The Putah Creek Streamkeeper will develop an annual project action plan (annual plan) by December of the preceding year to summarize and organize proposed project activities for the upcoming year. Information for each proposed project contained in the annual plan should include:

- *General Project Information* – project name and location, landowner information, project proponent information;
- *Project Description* – a summary description of the project, including resource issues to be addressed, project goals and objectives, and actions to be implemented;
- *Planning and Design Status* – description of the level of planning and design completed and/or scheduled to be completed during the year;
- *Funding Status* – description of the project budget and amount of funding secured for the project and/or a list of potential funding sources to be pursued during the year;

Proposed Action Plan Projects

	Project by Property Owner	Project Types					Selection Criteria						Notes
		Channel Restoration	Bank Stabilization	Habitat Enhancement	Invasive Plant Removal	Trash Clean-up	Existing Agreement (Cooperation & Commitment)	On-site Materials	Multiple Funding Sources	Contiguous with Other Projects	Public Education and Visibility	Upstream Location	
TIER ONE PROJECTS	Winters Putah Creek Park	●	●	●	●	●	●	●	●	●	●	●	1 mile reach from Winters Car Bridge to Hwy 505
	Carl Ramos	●	●	●	●	●	●	●	●	●	●	●	Dry Creek confluence
	Ken Bertinoia	●	●	●	●	●	●	●	●	●	●	●	Dry Creek confluence
	Herb Wimmer		●	●	●	●	●	●	●	●		●	Winters Oxbow
	Tony Morales		●	●	●	●	●	●	●	●		●	Below Putah Diversion Dam
	Dennis Kilkenny	●		●	●	●	●	●	●	●	●		Putah Creek Road east of Hwy 505
	Craig McNamara	●		●	●	●	●	●	●	●	●		Largest parcel on Putah Creek
	Yolo Housing	●	●	●	●	●	●	●	●		●		Low income housing–CALFED Prop 13
	UC Davis Russell Ranch	●		●	●	●	●	●	●	●	●		Above Stevenson's Bridge
	UC Davis Campus	●		●	●	●	●	●	●	●	●		Pedrick Road to Old Davis Road
	City of Davis	●		●	●	●	●	●	●	●	●		Below Mace Blvd.
	Solano County 505	●	●	●		●	●	●	●	●	●		South Bank Hwy 505 and east
	Ethel Hoskins		●		●	●	●	●	●		●	●	First arundo control and bank stabilization project
	Don Jordan			●	●	●	●	●	●				Above Stevenson's Bridge
	John Neil	●		●	●	●		●	●	●	●	●	27 acres above Winters Car Bridge
	Glide Ranch	●		●	●	●		●	●	●			2.5 miles north bank creek frontage
	John Hasbrook	●		●	●		●	●	●	●			Original Rock Weir
	John Pickerel			●	●	●	●			●	●	●	Below Putah Diversion Dam
	John Vickrey	●	●		●	●	●		●	●			Riparian restoration after fire
	Catholic Church	●		●	●	●		●	●	●			Between Hwy 505 and Stevenson's Bridge
	Joe Vonkugelgen	●	●	●	●		●	●		●			Below Stevenson's Bridge
	Joe Castro	●	●		●	●			●	●	●	●	Above Winters Car Bridge
	Stevenson's Bridge			●	●	●	●	●	●	●	●		South Bank east of the Bridge
	DFG Yolo Bypass	●		●	●	●			●	●	●		Fish passage
TIER TWO PROJECTS	Richard Lopez		●		●		●			●	●	●	Pleasants Creek
	William Nichols		●		●		●			●	●	●	Pleasants Creek
	Jannes Echols		●		●		●			●	●	●	Pleasants Creek
	Stan Mertz			●	●		●		●	●		●	Winters Oxbow
	Tom Ramos		●		●	●		●		●		●	Ag property on Dry Creek
	Valerie Whitworth	●	●		●		●		●	●		●	Ag property on Dry Creek
	Woody Fridae		●		●		●	●		●		●	Dry Creek
	Al Graf		●		●			●		●	●	●	Dry Creek
	Matt Kimes		●		●		●	●		●		●	Dry Creek
	Don McLish	●	●		●		●		●	●			Between Hwy 505 and Stevenson's Bridge
	John Ott				●		●	●		●	●		Below Stevenson's Bridge
	Harvey Olander			●	●		●	●		●			Below Stevenson's Bridge
	Ed Virgin				●	●	●		●	●			Below Road 106A
	Lake Solano Park		●		●				●	●	●	●	Interdam reach
	Mike Martin		●		●			●		●	●	●	Interdam reach
	Gary Bertagnoli		●		●					●	●	●	County bank restoration project on Pleasants Creek
	Cory Nichols			●	●	●	●	●	●	●	●	●	Pleasants Creek
	John Barbee		●		●	●				●		●	Proctor Draw
	Richard Harris		●		●		●			●		●	Below Putah Diversion Dam
	Duane Balough		●		●		●			●		●	Ag property on Dry Creek
	Ken Snyder	●			●	●	●		●				Between Hwy 505 and Stevenson's Bridge
	Los Rios Farms	●			●	●			●	●			Below Mace Blvd.
	Fishing Accesses				●	●				●	●	●	Interdam reach
	Dewey Wann	●				●	●			●	●		Above Mace Blvd.
	Joshua Friewald		●	●	●			●				●	Interdam reach
TIER THREE PROJECTS	Bruce Gates		●		●					●		●	Pleasants Creek
	Pat Shurnas		●		●						●	●	Pleasants Creek at Putah Creek Road
	Milo Shammas			●	●					●		●	Winters Oxbow
	Viona Hague		●					●		●		●	Dry Creek
	David Nishikawa	●			●		●			●			Above Pedrick Road
	Mike Madison				●		●			●			Below Stevenson's Bridge
	Pearse Family	●			●		●			●		●	Above Winter's Car Bridge
	DFG Cold Canyon				●					●	●	●	Below Monticello Dam
	Mack Cody				●					●		●	Below Putah Diversion Dam
	John Seeger				●					●		●	Interdam reach
	John Hammond				●					●		●	Interdam reach
	Stan Lester	●			●					●		●	Putah Creek above Dry Creek
	Robert Boshoven		●									●	Pleasants Creek
	John Fawcett				●								Below Stevenson's Bridge

Source: LPCCC 2006, EDAW 2008

Proposed Action Plan Projects **Exhibit 4-2**

- *Permitting Status* – description of the permits and regulatory compliance required for the project and permits obtained for the project and/or permits to be obtained during the year;
- *Project Schedule* – a schedule of project tasks for the year; and,
- *Responsible Parties* – a list of those individuals/entities responsible for implementing the project.

Information contained in the annual plan need not be exhaustive. Detailed project plans and designs and other project documentation (i.e., permits) can be included as appendices to the annual plan. The annual plan should contain only the proposed projects scheduled for action in the coming year. It is a tool for improving project effectiveness and efficiency. For example, it may identify opportunities for combining similar projects into one proposal for funding, or identify possibilities for scheduling resources, such as equipment or volunteers, for multiple projects to reduce costs.

4.6 STEPS FOR SUCCESSFUL PROJECT IMPLEMENTATION

Successful projects require good communication, careful planning, efficient implementation, monitoring to support adaptive management, and resources, including funding and in-kind contributions of materials and labor. Highlighted below are suggestions to consider for each project.

4.6.1 COMMUNICATION

Maintaining regular communication with those affected by the project (e.g., neighbors, community members, resource agencies) is a critical part of a successful project. Good communication reduces the likelihood of misunderstandings and gains knowledge, support, and resources for the project. Neighbors may have similar interests and concerns and may want to join in a coordinated effort. The LPCCC and other local organizations may have funding or equipment to support the project. Stakeholder and community involvement can bring additional resources. The LPCCC will solicit input from stakeholders affected by the project early in the planning process and keep stakeholders informed during planning and implementation of the project. Sharing information on project successes and failures will help the LPCCC refine techniques and gain efficiencies over time.

4.6.2 FUNDING

Projects come in all shapes and sizes, and not all projects require large amounts of funding. The first step to funding a project is having a sense of the project's scale and complexity. It is helpful to determine whether anyone else has addressed the same issue. If so, what was done and was it successful? Some projects already underway in the lower Putah Creek watershed include a Putah Creek Council Adopt-A-Reach (AAR) Program, FARMS Leadership program, Student and Landowner Education and Watershed Stewardship (SLEWS) program, a nest box trail, and LPCCC-sponsored invasive plant abatement, trash removal, and fish and wildlife habitat restoration projects. These programs may have funds for projects or may be able to include new projects in future grant proposals. Working with the LPCCC and other local organizations and entities (Putah Creek Council, NRCS, Yolo and Solano county Resource Conservation Districts [RCDs], land managers, community groups, and non-governmental agencies) can be the most effective route to obtaining funding or volunteer support for a project. Partnering with neighbors to share costs on expensive equipment or organizing volunteer workdays can help reduce project costs.

4.6.3 Planning and Design

The steps summarized below offer a strategy for project planning and design. Depending on the type and complexity of the project, it is often advisable to hire professional contractors (qualified ecological restoration consultants and engineers) to carry out the planning and design work. Simple projects may not require as intensive project planning and design as described below.

- *Goals and Objectives.* Planning begins by determining the goals and objectives for the project. For large projects, it may be appropriate to involve key stakeholders and other interested community members in the earliest stages of planning. These goals and objectives must be consistent with the WMAP goals, objectives, and guiding principles.
- *Inventory and Analysis.* The next step is to conduct an inventory and analysis of the project site. A review of the WMAP Phase I Resource Assessments will provide much of the information needed for planning purposes. Conducting site reconnaissance and identifying opportunities and constraints on the site will further guide project design.
- *Master Plan, Conceptual Design, and Regulatory Compliance.* A master plan can serve as a guide for the design, regulatory compliance and permitting, funding, implementation, and monitoring stages for the project. Early conceptual designs should be developed to meet stated goals and objectives and be based on a thorough understanding of the resource issues on the site, as well as the required regulatory compliance and permitting for the project. Once a concept design is developed that meets all the needs of the project and the regulatory agencies, the next step is to move forward with the development of detailed designs and begin the regulatory compliance and permitting process (see Regulatory Compliance and Permitting below for more detail). This is also a point at which the master plan can be used to support requests for project funding, if funding has not already been secured to take the project through final design, implementation, and monitoring. Up to 20% of a project budget can typically be used to develop detailed plans and specifications.
- *Design.* Prepare detailed designs for the project, including plans, specifications, and cost estimates that contractors can use to bid on the project, if work is to be implemented by hired contractors. These documents are used to ensure that construction is in conformance to the plans and specifications, and that permits and other regulatory compliance requirements are met during implementation.

4.6.4 Regulatory Compliance and Permitting

Most projects will require regulatory compliance and permitting, which can be simple to complex depending on the scope and size of the proposed project. The LPCCC has programmatic permits that will cover trash removal, weed control, and natural bank stabilization. Channel realignment projects will typically require individual permits. Project proponents should discuss their project with someone knowledgeable about the regulatory process prior to commencing work. Permits required for certain types of projects proposed include:

- **U.S. Army Corps of Engineers (USACE) Clean Water Act Section 404 permit and Regional Water Quality Control Board (RWQCB) Clean Water Act Section 401 certification** – address any activity that involves discharge of dredged or fill material into waters of the U.S., including wetlands;
- **California Department of Fish and Game (DFG) Section 1602 Streambed Alteration Agreement** – addresses any activity that would result in the modification of the bed, bank, or channel of a stream, river, or lake, including water diversion and

Planning and Design Steps

1. Determine Goals and Objectives
2. Conduct Inventory Analysis
3. Prepare Master Plan Conceptual Design
4. Apply for Regulatory Compliance Permits
5. Prepare Detailed Designs, Plans, and Specifications
6. Finalize Regulatory Compliance Permits
7. Select Contractor/Entity to Implement Project

Restoration Planting Day

Black-tailed jackrabbits (*Lepus californicus*) are common along Putah Creek

damming and removal of vegetation from the floodplain to the landward extent of the riparian zone;

- **U.S. Fish and Wildlife Service (USFWS)/National Marine Fisheries Service (NMFS) consultation regarding Endangered Species Act (ESA)** – addresses any activity that would adversely affect federally-listed species;
- **DFG consultation regarding California Endangered Species Act (CESA)** – addresses any activity that would result in adverse effects to state-listed species; and,
- **Reclamation Board encroachment permit** – addresses any activity that would affect levees or the floodway within/between levees, or the designated floodway if no levees are present, within the Sacramento and San Joaquin Rivers and their tributaries.

In addition to permit requirements, the California Environmental Quality Act (CEQA) applies to projects carried out or approved by California public agencies. Refer to Appendices H and I of the WMAP – Resource Assessments for more detailed information about environmental and regulatory compliance. In addition, the Sacramento River Watershed Program (SRWP) online regulatory permitting guide (www.sacriver.org) is a useful resource.

The LPCCC can often provide permit coverage for projects discussed in this document. Permits and regulatory approvals have already been acquired by the LPCCC for many initial restoration and enhancement actions, expediting implementation of projects conducted by or in coordination with the LPCCC. Refer to Appendix H of the WMAP – Resource Assessments for a more detailed discussion on the permits and approvals held by the LPCCC. New projects proposed by or for landowners in coordination with the LPCCC that are covered by existing regulatory approvals could result in continued financial investments by potential project funders.

4.6.5 Construction/Implementation

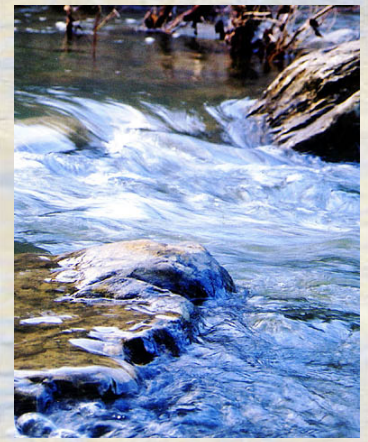
A first step in project construction/implementation is to develop a construction schedule that is appropriate for the type of project being implemented and that meets permit requirements. To protect sensitive resources and have successful outcomes, different project actions require different timing. For example, earth-moving activities in or near streams are typically restricted to the dry months of the year, while planting vegetation should be done during the wet months. Additionally, if sensitive species, such as nesting raptors, are located at or near the project site, construction activities may be subject to a limited timeframe. Developing a reasonable construction schedule can help ensure that the project is completed on time, on budget, and without regulatory compliance issues. Maintaining oversight of daily work and checking to see that work is consistent with plans provides the opportunity to make corrections and modifications in the field as needed. The LPCCC has a number of pieces of construction equipment useful for implementing projects described in this WMAP update. Contact the Putah Creek Streamkeeper to see if equipment may be available for potential projects.

4.6.6 Monitoring

Project monitoring provides information that can be used to determine when the work completed has been successful in accomplishing the goals set for a project, and thus builds knowledge and understanding for the next project. Monitoring aids in the understanding of a project's impact on the overall condition of lower Putah Creek and its tributaries. More detailed information about monitoring and project documentation is discussed in Chapters 2 and 5 of this document. New project sites may be eligible for LPCCC-funded monitoring of physical parameters like water temperature, turbidity and flow, and biological parameters such as monitoring of fish, wildlife, and aquatic insects.

CHAPTER 5

MONITORING AND ADAPTIVE MANAGEMENT FRAMEWORK



Utilizing an adaptive management framework will improve future projects

As a condition of the Accord, the LPCCC is committed to monitoring several attributes of watershed health in perpetuity. This monitoring is managed by the Putah Creek Streamkeeper. Data are used by the LPCCC to inform management decisions, and are available for review and use by landowners and other interested parties. This chapter describes the monitoring, record keeping, decision-making, and reporting (i.e., the learning cycle) that is integral to the adaptive management component of the Putah Creek WMAP.

5.1 ADAPTIVE MANAGEMENT PROCESS

Uncertainty is an unavoidable component of managing natural systems and implementing projects. Adaptive management strives to reduce that uncertainty and improve management over time. Adaptive management is an iterative process of planning and refining management approaches based on evaluating the condition of key resource parameters and the results of resource management actions. The components of adaptive management include:

- selecting indicators of watershed health, ecosystem functions, habitat values, or project objectives;
- setting measurable or observable targets (numerical or descriptive) for the indicators;
- monitoring the indicators at an appropriate time-step;
- documenting management practices;
- using monitoring results to evaluate management practices; and
- revising management practices, as necessary, to achieve objectives in response to monitoring data.

The LPCCC has identified near-, mid-, and long-term objectives and indicators it is using to monitor watershed health. These objectives and indicators are:

NEAR-TERM (1-5 YEARS)

- Eliminate Blight (i.e., Trash, Dump Sites)
- Eliminate Invasive Plants
- Increase Native Aquatic Invertebrates

MID-TERM (5-7 YEARS)

- Lower Water Temperature
- Reduce Turbidity
- Increase Salmon Population

LONG-TERM (7-10 YEARS)

- Increase Diversity and Abundance of Native Fish and Wildlife

The LPCCC coordinates with several entities to conduct monitoring programs on lower Putah Creek. Data are evaluated against established targets developed by each monitoring program for the resource areas being studied. Results are made available via the LPCCC website (www.putahcreek.org) in the following resource areas: wildlife, birds, fish, aquatic invertebrates (water quality), water temperature, flow, and vegetation.

Native grass planting

Plans for adaptive management of resources should focus on each of these resource components. More specifically, plans should contain a monitoring component that describes how monitoring data will trigger revisions of management practices (i.e., the feedback loop between monitoring and management) and how adaptive management decisions will be documented and reported.

Adaptive management includes monitoring and reporting components that together constitute the monitoring and reporting plan. Adaptive management and monitoring includes the following steps:

1. determining project objectives to achieve resource goals,
2. developing project resource management actions and targets consistent with objectives,
3. identifying and monitoring resource indicators efficiently (before and following actions),
4. evaluating results, and
5. modifying project actions and targets, if needed.

Monitoring is conducted on an on-going and regular basis. The monitoring and recording of management actions are summarized each year by the Putah Creek Streamkeeper. The Streamkeeper evaluates this information and decides what resource management changes to make, if any. The Streamkeeper also prepares an annual memorandum summarizing monitoring and management information, adaptive management decisions, and the basis for those decisions.

The following sections describe the monitoring program in greater detail.

5.2 MONITORING

Adaptive management decisions rely on an effective monitoring system. The LPCCC's general objectives for its monitoring programs are to:

- ensure logistical feasibility;
- maximize efficiency in observation, measurement, and learning;
- provide information sufficient to support adaptive management decisions; and
- summarize and interpret what has been learned in a appropriate manner that is responsive to management needs and supports future use of the information.

To fulfill these objectives, the Streamkeeper ensures that project and watershed-wide monitoring plans include descriptions of:

- indicators to be monitored,
- protocols for monitoring the indicators, and
- content and frequency of reports summarizing monitoring information.

This section describes the current monitoring efforts for the lower Putah Creek watershed that are coordinated by the LPCCC. While current procedures are outlined below, the WMAP allows flexibility for potential future monitoring conducted by participating landowners and others (e.g., U.C. Davis researchers).

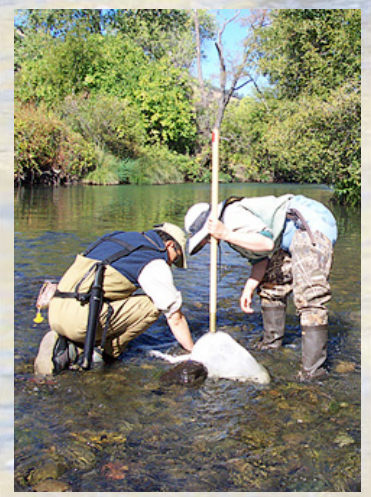
5.2.1 WATER QUALITY

Aquatic macroinvertebrates (animals, chiefly insects with aquatic life stages) have become a critical component of bioassessment programs (i.e., programs that use living organisms

The stonefly nymph is a key indicator for water quality (photo Ken W. Davis ©)

to assess environmental health) because they are more diverse, ubiquitous, and abundant than higher organisms such as fish. Each aquatic invertebrate species has a different tolerance level to habitat degradation effects. That information makes it possible to use macroinvertebrate species and assemblages as relative indicators of water quality and some habitat conditions. In contrast to chemical analysis of water samples that provide only a snapshot of water quality at an instant in time, the presence of macroinvertebrate species indicate water quality over the life of the organism. Macroinvertebrate monitoring can be done by volunteers with supervision, and requires no expensive equipment.

Until 2004, aquatic invertebrate populations in Putah Creek were largely unstudied and undocumented. In 2004, a volunteer group was formed by Putah Creek Council to monitor aquatic invertebrates. The group includes a U.C. Davis biology professor, graduate students, high school science teachers, and numerous community volunteers. The group conducted numerous macroinvertebrate assessments and is continually refining its approach. Research has shown that volunteer biomonitoring groups can achieve taxonomic accuracy that is statistically valid when compared to professional assessments (Wildlife Survey and Photo Service 2007).



Volunteer biomonitoring assessment on Putah Creek

The volunteer monitoring program objectives are to:

- monitor macroinvertebrate conditions monthly;
- submit a quarterly report to the Putah Creek Streamkeeper that provides professional macroinvertebrate bioassessment data, in-stream observations, and corresponding management recommendations;
- meet and exceed California Stream Bioassessment Procedure (CSBP) and Surface Water Ambient Monitoring Program (SWAMP) protocols;
- continue to build a level of professional monitoring protocol, taxonomic, and statistical expertise; and
- continue to build local biomonitoring expertise by providing and requiring training and certification for all volunteers.

5.2.2 FISH

The U.C. Davis Department of Wildlife, Fish, and Conservation Biology and Thomas R. Payne Associates conduct annual fish studies in lower Putah Creek. The findings are summarized in an annual report that is submitted to the Putah Creek Streamkeeper. The studies include the following components:

Sampling fish using electroshocking techniques

- **Adult Chinook salmon surveys.** Six surveys of the creek are conducted annually looking for salmon redds and carcasses to develop an estimate of the number of spawners. Flows permitting, most surveys are conducted by canoe.
- **Juvenile Chinook salmon surveys.** Flows permitting, key sites on the creek are systematically surveyed for the presence of juvenile salmon. All salmon are measured. Surveys conducted over a 2-month period provide data on growth rates, the locations of key rearing areas in relation to temperature, and when salmon leave the creek.
- **Smolt and juvenile Chinook salmon loss to predators study.** The abundant largemouth and smallmouth bass in the pools of the creek may be a threat, through predation, to juvenile salmon production. Bass are captured during the juvenile salmon out-migration season to determine their feeding habits (via gastric lavage).
- **Electrofishing surveys.** These surveys systematically catch, identify, weigh, and measure fish at five to seven locations in October of each year.


Bird box on a valley oak

- **Sacramento perch in Lake Solano study**. This study monitors the success of the Sacramento perch introduced to Lake Solano in 2003. Fish are surveyed using an electrofishing boat. Trapping larvae in light traps will provide evidence of species reproduction. This survey will also provide a good idea of the nature of the fish populations in Lake Solano.

The LPCCC is cooperating with the DFG and the Yolo Basin Foundation on the design and implementation of a fish bypass channel around Los Rios Check Dam to enhance passage of anadromous fish. Fish passage around Putah Diversion Dam is a more distant objective requiring further study and analysis of impacts.

5.2.3 Wildlife and Vegetation

Following the Accord settlement, the U.C. Davis Museum of Wildlife and Fish Biology (MWFB) began the Putah Creek Terrestrial Wildlife Monitoring Program, a comprehensive biological assessment of the plant, animal, and habitat resources of lower Putah Creek (Lindgren et al. 2006). Assessments were initiated in 2003.

Long-term goals of this monitoring project are:

- to evaluate the quality and importance of Putah Creek's riparian habitat and its contribution as a riparian habitat resource to the larger Central Valley landscape;
- to meet information needs of managers and landowners on Putah Creek and provide recommendations for habitat enhancements; and
- develop multi-taxonomic, multimetric models to establish physical and biotic relationships of Central Valley riparian habitats.

To reach these goals, the MWFB developed objectives to be met over two phases. Phase I, to be completed in 2008, involves the establishment of baseline inventory data on the distribution, richness, diversity, and relative abundance of wildlife and vegetation along lower Putah Creek. These data will be used to expand and direct future research efforts during Phase II: Long-Term Monitoring, scheduled to begin in 2009.

Phase I: Short-Term Objectives

Short-term objectives are as follows:

- develop site specific wildlife and vegetation inventories;
- assess vegetation structure, composition, and inter- and intra-site variability;
- estimate butterfly species richness, diversity and distribution;
- generate a Breeding Bird Atlas for Putah Creek;
- estimate avian species richness, diversity, relative abundance, density, and distribution;
- conduct focused analyses to include diversity estimates of Riparian Habitat Joint Venture(RHJV) and California Partners in Flight (CalPIF) focal species, California endemics, breeding birds, resident birds, winter focal species, and Neotropical migrants; and
- monitor artificial nest box use and document changes in the relative abundance and composition of the cavity-nesting bird community using the boxes.

PHASE II: LONG-TERM OBJECTIVES

Long-term objectives are as follows:

- determine avian productivity and survivorship at selected sites along Putah Creek;
- estimate avian population trends (relative abundance) and identify potential causes of any detected population changes from productivity and survivorship estimates;
- identify proximate causes of low avian productivity and survivorship through nest searching of avian focal species;
- assess the effects of nest box augmentation on the avian community;
- develop wildlife habitat association models to inform management and restoration decisions and to facilitate adaptive management; and
- compare findings to data from other long-term riparian study sites in the Yolo Bypass and Cosumnes River Preserve.

During Phase I, the MWFB surveyed for plants, invertebrates, birds, amphibians and reptiles, and mammals. Vegetation surveys, conducted during the 2005, 2006, and 2007 field seasons, were designed to provide quantitative, spatially explicit analyses of the composition and structure of the riparian plant community at a variety of scales. Vegetation surveys for species composition and percent cover were conducted on 10m radius plots for woody vegetation and on 1m square quadrants for herbaceous vegetation. Cover classes were chosen to conform to California Wildlife Habitat Relationships (CWHR) and California Native Plant Society (CNPS) categories and protocols. Data on species composition, relative cover, size class, tree diameter at breast height, crown diameter, height, vertical structural diversity, and site character and habitat quality were collected. Rough sketches of plant cover types, topography, and other noteworthy features, such as fallen logs or roads, were recorded for each plot. In August 2005 Lepidopteran (i.e., butterflies, moths, and skippers) surveys were incorporated as part of the monitoring effort along lower Putah Creek. Terrestrial insects are useful as early indicators of environmental health because they are abundant, easily identified, and respond more quickly to environmental changes than higher organisms. Avian survey methods consisted of transect surveys, timed variable radius point count surveys, constant-effort mist-netting Monitoring Avian Productivity and Survivorship (MAPS) protocol, nest box monitoring, and Breeding Bird Atlas (BBA) protocols. To provide a more comprehensive look at the species composition of local riparian ecosystems, researchers compiled lists of amphibian, reptile, and mammal species derived from incidental observations gathered while carrying out other survey activities.

5.3 DOCUMENTING MANAGEMENT ACTIONS

The LPCCC documents all management actions occurring in the watershed. Documenting management actions is an important component of the adaptive management and monitoring framework. During continued implementation of this WMAP, records will be incorporated into the annual adaptive management reports prepared by the Streamkeeper.

5.4 DECISION-MAKING PROCESS

The Streamkeeper provides participating landowners with summaries of monitoring data. The LPCCC reviews monitoring data in annual reports from the Streamkeeper and adjusts monitoring targets and strategies after discussion in regular board meetings each May. These meetings are open to the public.

5.5 Reporting

5.5.1 Adaptive Management Reporting

For the May LPCCC meetings, the Streamkeeper will prepare a memorandum that summarizes the monitoring program, key monitoring results, and proposed changes in monitoring and/or management practices for the following year.

CHAPTER 6

FUTURE UPDATES TO THE WATERSHED MANAGEMENT ACTION PLAN

All planning documents eventually become dated and require revision so that they can continue to provide practical direction for new projects, as well as for operational and maintenance activities for existing projects. A common and unfortunate situation is that the revision of planning documents is often neglected for budgetary or staff constraints, or other reasons. To address this problem, this section incorporates a suggested hierarchy of revision procedures in which the level of future updating is proportionate to the level of project change that is proposed. The WMAP – Projects reflects the best information available during the planning process, but it is understood that changes will occur and new information will become available over time, thus adjustments will be required to keep this document current. Such new information may include:

- feedback generated by landowners and members of the LPCCC,
- new residents and/or private property issues within the watershed,
- other scientific research that directs improved techniques of restoration and habitat management,
- research that directs improved management of watershed resources,
- documented threats to fish and wildlife species and their habitats,
- other changes in the status of plant or wildlife populations and their habitats,
- future modeling results, or
- new legislative or policy direction.

Unless a reasonable and clear revision process exists, the WMAP could become outdated and irrelevant. If the appropriate procedure for a particular, proposed revision is not apparent, the determination of which of the following procedures to use shall be made by the LPCCC.

6.1 MINOR REVISIONS AND UPDATES

Minor revisions may include the adoption of limited changes to the WMAP through adaptive management, based on other scientific information, or LPCCC direction. This procedure will be applicable to revisions that meet the following criteria:

- no change is proposed to the overall purposes of this document;
- CEQA documentation (if required) is prepared and approved;
- appropriate consultation occurs with the LPCCC;
- appropriate consultation with resource agencies occurs;
- adjoining neighbors are consulted regarding the revision, if the revision is related to a specific location; and
- an information presentation regarding the proposed revision is made to the LPCCC.

Minor revisions should be discussed with the LPCCC and should be prepared by the Putah Creek Streamkeeper.

Valley oaks are common along Putah Creek

6.2 Major Revisions and Updates

A major revision requires a procedure comparable to the WMAP planning process, but also proportionate to the level of project change that is proposed. This procedure will be applicable to revisions that meet the following criteria:

- substantial revision and/or a new policy direction is proposed to this document or the adoption of a completely new plan is proposed,
- appropriate coordination and consultation with resource agencies occurs,
- a stakeholder outreach program is conducted that is proportional to the level of the proposed revision, and
- an information presentation regarding the proposed revision or plan is made to the LPCCC.

The major revision or new plan may be prepared using available LPCCC resources. The major revision or new plan requires recommendation by the Streamkeeper and LPCCC.

If the appropriate procedure for a particular, proposed revision is not apparent, the determination of which of these procedures to use shall be made by a collaborative process between the Streamkeeper, the LPCCC, watershed stakeholders, project consultants, and grant managers.

6.3 Five-Year Action Plan Status Reports

Periodic evaluation is important to help ensure that the purposes and goals of the WMAP are being met. Chapter 4 “Watershed Enhancements,” contains a list of projects that involve improving environmental conditions within Putah Creek. Cumulatively, these efforts will provide feedback regarding the success of the overall management effort. Periodic and detailed analysis of these projects to assess environmental response will help determine the effectiveness of individual and combined actions and adaptive management.

An exhaustive review of the achievement of a sustainable ecosystem and objectives of the WMAP should be prepared every 5 years following the date of adoption of this document or subsequent revisions. A status report documenting this review should, at minimum, include:

- evaluation of the achievement of a sustainable ecosystem and objectives of the WMAP;
- evaluation of the completion or annual completion, as appropriate, of priority projects contained in the WMAP;
- evaluation of environmental response to restoration-related projects within the watershed;
- fiscal evaluation of the program;
- evaluation of the effectiveness of LPCCC’s coordination efforts with CALFED, local governments, watershed stakeholders, and other property management and regulatory agencies involved in the Putah Creek watershed;
- notation of important new scientific information that has bearing on the management of the Putah Creek watershed; and
- recommendations for revisions to this document to incorporate new information and improve its effectiveness.

The status report should be prepared or coordinated by the Streamkeeper. It should be submitted to the LPCCC for review, comment, and approval. This report should serve as a basis for revision of the WMAP and appropriate adjustment to ongoing management practices. Through the evaluation process it will be noted whether 5 years seems to be the appropriate interval to perform status reports. It may take more time for results of certain restoration related projects to become measurable or less time for other projects to begin to mature. Therefore, this evaluation and updating process should be done utilizing principles of adaptive management.

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CHAPTER 7

REFERENCES

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CHAPTER 8

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U.S. Bureau of Reclamation

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CHAPTER 9

GLOSSARY OF ACRONYMS

AAR	Adopt-A-Reach Program
Accord	Putah Creek Water Accord
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
DFG	California Department of Fish and Game
ESA	Endangered Species Act
LPCCC	Lower Putah Creek Coordinating Committee
NMFS	National Marine Fisheries Service
NPS	non point source
NRCS	USDA Natural Resources Conservation Service
PCC	Putah Creek Council
RCD	Resource Conservation District
RWQCB	Regional Water Quality Control Board
SCWA	Solano County Water Agency
SLEWS	Student and Landowner Education and Watershed Stewardship Program
SRWP	Sacramento River Watershed Program
USACE	U. S. Army Corps of Engineers
USFWS	U. S. Fish and Wildlife Service
WMAP	Watershed Management Action Plan
WMAP - Projects	Watershed Management Action Plan - Proposed Projects
WMAP - Resource Assessments	Watershed Management Action Plan - Resource Assessments

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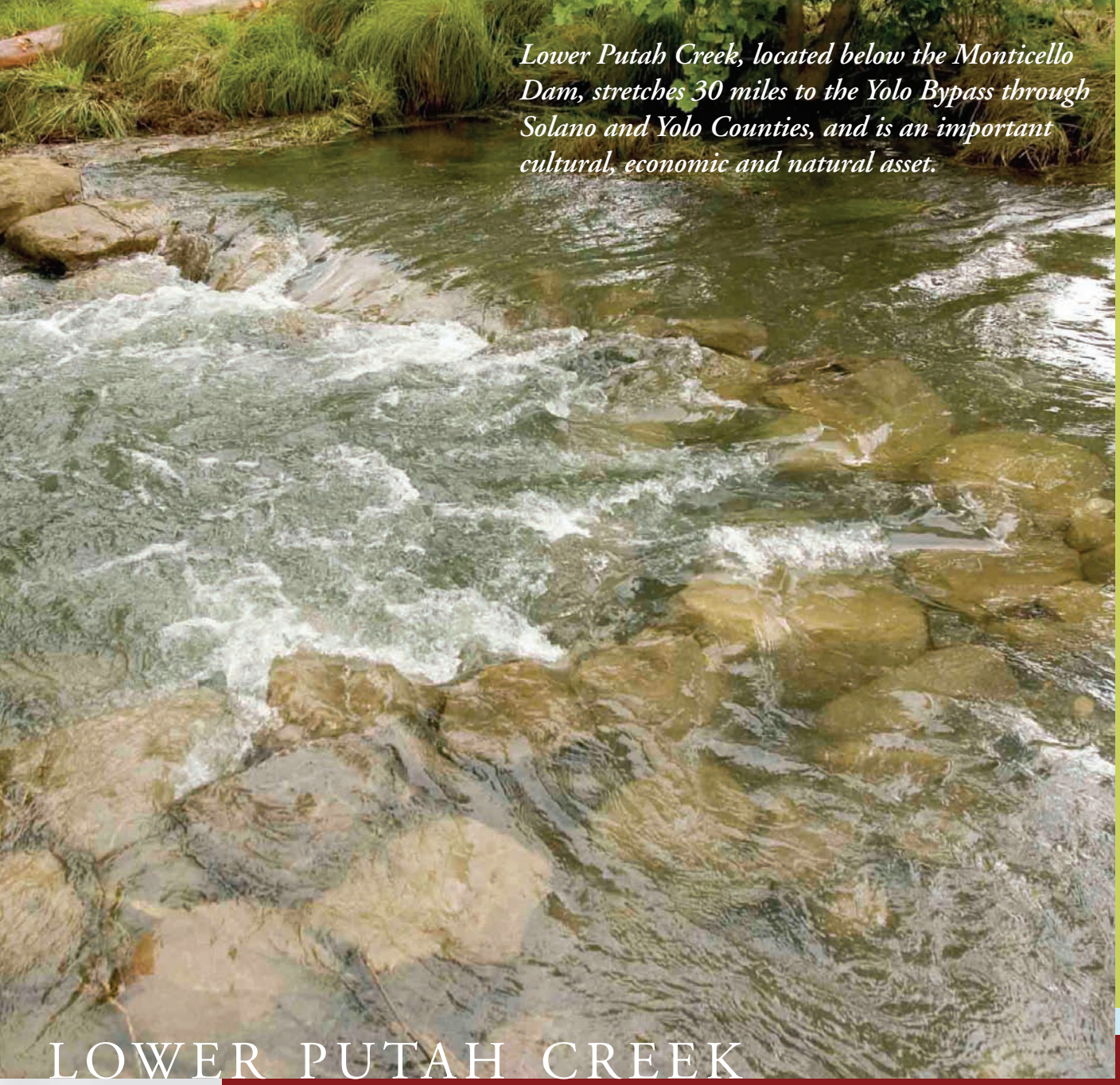
APPENDIX A

Stewardship Process Summary



Lower Putah Creek, located below the Monticello Dam, stretches 30 miles to the Yolo Bypass through Solano and Yolo Counties, and is an important cultural, economic and natural asset.

LOWER PUTAH CREEK

COORDINATING COMMITTEE'S REPORT TO THE COMMUNITY

A great deal of work must be done to restore the ecological health *of Lower Putah Creek after decades of neglect and deterioration. The LPCCC is working with expert consulting groups to increase the involvement of community members and landowners to gain their input, support and participation in this restoration process. With the guiding direction and help of the community, we can restore Lower Putah Creek to its natural state and preserve and protect it for the future.*

Purpose This report documents the involvement of landowners and community members along Lower Putah Creek in setting priorities for restoration and stewardship activities. The process was generously underwritten by a grant from the State Water Resources Control Board.

Background The Lower Putah Creek Coordinating Committee (LPCCC) was formed in 2000 by an accord between Solano County water users and Yolo County environmental advocates to protect fish and wildlife resources of Putah Creek. The LPCCC represents the Boards of Supervisors of Solano and Yolo Counties; the Cities of Davis, Fairfield, Suisun, Vacaville, Vallejo and Winters; Solano County Water Agency; Solano Irrigation District; Maine Prairie Water District; the University of California, Davis; Putah Creek Council; and riparian landowners.

guiding principles

To initiate the process and provide a framework for discussion, the planning team drafted a set of "guiding principles" to initiate discussions with the community. These principles were validated by the community during the first meeting and through written comments. All aspects of the process would be consistent with the following guiding principles:

- *The Creek is a Community Asset*—Benefits achieved at individual locations serve the broader interest of the Creek and the community.
- *Private Property Rights*—The process respects the rights of the landowner.
- *Improvement and Enhancement of Lower Putah Creek*—Actions identified through the process will enhance riparian restoration and maintenance of Lower Putah Creek, including tributaries (Dry Creek below Highway 128, Pleasants Creek below Miller Canyon, Proctor Draw, and other tributaries that influence or are influenced by Lower Putah Creek).
- *Willing Participants*—The process involves willing participants. Stewardship activities will be directed to sites on private or public lands where the landowner or public land manager is willing to participate.
- *Respect for Local Knowledge*—Local knowledge is an indispensable element of the process.
- *Wide Variety of Improvement and Enhancement Activities are Eligible for Consideration*—The process will consider a wide range of activities including but not limited to: invasive plant removal, trash clean-ups, bank stabilization, erosion control, fish and wildlife habitat improvements, water quality improvements, and others.
- *Actions are Consistent with Current Regulations and Policies*—Actions recommended to improve and enhance the creek must be implemented in a manner that is consistent with local, state and federal regulations, and within the limits of the specific funding source used for each action.

The LPCCC unites the primary stakeholders overseeing implementation of the Accord and restoration activities that protect and enhance the creek's resources. One of the LPCCC's first major accomplishments was to develop a Watershed Management Action Plan (WMAP). The WMAP is divided into three phases. Phase I documents the history and present conditions of the creek and watershed and provides a comprehensive assessment of the biological, physical and cultural resources. The document also provides baseline information for decision-making. Phase II evaluates the opportunities and constraints for resource enhancement within the watershed, using the priorities determined by the community. Phase III covers implementation, which largely depends on funding, permits and regulatory approvals.

Setting Priorities for Creek Restoration Lower Putah Creek, located below the Monticello Dam, stretches 30 miles to the Yolo Bypass through Solano and Yolo Counties, and acts as the county boundary for much of its length. It is an important cultural, economic and natural asset for the community. The process documented in this report also addresses major tributaries including: Dry Creek below Highway 128, Pleasants Creek below Miller Canyon, Proctor Draw, and other tributaries that influence or are influenced by Lower Putah Creek. About 100 private landowners own over 70 percent of the creek front acreage, while public entities (including the City of Winters, City of Davis and the University of California at Davis) own the remaining 30 percent. More than 70 percent of the land along the riparian corridor is used for agriculture, with the remaining stretches offering a mixture of urban, rural residential, conservation and recreational uses. Water quality is generally considered good, and Lower Putah Creek is an important source of drinking water. The creek is also used for fishing, boating, and swimming.

In 2005, the State Water Resources Control Board provided funds on behalf of the LPCCC for Solano County Water Agency to hire consulting assistance to develop a process in setting restoration priorities. Previous efforts to involve the community in creek restoration discussions were unsuccessful because community members were not yet willing to trust a new and unproven organization. Over the past six years, the LPCCC has worked steadily to build positive working relationships and establish a portfolio of successful creek restoration projects. Many of these projects were initiated at the request of private landowners and public agencies needing help with urgent projects, such as repairing a severely eroded bank undercutting a public road, or removing legacy trash heaps.

The LPCCC hired Joan Chaplick of Moore Iacofano Goltsman (MIG), Inc., to design and implement the process. The LPCCC also hired Dennis Bowker, an independent consultant, to assist with productive communications with private landowners. Rich Marovich, LPCCC Streamkeeper, completed the three-person team that planned and implemented the community involvement activities described in this report. The process was designed to encourage broad participation while providing opportunities for in-depth discussion, especially with private landowners. The planning team mapped out a five-month process that included two to three large community meetings, and approximately six smaller working group meetings. The schedule and number of meetings were modified as necessary depending on the needs of the participants. Interviews were conducted in advance with a few community members to help identify key issues.

Community Meetings The first community meeting was held on June 28, 2006 from 7-9 pm at the Winters Community Center. Approximately 90 community members attended. The outcomes of the first meeting began developing community-based priorities for stewardship activities on Lower Putah Creek; helped to develop a shared understanding of the LPCCC's role in the process; and provided review and discussion of the draft guiding principles. The meeting opened with a welcoming statement from Lois Wolk, Assemblywoman, 8th District. Assemblywoman Wolk has been very active in efforts to protect Lower Putah Creek, and was one of the signators of the Putah Creek Accord.

Following Ms. Wolk, Rich Marovich, LPCCC Streamkeeper, provided an overview of the LPCCC's role and presented several restoration projects the LPCCC has successfully implemented along the Creek on both public and private lands. Much of LPCCC's involvement in these projects came as a result of landowner and agency requests for assistance in dealing with urgent erosion control, sedimentation and bank stabilization efforts. Following the LPCCC presentation, Ron Unger, Director of Watershed Planning from EDAW, Inc., summarized the data included in the Lower Putah Creek WMAP and provided a description of its three phases. The results of the three phases of the WMAP will serve as a plan for restoration activities along the creek for the next 5-10 years.

This first community meeting was designed to share information about the LPCCC and creek and provided an opportunity for community members to develop guiding principles for the process. Members provided comments during the meeting, or in writing by turning in a comment card at the end of the meeting. The group reviewed and discussed the guiding principles and how they would be applied to this process.

Community members then signed up to participate in working groups to allow for more in-depth discussion. One working group dealt with potential project opportunities on public lands along the creek, and the other dealt with projects on privately owned lands. The meetings were facilitated by the consultants. Any community member was eligible to participate in either or both working groups regardless of their status as a landowner. It was anticipated the working groups would meet 1-2 times and then present their findings to the community for discussion by the larger group. The working groups would then reconvene to incorporate the feedback received from the community and refine the projects list. More than 50 community members signed up to participate in one or both groups.

The first working group meetings took place on July 18 (private lands) and July 20 (public lands) at the Winters Community Center. Each working group was tasked with developing a draft list of projects for review and discussion by the community.

Public Lands Working Group About thirty community members attended the public lands working group on July 20 at the Winters Community Center. Participants included local residents, agency officials and members of community based-organizations. The group discussed the types of stewardship and restoration projects that could be implemented on public lands. Project types identified by the group included increasing public access, monitoring water quality, stabilizing banks, and completing restoration work to improve water quality. The group then brainstormed a general list of potential projects for the publicly owned lands along the creek. The public lands discussed included: public fishing areas,

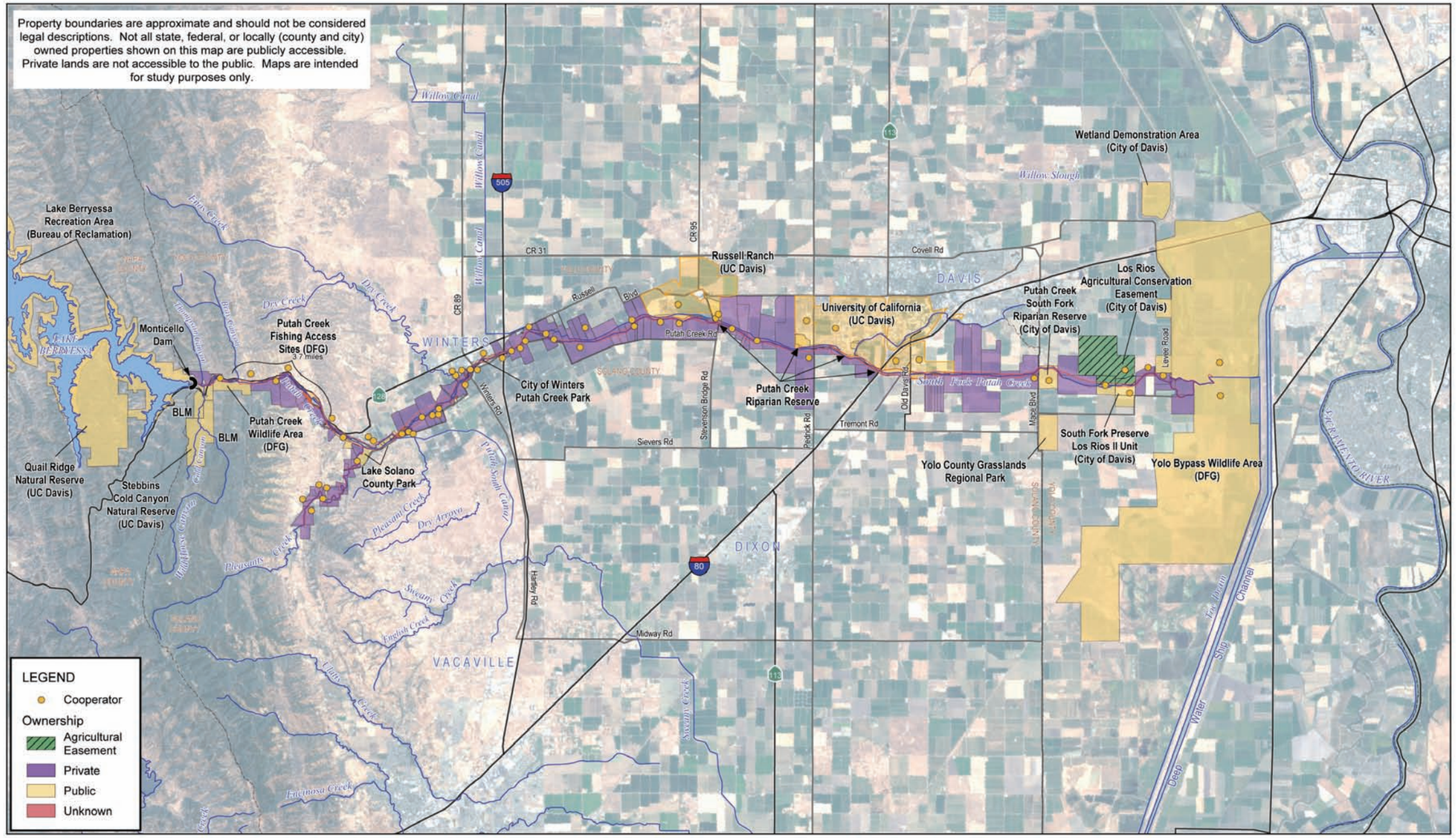
Winters Putah Creek Park, the area below Monticello Dam, Lake Solano County Park, Stevenson's Bridge, UC Davis Reserve, City of Davis lands and the Yolo Bypass. Participants were encouraged to consider the guiding principles as they suggested potential projects. Participants agreed that actions suggested by this working group should also be consistent with those recommended by the private lands working group.

Participants recognized the limitations on their ability to identify specific projects because more detailed planning, community involvement and environmental review would be needed by the land management agencies. However, the proposed project list helped identify areas of community interest and potential support. The LPCCC agreed to use this list as a basis for contacting public land managers to identify projects of mutual interest.

After the discussion, participants agreed the first working group meeting accomplished its purpose and the group did not need to meet again. Participants also agreed that a tour of demonstration projects along the creek would be beneficial, and requested that one be organized by the LPCCC. The tour was held on August 23, 2006 from 5:30 – 8:00 pm.

Private Lands Working Group The private lands working group met on July 18 and on August 1, 2006. About 20 community members attended the July 18 meeting. Participants brainstormed a list of potential projects that could be accomplished on private lands along the creek; participants who were land owners were then asked to identify specific restoration activities that could be implemented on their own properties. The group created a consolidated project list and agreed to discuss and refine it further at the next meeting. Participants reviewed the listed projects to ensure their consistency with the guiding principles and recognized that LPCCC will only pursue projects where the landowner has expressed interest in participating. Participants were encouraged to discuss the process with their neighbors and to encourage anyone unable to attend to contact the LPCCC if they were interested in having their project included in the process.

The second working group meeting was held on August 1, and 16 community members attended. Participants were asked to identify project types they believed would provide the highest restoration benefits. The group discussed several project types, and Rich Marovich provided several examples to help community members understand the benefits of different project types. The group agreed on four main project types (see sidebar, next page).



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

Lower Putah Creek Ownership Map

Lower Putah Creek Watershed Management Action Plan

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EXHIBIT 3-1

Selection Criteria Along with the four project types, working group participants also identified criteria that would be used to set priorities for project selection. The criteria include:

- **High level of landowner cooperation**—the landowner is cooperative during all stages of the process including planning, implementation and maintenance.
- **Landowner commitment to long-term maintenance—**the landowner commits to supporting project maintenance and providing access for monitoring and follow-up activities by LPCCC.
- **On-site availability of materials for restoration—**the availability of on-site materials can greatly reduce project costs. For example, downed eucalyptus trees on-site can be used as revetments for bank stabilization activities.

project types

The committee agreed on four main project types:

INVASIVE SPECIES REMOVAL. These projects remove invasive species responsible for geomorphic change in the creek (patterns of scour and deposition, including bank erosion, channel deflection, elevation of floodplains, etc.). Invasive plants such as Arundo, Tamarisk, and Himalayan Blackberry are known to cause geomorphic change. To be effective in the long term, these project plans must also address site restoration and the long-term maintenance needs of the site.

BANK STABILIZATION. Stable banks are the foundation of all stewardship and water quality protection efforts along the creek. Bank erosion is the primary source of sedimentation in the creek, and contributes to declining water quality and degradation of fish and wildlife habitat. The stability of many banks has been compromised by the presence of invasive plants, some of which were originally introduced and planted with the intention of improving bank stability. Because invasive plant removal and bank stability are intertwined at many sites along the creek, it is critical that these two activities be planned and implemented concurrently. Priority will also be given to other bank stabilization activities, such as weir installation, as long as they help achieve multiple benefits at the site.

TRASH CLEAN-UP. Historically, the creek was used as a dumpsite and many landowners inherited significant debris deposited on their property. Some of the large debris has been there many years, and the items (abandoned cars, old appliances, etc.) often require heavy equipment and skilled operators to remove them. Removing these gross pollutants can provide significant habitat and water quality benefits, and improve the appearance of the creek. Debris removal also reminds potential dumpers that this practice is no longer acceptable, and that keeping the creek free of debris is a priority for landowners and the community.

HABITAT ENHANCEMENT. Because the protection of salmon habitat was a catalyst for many of the issues addressed by the Lower Putah Creek Accord, priority should be given to projects that improve and enhance habitat for salmon and other fish and wildlife in and along the creek.

- **Project qualifies for available/multiple funding sources—**most restoration activities will be accomplished with support received from competitive public and private grant sources.
- **Project is on lands contiguous with other projects—** cumulative project benefits can be achieved when restoration efforts are contiguous.
- **Project location allows for public education—**projects that are visible from public access points, such as a bridge or nearby public lands, can be used to inform others about the benefits and value of these projects.
- **Project is located upstream—**some activities, such as erosion control or invasive plant removal, will achieve the greatest benefit if the activities begin on upstream properties.
- **Project includes multiple project types—**properties where the multiple benefits of all four project types can be accomplished in one location will be given priority.

CONSENSUS ON PROJECT TYPES AND CRITERIA The working group participants (of whom 14 out of 16 were private landowners) gave a unanimous vote of confidence to Streamkeeper Rich Marovich's ability to further refine the priority order of the projects using the selection criteria. They agreed that no additional working group meetings were needed. Prior to reconvening with the large group for the community meeting, the participants requested a tour of demonstration projects.

DEMONSTRATION PROJECT TOUR In response to the requests of both working groups, the LPCCC hosted a tour of three demonstration projects along the creek on August 23. Twenty participants from the private and public lands working groups toured the properties of three landowners who provided access to their lands. Participants visited Herb Wimmer's property to see the results of the extensive Himalayan Blackberry and Arundo control project. They also visited the Dry Creek Confluence Bank Restoration project, which prevented the undercutting of Lower Putah Creek Road during winter storms in 2005 and 2006. The tour ended at Dennis Kilkenny's property where participants saw the fish restoration activities implemented and enjoyed a reception hosted by Dennis and Jessica Kilkenny. The reception provided an opportunity for members of the two working groups to meet and informally discuss restoration activities along the creek.

COMMUNITY PRIORITIES FOR LOWER PUTAH CREEK On October 16, from 6:30–8:30, community members reconvened to review the proposed list of projects drafted by Rich Marovich using the results of the working groups. Approximately 30 community members attended the meeting. Many of the participants had a project under consideration and were interested in learning the status of their project. The project list included 63 projects, all of which were consistent with the guiding prin-

PROPOSED ACTION PLAN PROJECTS

	PROJECT BY PROPERTY OWNER	EXISTING AGREEMENT	INVASIVE SPECIES	BANK STABILIZATION	TRASH CLEAN-UP	HABITAT ENHANCEMENT	ON-SITE MATERIALS	MULTIPLE FUNDING	CONTIGUOUS LAND	VISIBILITY	NOTES
TIER ONE PROJECTS	Winters Putah Creek Park	•	•	•	•	•	•	•	•	•	*One mile reach from Winters Car Bridge to Hwy 505*
	Carl Ramos	•	•	•	•	•	•	•	•	•	*Dry Creek confluence*
	Ken Bertinoia	•	•	•	•	•	•	•	•	•	*Dry Creek confluence*
	Herb Wimmer	•	•	•	•	•	•	•	•		*Winters Oxbow*
	Tony Morales	•	•	•	•	•	•	•	•		*Below Putah Diversion Dam*
	Dennis Kilkenny	•	•		•	•	•	•	•	•	*Putah Creek Road East of 505*
	Craig McNamara	•	•		•	•	•	•	•	•	*Largest Parcel on Putah Creek*
	Yolo Housing	•	•	•	•	•	•	•		•	*Low income housing—CALFED Prop 13*
	UC Davis Russell Ranch	•	•		•	•	•	•	•	•	*Above Stevenson's Bridge*
	UC Davis Campus	•	•		•	•	•	•	•	•	*Pedrick Road to Old Davis Road*
	City of Davis	•	•		•	•	•	•	•	•	*Below Mace*
	Solano County 505	•		•	•	•	•	•	•	•	*South Bank 505 and East*
	Ethel Hoskins	•	•	•	•		•	•		•	*First Arundo Control and Bank Stabilization project*
	Don Jordan	•	•		•	•	•	•			*Above Stevensen's Bridge*
	John Neil		•		•	•	•	•	•	•	*27 acres above Winters Car Bridge*
	Glide Ranch		•		•	•	•	•	•		*2.5 miles north bank creek frontage*
	John Hasbrook	•	•			•	•	•	•		*Original Rock Weir*
	John Pickerel	•	•		•	•			•	•	*Below Putah Diversion Dam*
	John Vickrey	•	•	•	•			•	•		*Riparian restoration after fire*
	Catholic Church		•		•	•	•	•	•		*Between 505 and Stevenson's Bridge*
	Joe Vonkugelgen	•	•	•		•	•		•		*Below Stevenson's Bridge*
	Joe Castro		•	•	•			•	•	•	*Above Winters Car Bridge*
	Stevenson's Bridge	•	•		•	•	•	•	•	•	*South Bank East of the Bridge*
	DFG Yolo Bypass		•		•	•		•	•	•	*Fish passage*
TIER TWO PROJECTS	Richard Lopez	•	•	•					•	•	*Pleasants Creek*
	William Nichols	•	•	•					•	•	*Pleasants Creek*
	Jannes Echols	•	•	•					•	•	*Pleasants Creek*
	Stan Mertz	•	•			•		•	•		*Winters Oxbow*
	Tom Ramos		•	•	•		•		•		*Ag property on Dry Creek*
	Valerie Whitworth	•	•	•				•	•		*Ag property on Dry Creek*
	Woody Fridae	•	•	•			•		•		*Dry Creek*
	Al Graf		•	•			•		•	•	*Dry Creek*
	Matt Kimes	•	•	•			•		•		*Dry Creek*
	Don McLish	•	•	•				•	•		*Between 505 and Stevenson's Bridge*
	John Ott	•	•				•		•	•	*Below Stevenson's Bridge*
	Harvey Olander	•	•			•	•		•		*Below Stevenson's Bridge*
	Ed Virgin	•	•		•			•	•		*Below Road 106A*
	Lake Solano Park		•	•				•	•	•	*Interdam Reach*
	Mike Martin		•	•			•		•	•	*Interdam Reach*
	Gary Bertagnoli		•	•					•	•	*County bank restoration project on Pleasants Creek*
	Cory Nichols	•	•		•	•	•	•	•	•	*Pleasants Creek*
	John Barbee		•	•	•				•		*Proctor Draw*
	Richard Harris	•	•	•					•		*Below Putah Diversion Dam*
	Duane Balough	•	•	•					•		*Ag Property on Dry Creek*
	Ken Snyder	•	•		•			•			*Between 505 and Stevenson's Bridge*
	Los Rios Farms		•		•			•	•		*Below Mace*
	Fishing Accesses		•		•				•	•	*Interdam Reach*
	Dewey Wann	•			•				•	•	*Above Mace*
	Joshua Friewald		•	•		•	•				*Interdam Reach*
TIER THREE PROJECTS	Bruce Gates		•	•					•		*Pleasants Creek*
	Pat Shurnas		•	•						•	*Pleasants Creek at Putah Creek Road*
	Milo Shammas		•			•			•		*Winters Oxbow*
	Viona Hague			•			•		•		*Dry Creek*
	David Nishikawa	•	•						•		*Above Pedrick*
	Mike Madison	•	•						•		*Below Stevenson's Bridge*
	Pearse Family	•	•						•		*Above Winter's Car Bridge*
	DFG Cold Canyon		•						•	•	*Below Monticello Dam*
	Mack Cody		•						•		*Below Putah Diversion Dam*
	John Seeger		•						•		*Interdam Reach*
	John Hammond		•						•		*Interdam Reach*
	Stan Lester		•						•		*Putah Creek above Dry Creek*
	Robert Boshoven			•							*Pleasants Creek*
	John Fawcett		•								*Below Stevenson's Bridge*


ciples. The list included projects on public and private lands, and was separated into three tiers.

Tier One projects include most priority project types and met the selection criteria described by the private landowners. These projects feature a high degree of landowner willingness, as evidenced by the executed agreement between the LPCCC and the landowner or land management agency. Tier Two and Three projects feature some of the project types and meet several of the selection criteria. (Please see the project list on page 7 and map on page 4.)

Rich Marovich reviewed and briefly discussed the 63 projects on the list, stopping periodically to answer questions. Participants were asked if they believed any projects should be revised, moved to a different tier, or removed from the list. They were also asked to identify any projects that may have been omitted from the list. There was consensus among the group that the list of projects reflected the results of the working groups, and there were no requests to modify the list. Tier 1 projects will be funded and implemented first. However, should resources or opportunities allow for a Tier 2 or Tier 3 project to be achieved in a cost-effective and efficient manner, these projects will be considered earlier.

While a list with 63 priority projects may appear ambitious, not all projects require the same level of resources or LPCCC project management. The LPCCC has a proven track record of leveraging funds and resources and managing multiple projects concurrently. The LPCCC owns a fleet of specialized vehicles and heavy equipment, such as earth movers and hydroseeders, that can accomplish specific restoration tasks very effectively. Projects can be accomplished using several models of LPCCC involvement, including:

- LPCCC staff perform the work, or hire contractors to provide specialized assistance.
- LPCCC partners with a landowner or public land manager to jointly accomplish project tasks.
- LPCCC works with local community based organizations to involve volunteers and students in restoration activities, such as trash clean-up or planting native plants.
- LPCCC loans the use of its vehicles or specialized equipment to landowners who prefer to do the work themselves.
- LPCCC provides herbicides or other in-kind resources to landowners seeking to remove invasives and maintain sites over the long-term.

Conclusion Lower Putah Creek community members care deeply about the long-term health of the creek and their community. There is a strong commitment from private landowners, public agencies and the general public to take action to protect this important resource. The productive and solution-oriented discussions allowed the group to identify and list priorities in a relatively short timeframe. Much of this was due to an emphasis on the guiding principles, especially the principle to respect the rights of landowners. Almost 60% of the landowners along the creek have agreed to participate and have a project on the priority list. The LPCCC continues to develop and sustain relationships within the community and build its portfolio of successful restoration projects. This process provided an opportunity for the whole community to actively participate in setting a course for future restoration activities. The LPCCC intends to sustain this interest and momentum by hosting an annual meeting to report on its progress, and share the challenges and opportunities for restoration activities along Lower Putah Creek.

Acknowledgements The Lower Putah Creek Coordinating Committee extends its appreciation to the State Water Resources Control Board for its financial support in this process, and to the more than 150 community members who participated in the development of the project priority list by attending a community meeting, participating in the public and/or private lands working group, participating in a tour of demonstration projects, or providing comments in writing via e-mail, comment card or letter.

APPENDIX B

Lower Putah Creek Riparian Corridor Recommended Restoration Plant Palette and Plant Descriptions

Table B-1 Lower Putah Creek Riparian Corridor Recommended Restoration Plant Palette[1]			
Scientific Name	**Common Name**	**Habitat Type[2]**	**Prevalence[3]**
INSTREAM/WETLAND			
HERBS, GRASSES, GRAMINOIDS			
Carex barbarae	Santa Barbara sedge	RW	Common
Carex nudata	Naked sedge	RW	Common
Carex praegracilis	Clustered field sedge	RW	Common
Eleocharis macrostachya	Common spikerush	RW	Common
Euthamia occidentalis	Western goldenrod	RW	Occasional
Hibiscus lasiocarpus	Rose mallow	RW	Occasional[4]
Juncus balticus	Baltic rush	RW	Common
Juncus effusus	Common rush	MRF, RW	Common
Leersia oryzoides	Rice cutgrass	RW	Common
Polygonum hydropiperoides	Swamp smartweed	RW	Common
Polygonum lapathifolium	Willow smartweed	RW	Common
Polygonum punctatum	Punctate smartweed	RW	Common
Scirpus acutus	Common tule	RW	Occasional
SAND/GRAVEL BAR AND LOWER BANK			
HERBS, GRASSES, GRAMINOIDS			
Artemisia douglasiana	Mugwort	MRF, RG, RW	Common
Carex barbarae	Santa Barbara sedge	RW	Occasional
Carex nudata	Naked sedge	RW	Occasional
Carex praegracilis	Clustered field sedge	RW	Occasional
Eleocharis macrostachya	Common spikerush	RW	Occasional
Euthamia occidentalis	Western goldenrod	RW	Occasional
Hordeum brachyantherum	Meadow barley	RG	Common
Juncus balticus	Baltic rush	RW	Occasional
Juncus effusus	Common rush	MRF, RW	Common
Leymus triticoides	Creeping wildrye	MRF, RG, RW	Common
Muhlenbergia rigens	Deergrass	MRF, RG, RS, VORF	Common

Table B-1 Lower Putah Creek Riparian Corridor Recommended Restoration Plant Palette[1]			
Scientific Name	**Common Name**	**Habitat Type[2]**	**Prevalence[3]**
Polygonum hydropiperoides	Swamp smartweed	RW	Occasional
Polygonum lapathifolium	Willow smartweed	RW	Occasional
Polygonum punctatum	Punctate smartweed	RW	Occasional
SHRUB SPECIES			
Baccharis salicifolia	Mulefat	RW	Common
Cephalanthus occidentalis	Buttonbush	MRF, RS	Occasional[4]
Rubus ursinus	California blackberry	MRF, VORF	Common
Rosa californica	California rose	MRF, VORF	Common
Salix exigua	Sandbar willow	RS	Common
Salix lasiolepis	Arroyo willow	RS, MRF	Common
Sambucus mexicana	Blue elderberry	MRF, VORF	Common
Vitis californica	California grape	MRF, VORF	Common
TREE SPECIES			
Acer negundo	Box elder	MRF	Common
Alnus rhombifolia	White alder	MRF	Common
Fraxinus latifolia	Oregon ash	MRF	Common
Populus fremontii	Fremont cottonwood	MRF	Common
Quercus lobata	Valley oak	MRF, VORF	Occasional
Salix gooddingii	Gooddings willow	MRF	Common
Salix laevigata	Red willow	MRF, RS	Common
UPPER BANK AND TERRACE			
HERBS, GRASSES, GRAMINOIDS			
Artemisia douglasiana	Mugwort	MRF, RG, RW	Common
Asclepias fascicularis	Narrow leaf milkweed	RG, VORF	Occasional
Bromus carinatus	California brome	RG	Common
Elymus glaucus	Blue wildrye	MRF, RG, RW	Common
Elymus trachycaulus	Slender wheatgrass	RG	Occasional
Eschscholzia californica	California poppy	RG	Common

Table B-1
Lower Putah Creek Riparian Corridor Recommended Restoration Plant Palette[1]

Scientific Name	Common Name	Habitat Type[2]	Prevalence[3]
Grindelia camporum	Gumplant	MRF, RG, RS, VORF	Common
Leymus triticoides	Creeping wildrye	MRF, RG, RW	Common
Lupinus bicolor	Miniature lupine	RG	Occasional
Melica californica	California oniongrass	RG	Common
Nassella pulchra	Purple needlegrass	RG	Common
SHRUB SPECIES			
Baccharis pilularis	Coyote bush	MRF, RG, RS	Common
Cercis occidentalis	Redbud	MRF, RS, VORF	Common[5]
Heteromeles arbutifolia	Toyon	MRF, RS, VORF	Common[5]
Rhamnus californica	Coffeeberry	RS	Common
Rubus ursinus	California blackberry	MRF, VORF	Common
Rosa californica	California rose	MRF, VORF	Common
Sambucus mexicana	Blue elderberry	MRF, VORF	Common
Vitis californica	California grape	MRF, VORF	Common
TREE SPECIES			
Populus fremontii	Fremont cottonwood	MRF	Occasional
Quercus lobata	Valley oak	MRF, VORF	Common
Quercus wislizeni	Interior live oak	MRF, VORF	Common[5]

[1] Organized by creek bank location. Not all plants are appropriate for all sites. Planting palettes should be based on site conditions and vegetation communities appropriate for the specific restoration site.

[2] Habitat Types
- MRF Mixed Riparian Forest and Scrub
- RG Ruderal Grassland
- RS Riparian Scrub
- RW Riverine Wetland
- VORF Valley Oak Riparian Forest

[3] Prevalence of species is based on observed abundance on lower Putah Creek and typical Central Valley riparian area species abundance.

[4] Lower reaches only (i.e. Reaches 1-5)

[5] Interdam reach only (i.e. Reach 6)

Table B-2
Lower Putah Creek Riparian Corridor Plant Descriptions

Species	Growth Form	Planting Material	Restoration Values and Ethnobotanical Uses	Wildlife Values
TREE SPECIES				
Acer negundo Box elder	Small to large-sized, deciduous tree	Rooted stock	• Fast growth rate • Resprout ability • Adapted to many soil types • High drought tolerance • Shade tolerant • High seed production	• Seeds eaten by birds and squirrels • Deer browse • Cover for wildlife and livestock • Evidence that song sparrows have better success at raising broods if box elder trees around nest (Small et al. 1998) • Tree important for nesting American goldfinch • Nesting habitat for yellow-billed cuckoo, American robin, western scrub-jay, house wren, black-headed grosbeak and lazuli bunting
Alnus rhombifolia White alder	Small to medium-sized, deciduous tree	Rooted stock	• Nitrogen fixer • Good soil stabilizer • Rapid growth rate • Resprout ability • Long life span • Shade tolerant • Flood tolerant • High seedling vigor • Native American medicinal • Used for basketry dye	• Provides structural diversity and cover for perching birds • Bark used by beavers • Seeds eaten by songbirds • Important habitat for nesting black-headed grosbeaks, song-sparrow and yellow-breasted chat
Fraxinus latifolia Oregon ash	Small to medium-sized, deciduous tree	Rooted stock	• Moderate growth rate • Good soil stabilizer • Flood tolerant • Resprout ability	• Provides stand structural diversity and cover for wildlife • Important habitat for nesting black-headed grosbeaks
Populus fremontii Fremont cottonwood	Large-sized, deciduous tree	Cuttings, rooted stock	• Rapid growth rate • Good soil stabilizer • Resprout ability • Root suckers • Sap edible • Medicine used for cuts, burns, and abrasions	• Provides cover, nesting and foraging habitat for many birds, including cavity nesters and raptors, as well as squirrels and beavers • Very important nesting habitat for birds, including Swainson's hawk, red-tailed hawk, Nuttall's woodpecker, western kingbird, western wood-peewee, American robin, house wren, and Bullock's oriole

Table B-2 Lower Putah Creek Riparian Corridor Plant Descriptions				
Species	**Growth Form**	**Planting Material**	**Restoration Values and Ethnobotanical Uses**	**Wildlife Values**
Quercus lobata Valley oak	Large-sized, deciduous tree	Rooted stock	• Rapid growth rate • Resprout ability (seedlings and saplings) • Drought tolerant • Flood tolerant • Important food source for Native Americans and early settlers • Medicinal • Used in construction of cradle boards	• Critical habitat for wildlife, supports more nesting bird species than any other habitat type including Swainson's hawks, red-tailed hawk, Nuttall's woodpecker, western kingbird, western wood-peewee, and western scrub-jay • Provides habitat for rare remnant populations of ringtail in the Central Valley • Used by many cavity dwelling birds and mammals • Acorns important food source for some mammals and birds
Quercus wislizeni Interior live oak	Medium to large-sized, evergreen tree	Rooted stock	• Resprout ability • Drought tolerant • Shade tolerant • Important food source for Native Americans and early settlers • Medicinal • Used in construction of cradle boards	• Important food and cover for many wildlife species • Valuable year-round deer browse • Many birds eat acorns including quails, ring-necked pheasant, northern flicker, acorn woodpecker, scrub jay, magpie, Steller's jay, mountain chickadee, California thrasher, western meadowlark, starling, purple finch, American goldfinch, rufous-sided towhee, brown towhee, common crow, and band-tailed pigeon • Interior live oak provides good foraging sites for Nutall's woodpecker, white-breasted nuthatch, plain titmouse, ash-throated flycatcher, black-headed grosbeak, and northern oriole
Salix gooddingii Goodding's willow	Medium to large-sized, deciduous tree	Cuttings, rooted stock	• Rapid growth rate • Good soil stabilizer • Resprout ability • Flood tolerant • Pioneer species	• Provides browse and cover for wildlife • Important nesting habitat for black-chinned hummingbirds, house wren and black-headed grosbeak • Provides important foraging habitat for migratory songbirds

Table B-2 Lower Putah Creek Riparian Corridor Plant Descriptions				
Species	**Growth Form**	**Planting Material**	**Restoration Values and Ethnobotanical Uses**	**Wildlife Values**
Salix laevigata Red willow	Medium to large-sized, deciduous tree	Cutting, rooted stock	• Vigorous root system/good streambank stabilizer • Resprout ability • Flood tolerant • Plant in wet sites • Native American basketry material • Medicinal	• Important habitat for many breeding and migratory birds • Early season pollinator food source
SHRUB SPECIES				
Baccharis pilularis Coyote bush	Medium-sized, deciduous shrub	Rooted stock	• Moderate growth rate • Resprout ability • Vegetative spread rate • Need to plant both male and female plants	• Important nesting habitat for song sparrow and American gold finch • Late to very late flowering season pollinator food source
Baccharis salicifolia Mulefat	Medium-sized, semi-deciduous shrub	Rooted stock	• Rapid growth rate • Resprout ability • High seedling vigor • Ability to grow in disturbed/difficult growing conditions	• Attractive to beneficial insects such as pollinators and pest predators (Las Pilitas website)
Cephalanthus occidentalis Buttonbush	Large, deciduous shrub or small tree	Cutting, rooted stock	• Resprout ability • Flood tolerant • Plant in wet sites • Shade tolerant • High seedling vigor	• Seeds eaten by waterfowl • Bees use plant to produce honey • Wood ducks use for rearing and cover
Cercis occidentalis Redbud	Small to medium-sized, deciduous shrub	Rooted stock	• Moderate growth rate • Drought tolerant • Native American basketry material	• Early season pollinator food source
Heteromeles arbutifolia Toyon	Large, evergreen shrub (6-10 feet)	Cutting, rooted stock, seed	• Moderate growth rate • Drought tolerant • Slope stabilizer	• Berries important food source for wildlife and birds • Mid-season flower pollinator food source
Rhamnus californica Coffeeberry	Small to medium-sized, evergreen shrub	Rooted stock	• Drought tolerant	• Provides cover and nesting habitat for birds and small mammals • Berries are a food source for birds

Table B-2 Lower Putah Creek Riparian Corridor Plant Descriptions				
Species	**Growth Form**	**Planting Material**	**Restoration Values and Ethnobotanical Uses**	**Wildlife Values**
Rosa californica California rose	Thicket-forming, semi-deciduous shrub	Rooted stock	• Vigorous root system/good soil stabilizer • Rapid growth rate • Resprout ability • Rapid vegetative spread rate • Native American basketry material • Edible and medicinal • Used to make arrow shafts	• Important nesting habitat for Lazuli bunting
Rubus ursinus California blackberry	Low growing, thicket-forming, evergreen shrub	Cutting, rooted stock	• Vigorous establishment on disturbed sites • Good soil stabilizer • Rapid growth rate • Thicket forming • Resprout ability • Shade tolerant • Edible and medicinal	• One of the most important shrubs for birds, providing shelter, food, and protects nests for species such as song sparrow and yellow-breasted chat
Salix exigua Sandbar willow	Large, deciduous shrub or small tree	Cutting, rooted stock	• Thicket-forming • Vigorous root system/ good stream bank stabilizer • Moderate vegetative spread • Flood tolerant • Native American basketry material • Beds, lodges, boats, cradles, & games	• Important nesting habitat for blue grosbeak and black-headed grosbeak
Salix lasiolepis Arroyo willow	Large, deciduous shrub or small tree	Cutting, rooted stock	• Moderate growth rate • Resprout ability • Good soil stabilizer • Native American basketry material	• Important nesting habitat for black-headed grosbeak and other birds
Sambucus mexicana Blue elderberry	Large, deciduous shrub or small tree	Rooted stock	• Rapid growth rate • Resprout ability • Good vegetative spread rate • Expansive root systems/good soil stabilizer • Stems used as musical instruments • Edible, medicinal, tinder	• Valuable cover for wildlife • Fruit eaten by many species of birds and mammals • Habitat for valley elderberry longhorn beetle

Table B-2
Lower Putah Creek Riparian Corridor Plant Descriptions

Species	Growth Form	Planting Material	Restoration Values and Ethnobotanical Uses	Wildlife Values
Vitis californica California grape	Woody, deciduous vine or sprawling shrub	Rooted stock	• Easily propagated from cuttings • Rapid growth rate • Flood tolerant • Good rate of establishment • Plant in wet sites	• Valuable riparian plant species for wildlife, provides cover and food for many mammals and very important habitat for breeding birds, especially for nest concealment • The fruits are a fall staple for many animal species, including coyote, opossum, western spotted skunk, striped skunk, wood duck, band-tailed pigeon, California quail, mountain bluebird, and other passerines
HERBS, GRASSES, GRAMINOIDS				
Asclepias fascicularis Narrow leaf milkweed	Perennial herb (1-2 feet)	Rooted stock, seed	• Plants can absorb toxins from water, air and soil • Stems used for cords • Medicinal uses	• Larval host plant to monarch butterfly • Pollinator food source • Can be toxic if ingested
Bromus carinatus California brome	Bunchgrass with thick, extensive root system	Rooted stock, seed	• High seedling vigor • Rapid growth • Drought tolerant • Favored by light/moderate grazing	• High quality forage and browse
Carex barbarae Santa Barbara sedge, ***Carex nudata*** Naked sedge, ***Carex praegracilis*** Clustered field sedge	Perennial rhizomatous herb	Rooted stock, plugs	• Plant in wet sites • Vegetative reproduction • Flood and scour tolerant • Shade tolerant • Good for streambank stabilization and erosion control • Medicinal and tubers edible • Basketry material	• Important nesting habitat for song sparrow, spotted tohee, and common yellowthroat
Eleocharis macrostachya Common spikerush	Perennial rhizomatous herb	Seed, plugs, rooted stock	• Extensive root development • Plant in wet sites only • Vegetative reproduction • Shade tolerant	• Food source and cover for waterfowl
Elymus glaucus Blue wildrye	Perennial bunchgrass	Rooted stock, seed	• Fire tolerant • High seedling vigor • Abundant seed production • Rapid growth • Vigorous root system • Important famine food	• Important forage for wildlife

Table B-2 Lower Putah Creek Riparian Corridor Plant Descriptions				
Species	**Growth Form**	**Planting Material**	**Restoration Values and Ethnobotanical Uses**	**Wildlife Values**
Elymus trachycaulus Slender wheatgrass	Perennial bunchgrass	Rooted stock, seed	• Rapid growth • Vegetative reproduction • Drought tolerant • Does well on disturbed sites • High salt tolerance • Abundant seed production • Important famine food	• Leaves and seeds food source for wildlife, highly palatable for grazers • Provides cover and nesting habitat for birds and small mammals
Eschscholzia californica California poppy	Annual, perennial flowering herb	Seed	• High seedling vigor • Does well on disturbed sites • Drought tolerant • Leaves used for toothaches	• Early to late flower for bees and other pollinators
Euthamia occidentalis Western goldenrod	Perennial rhizomatous herb (4-6 feet)	Rooted stock	• Extensive root development • Moderate growth rate • Plant in wet sites only • Vegetative reproduction	• Late flower season for bees and other pollinators
Grindelia camporum Gumplant	Perennial flowering herb	Rooted stock, seed	• Drought tolerant • Tolerates clay and alkaline soils • Medicinal uses both topical and internal	• Late flower season for bees and other pollinators • Not palatable for grazing animals
Hibiscus lasiocarpus Rose mallow	Emergent perennial herb	Rooted stock, seed	• Plant in wet sites • CNPS List 2 plant	• Long bloom period • Food source for bees and other pollinators
Hordeum brachyantherum Meadow barley	Bunchgrass	Rooted stock, seed	• Drought tolerant • Flood tolerant • Edible	• Small mammals and waterfowl may make limited use of H. brachyantherum leaves and seeds for food
Juncus balticus Baltic rush	Perennial rhizomatous herb	Rooted stock, plugs	• Thick, extensive root system • Excellent streambank stabilizer • Increases with grazing • Sometimes an indicator of disturbed wetlands	• Important cover and nesting habitat for waterfowl, non-game birds and small mammals
Juncus effusus Common rush	Perennial clumping herb	Rooted stock, plugs	• High seedling vigor • Moderate growth rate • Adapted to many soil types • Plant in wet sites only	• Highly palatable browse

Table B-2
Lower Putah Creek Riparian Corridor Plant Descriptions

Species	Growth Form	Planting Material	Restoration Values and Ethnobotanical Uses	Wildlife Values
Leersia oryzoides Rice cutgrass	Rhizomatous grass	Rooted stock, seed	• Adapted to many soil types • Vegetative reproduction • Tolerant of short-term flooding • Plant in wet sites only	• Highly palatable for grazing animals
Leymus triticoides Creeping wildrye	Perennial rhizomatous herb (1-2 feet)	Rooted stock, seed	• Rapid growth rate • Rapid vegetative spread rate • Good for erosion control • Commonly used in restoration projects	• Highly palatable browse
Lupinus bicolor Miniature lupine	Annual flowering herb (1-3 feet)	Seed	• Rapid growth • Drought tolerant • Adds nitrogen to soil • Good for disturbed areas • Vegetative reproduction	• Stabilizes and restores disturbed and degraded areas
Melica californica California oniongrass	Bunchgrass with extensive root development	Rooted stock, seed	• Moderately shade tolerant • Drought tolerant	• Palatable for browsing and grazing animals
Muhlenbergia rigens Deergrass	Bunchgrass	Rooted stock, plugs	• Extensive root system • Dense plantings can suppress weeds • Fire tolerant • Flower stalks used for coiled baskets	• Forage and cover for deer • Overwintering habitat for ladybugs
Nassella pulchra Purple needlegrass	Bunchgrass	Rooted stock, seed	• Rapid growth • Drought tolerant • Vegetative reproduction • Competitive with non-native grasses	• Palatable browse source
Polygonum hydropiperoides Swamp smartweed, ***Polygonum lapathifolium*** Willow smartweed, ***Polygonum punctatum*** Punctate smartweed	Perennial rhizomatous herb	Seed	• Adapted to many soil types • Plant in wet sites • Flood tolerant • Vegetative reproduction	• Important food source for waterfowl • Important nesting habitat for blue grosbeak

Table B-2
Lower Putah Creek Riparian Corridor Plant Descriptions

Species	Growth Form	Planting Material	Restoration Values and Ethnobotanical Uses	Wildlife Values
Scirpus acutus Common tule	Perennial rhizomatous herb (4 – 6 feet)	Rooted stock, plugs	• Forms dense colonies • Extensive root system • Plant in wet sites only • Vegetative reproduction • Flood tolerant • Buffers wind and wave action along streambanks and shorelines • Edible • Basketry material • Canoes, clothing, & dwellings	• Seeds eaten by songbirds and waterfowl • Used for cover and nesting habitat by birds • Food source for muskrat and other small mammals

Source: EDAW 2007
CALFLORA online database (http://www.calflora.org/)
Point Reyes Bird Observatory (PRBO) – 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)
USDA GRIN (Germplasm Resources Information Network) online database (http://www.ars-grin.gov/)
USDA NRCS (Natural Resources Conservation Service) online database (http://www.nrcs.usda.gov/)

References:
Small. S.L., G.R. Geupel, N. Nur, A.L. Holmes, and T. Gardali. 1998. The health of riparian bird populations in central coastal California National Parks. A presentation to the Wildlife Society, Western Section, Sacramento CA.

APPENDIX C

Sources of Native Plant Materials

CALIFORNIA NATIVE PLANT NURSERIES & SEED COMPANIES

Albright Seed Company
189 Arthur Road
Martinez, CA 94553
925 / 372-8245
www.albrightseed.com
Bulk sales grass, wildflower, shrub & tree seed, 50% native; $25 minimum order.

Appleton Forestry Nursery
1369 Tilton Road
Sebastopol, CA 95472
707 / 823-3776
Container trees & shrubs, contract collect & grow, wholesale & retail. Call ahead.

Bitterroot Restoration, Inc.
55 Sierra College Boulevard
Lincoln, CA 95648
916 / 434-9571
www.bitterrootrestoration.com
Wholesale and custom growing.

California Flora Nursery
P.O. Box 3, Somers & D Streets
Fulton, CA 95439
707 / 528-8813
www.calfloranursery.com
Wholesale and retail, native and Mediterranean plants.

Cal-Native Plants, LLC
25735 Garbani Rd.
Menifee CA, 92584
909 / 301-8075
http://www.cal-nativeplants.com/
Aims to increase native stock and community awareness of the critical role native plants play in California's ecological well-being.

Central Coast Wilds
114 Liberty Street
Santa Cruz, CA 95060
831 / 459-0655
www.centralcoastwilds.com
State registered organic nursery provides quality native plants, seeds, and services to landscapers and designers.

Circuit Rider Productions, Inc.
9619 Old Redwood Highway
Windsor, CA 95492
707 / 838-6641
www.crpinc.org
By appt. only, wholesale & retail plants (small sizes), contract collect & grow, revegetation & restoration.

Clyde Robin Seed Company
P.O. Box 2366
Castro Valley, CA 94546
510 / 785-0425
www.clyerobin.com
Wholesale & mail order seed.

Cornflower Farms
P.O. Box 896
Elk Grove, CA 95759
916 / 689-1015
www.cornflowerfarms.com
Container plants, 80%-90% natives, revegetation and restoration. Open for retail sales the 2nd Saturday of each month from March to November from 7:30 am - 2:00 pm.

Elkhorn Native Plant Nursery
P.O. Box 270, 19578 Hwy 1
Moss Landing, CA 95039
831 / 763-1207
www.elkhornnursery.com
Wholesale & retail on Wed. & Sat., seed, container & bareroot plants, contract collect & grow, demonstration garden.

Farm on Putah Creek
Native Plant Nursery
5265 Putah Creek Rd.
Winters, CA 95694
530 / 795-1520
http://www.landbasedlearning.org/nursery.php
Contract collect and grow and some retail. All proceeds from plant sales support environmental education programs run by the Center for Land Based Learning.

Floral Native Nursery
2511 Floral Ave.
Chico, CA. 95973
530 / 892-2511 (phone/fax)
www.floralnativenursery.com
Dedicated to growing California native plants for landscaping and restoration. Wholesale and retail.

Forest Seeds of California
1100 Indian Hill Road
Placerville, CA 95667
530 / 621-1551
Mail order tree & shrub seeds, contract collect.

Freshwater Farms, Inc.
5851 Myrtle Avenue
Eureka, CA 95503
707 / 444-8261 800 / 200-8969
www.freshwaterfarms.com
Wholesale & retail seed, container & bareroot riparian plants, contract collect & grow, revegetation & restoration.

Hartland Nursery/Hart Restoration, Inc.
13737 Grand Island Road
Walnut Grove, CA 95690
916 / 775-4021
www.hartlandnursery.com
Specializes in growing plants that are native to Northern California's Central Valley. Contract collect and grow, and full-service restoration installation and maintenance.

Hedgerow Farms
21740 County Road 88
Winters, CA 95694
530 / 662-6847
www.hedgerowfarms.com
Wholesale & retail seed, container grasses, sedges, rushes, & forbes, contract collect & grow, revegetation & restoration.

Intermountain Nursery
30443 N. Auberry Rd
Prather, CA 93651
559 / 855-3113
Specialize in drought tolerant CA native plants for the Central valley up to the central Sierra Nevada. Also does contract growing and wholesale.

Lake County Natives
7480 Kelsey Creek Drive
Kelseyville, CA 95451
707 / 279-2868
Wholesale & retail plants by appointment.

Las Pilitas Nursery
3232 Las Pilitas Road
Santa Margarita, CA 93453
www.laspilitas.com
Wholesale, retail by appointment, seed & container plants, contract collect & grow.

Mostly Natives Nursery
27235 Hwy One
P.O. Box 258
Tomales, CA 94971
707 / 878-2009
www.mostlynatives.com
Wholesale & retail plants, coastal natives and drought-tolerant plants.

Native Here Nursery
101 Golf Coarse Drive
Tilden Regional Park
Berkeley, CA 94708
510 / 549-0211
http://www.ebcnps.org/nativehere.html
Volunteer run by CNPS, excellent source of locally native plants, revegetation, and restoration. Open Friday & Saturday, call ahead.

Native Revival Nursery
8022 Soquel Drive
Aptos, CA 95003
831 / 684-1811
www.nativerevival.com
Wholesale & retail seed & plants, contract collect & grow, revegetation & restoration.

North Coast Native Nursery/Pacific Openspace
P.O. Box 744
Petaluma, CA 94953
707 / 769-1213
www.northcoastnativenursery.com
Native plants for woodland, coastal and riparian habitats, wholesale & retail seed & plants, contract collect & grow, revegetation and restoration, call ahead.

Northwest Native Seed
Ron Ratko
17595 Vierra Canyon Road #172
Prunedale, CA 93907
E*xtensive listings include data on where collected, many hard-to-find.*

O'Donnell's Fairfax Nursery
1700 Sir Francis Drake Boulevard
Fairfax, CA 94930
415 / 453-0372
Retail and wholesale organic native nursery specializing in Californian native habitat restoration.

Pacific Coast Seed
533 Hawthorne Place
Livermore, CA 94551
925 / 373-4417
www.pcseed.com
Wholesale only or through local nurseries. Seed, wildflowers, shrubs, grasses, trees.

Rana Creek Habitat Restoration
35351 East Carmel Valley Road
Carmel Valley CA 93924
831 / 659-3820
www.ranacreek.com
Wholesale & retail on Fri. & first Sat. of month, revegetation seed, container & bareroot plants.

Saratoga Horticultural Research Foundation
15185 Murphy Avenue
San Martin, CA 95046
408 / 779-3303
Wholesale, retail the first Friday of every month, container plants (not all native).

Seedhunt
P.O. Box 96
Freedom, CA 95019-0096
www.seedhunt.com
Mail order annual and perennial seed, about 1/3 native, many hard-to-find.

The Watershed Nursery
155 Tamalpais Rd
Berkeley, CA 94708
510 / 548-4714
www.TheWatershedNursery.com
Grows a wide variety of plants providing for a high degree of native plant/habitat biodiversity.

Wildflowers International, Inc.
967 Highway 128
Philo, CA 95466
707/895-3500
Wholesale business specializing in wildflower seed

Yerba Buena Nursery
19500 Skyline Blvd.
Woodside, CA 94062
650 / 851-1668
www.yerbabuenanursery.com
Retail plants and some seed, large demonstration garden with mature examples of many cultivar and species natives. Except for ferns, all native.

APPENDIX D

Common Landscaping Plants to Avoid

COMMON LANDSCAPING PLANTS TO AVOID

The following is a short list of invasive horticultural species to avoid using for landscaping in areas where they may escape into the Putah Creek riparian corridor. This list was compiled from a variety of sources including the California Invasive Plant Council (CAL-IPC, a recognized authority on invasive wildland weeds of California. CAL-IPC has produced a brochure that lists invasive ornamental plants that should not be planted adjacent to wildland settings in the greater San Francisco Bay area and offers safe alternatives to these plants. The "Don't Plant a Pest" brochures are available electronically at the following web address - www.cal-ipc.org or you can call or write to:

California Invasive Plant Council
Nursery Sustainability Program
1442-A Walnut Street #462
Berkeley, CA 94709
(510) 525-1502

Other sources used to compile the following included the Federal and state Noxious Weed lists available on the California Department of Agriculture's Encycloweedia website and a publication by the California Department of Water Resources.

TREES AND SHRUBS:

Acacia species	Acacia
Ageratina adenophora	Eupatory
Ailanthus altissima	Tree-of-Heaven
Berberis thunbergii	Japanese barberry
Buddleja davidii	Butterflybush
Catalpa bignonioides	Southern catalpa
Cotoneaster pannosus, C. lacteus	Cotoneaster
Crataegus monogyna	Hawthorn
Cytisus species	Brooms
Eucalyptus species	Eucalyptus
Ficus carica	Edible fig
Genista mospessulanus	French broom
Maytenus boaria	Mayten
Myoporum laetum	Myoporum
Nicotiana glauca	Tree tobacco
Olea europa	Olive
Pyracantha angustifolia	Firethorn
Robinia pseudoacacia	Black locust
Rubus armeniacus (discolor)	Himalayan blackberry
Sabium sebiferum	Chinese tallow
Schinus terebinthifolius	Brazilian peppertree
Schinus molle	California peppertree
Sesbania punicea	Scarlet wisteria
Spartium junceum	Spanish broom
Tamarix species	Tamarisk
Ulex europaeus	Gorse

PERENNIALS AND ANNUALS

Aegopodium podagraria	Gout weed
Arundo donax	Giant reed
Carpobrotus edulis	Iceplant
Cortaderia selloana	Pampas grass
Cortaderia jubata	Jubatagrass
Dimorphotheca sinuata	African daisy
Echium fatuosum (E. candicans), E. piniana	Pride of Madeira
Festuca arundinacea	Tall fescue
Foeniculum vulgare	Fennel
Iris pseudoacorus	Yellow flag iris
Lythrum salicaria, L. virgatum	Purple loosestrife
Pennisetum clandestinum	Kikuyugrass
Pennisetum setaceum	Fountain grass
Polygonum cuspidatum	Japanese knotweed
Saponaria officinalis	Bouncing bet
Verbena bonariensis, V. litoralis	Tall vervain

VINES AND GROUND COVERS

Hedera helix	English ivy
Lonicera species	Honeysuckle
Parthenocissus quinquefolia	Virginia creeper
Vinca major	Periwinkle

AQUATIC PLANTS

Egeria densa	Brazilian waterweed, anacharis
Eichhornia crassipes	Water hyacinth
Hydrilla verticillata	Hydrilla
Myriophyllum aquaticum	Parrot's feather
Myriophyllum sibericum	Siberian milfoil
Myriophyllum spicatum	Eurasian watermilfoil
Pistia stratiotes	Water lettuce
Salvinia molesta	Giant salvinia

SOURCES:

California Department of Agriculture. EncycloWeedia .Available: http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia_hp.htm

California Invasive Plant Council (CALIPC). 2007. Don't Plant a Pest. Available electronically: www.cal-ipc.org.

University of California Cooperative Extension and California Department of Resources. August 2000. A Guide to Estimating Irrigation Water Needs of Landscape Plantings in California. Appendix B. Invasive Species. pp143-144. Available electronically: http://www.owue.water.ca.gov/docs/wucols00.pdf.

APPENDIX E

Useful Local Resource Documents

USEFUL LOCAL RESOURCE DOCUMENTS

Exploring Putah Creek from Monticello Dam to the Yolo Wildlife Area
Ann Brice
Available from:
Putah Creek Council
P.O. Box 743
Davis, CA 95616
530 / 795-3006
http://www.putahcreekcouncil.org

Landowner's Guide to Streambank Management on Cache Creek
Ann Brice
Available from:
Yolo County Parks and Resources Department
120 West Main Street, Suite C
Woodland, CA 95695
(530) 406-4880
http://www.yolocounty.org
Link to the document:
http://www.yolocounty.org/prm/streambank/CC-Landowners-Guide-LR.pdf

Yolo County Oak Woodland Conservation and Enhancement Plan
Yolo County
Available from:
Yolo County Parks and Resources Department
120 West Main Street, Suite C
Woodland, CA 95695
(530) 406-4880
http://www.yolocounty.org
Link to the document:
http://www.yolocounty.org/docs/FINALOak_Woodland_Conservation_and_Enhancement_Plan.pdf

Bring Farm Edges Back to Life! Landowner Conservation Guidebook
Yolo County RCD
Available from:
Yolo County RCD
221 West Court St. #1
Woodland, CA 95695
(530) 662-2037
http://www.yolorcd.org/
Link to the document:
http://yolorcd.org/resources/manuals/Farm%20Edges%20v5.pdf

Capay Valley Conservation and Restoration Manual
Yolo County RCD
Available from:
Yolo County RCD
221 West Court St. #1
Woodland, CA 95695
(530) 662-2037
http://www.yolorcd.org/
Link to the document:
http://www.yolorcd.org/resources/manuals/Revised%20Manual%20111702.pdf

Monitoring on Your Farm - A Guide to Tracking and Understanding the Resources and Wildlife on your Land
Yolo County RCD
Available from:
Yolo County RCD
221 West Court St. #1
Woodland, CA 95695
(530) 662-2037
http://www.yolorcd.org/
Link to the document:
http://www.yolorcd.org/resources/manuals/Monitoring%20Guide%20v1.pdf

Know Your Natives: A Pictorial Guide to California Native Grasses
Yolo County RCD
Available from:
Yolo County RCD
221 West Court St. #1
Woodland, CA 95695
(530) 662-2037
http://www.yolorcd.org/

Capay Valley Watershed Stewardship Plan
Yolo County RCD
Available from:
Yolo County RCD
221 West Court St. #1
Woodland, CA 95695
(530) 662-2037
http://www.yolorcd.org/
Link to the document:
http://www.yolorcd.org/resources/manuals/CV%20Stewardship%20Plan.pdf

Napa River Watershed Owners Manual
Napa County RCD
Available from:
Napa County RCD
1303 Jefferson St., Suite 500B
Napa, CA 94559
(707) 252-4188
http://www.naparcd.org
Link to the document:
http://www.naparcd.org/napariverownersmanual.pdf

Caring for Creeks in Napa County: Management Tips for Streamside Property Owners
Napa County RCD
Available from:
Napa County RCD
1303 Jefferson St., Suite 500B
Napa, CA 94559
(707) 252-4188
http://www.naparcd.org
Link to the document:
http://www.napawatersheds.org/docManager/13411/Creek%20Care%20FINAL.pdf

Arundo – A Landowner Handbook
Sonoma Ecology Center
Team Arundo del Norte
Available from:
Sonoma Ecology Center
P.O. Box 1486
Eldridge, CA 95431
(707) 996-0712 x104
http://www.sonomaecologycenter.org/
Link to the document:
http://ceres.ca.gov/tadn/education/landowner_handbook.pdf

Controlling Arundo in Your Watershed: A Guide for Organizations
Sonoma Ecology Center
Team Arundo del Norte
Available from:
Sonoma Ecology Center
P.O. Box 1486
Eldridge, CA 95431
(707) 996-0712 x104
http://www.sonomaecologycenter.org/
Link to the document:
http://ceres.ca.gov/tadn/education/org_guide.pdf