Central Valley Regional Water Quality Control Board

3 April 2023

Gavin R. Poore
Solano County Water Agency
810 Vaca Valley Parkway, Suite 203
Vacaville, CA 95688
Gpoore@scwa2.com

COMMENTS TO REQUEST FOR REVIEW FOR THE MITIGATED NEGATIVE DECLARATION, LOWER PUTAH CREEK RESTORATION PROJECT, NISHIKAWA REACH, SCH#2015022022, SOLANO COUNTY

Pursuant to the State Clearinghouse's 3 March 2023 request, the Central Valley Regional Water Quality Control Board (Central Valley Water Board) has reviewed the *Request for Review for the Mitigated Negative Declaration* for the Lower Putah Creek Restoration Project, Nishikawa Reach, located in Solano County.

Our agency is delegated with the responsibility of protecting the quality of surface and groundwaters of the state; therefore, our comments will address concerns surrounding those issues.

I. Regulatory Setting

Basin Plan

The Central Valley Water Board is required to formulate and adopt Basin Plans for all areas within the Central Valley region under Section 13240 of the Porter-Cologne Water Quality Control Act. Each Basin Plan must contain water quality objectives to ensure the reasonable protection of beneficial uses, as well as a program of implementation for achieving water quality objectives with the Basin Plans. Federal regulations require each state to adopt water quality standards to protect the public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act. In California, the beneficial uses, water quality objectives, and the Antidegradation Policy are the State's water quality standards. Water quality standards are also contained in the National Toxics Rule, 40 CFR Section 131.36, and the California Toxics Rule, 40 CFR Section 131.38.

The Basin Plan is subject to modification as necessary, considering applicable laws, policies, technologies, water quality conditions and priorities. The original Basin Plans were adopted in 1975, and have been updated and revised periodically as required, using Basin Plan amendments. Once the Central Valley Water Board has adopted a Basin Plan amendment in noticed public hearings, it must be approved by the State Water Resources Control Board (State Water Board), Office of

Administrative Law (OAL) and in some cases, the United States Environmental Protection Agency (USEPA). Basin Plan amendments only become effective after they have been approved by the OAL and in some cases, the USEPA. Every three (3) years, a review of the Basin Plan is completed that assesses the appropriateness of existing standards and evaluates and prioritizes Basin Planning issues. For more information on the *Water Quality Control Plan for the Sacramento and San Joaquin River Basins*, please visit our website:
http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/

Antidegradation Considerations

All wastewater discharges must comply with the Antidegradation Policy (State Water Board Resolution 68-16) and the Antidegradation Implementation Policy contained in the Basin Plan. The Antidegradation Implementation Policy is available on page 74 at:
https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/sacsjr_201805.pdf

In part it states:

Any discharge of waste to high quality waters must apply best practicable treatment or control not only to prevent a condition of pollution or nuisance from occurring, but also to maintain the highest water quality possible consistent with the maximum benefit to the people of the State.

This information must be presented as an analysis of the impacts and potential impacts of the discharge on water quality, as measured by background concentrations and applicable water quality objectives.

The antidegradation analysis is a mandatory element in the National Pollutant Discharge Elimination System and land discharge Waste Discharge Requirements (WDRs) permitting processes. The environmental review document should evaluate potential impacts to both surface and groundwater quality.

II. Permitting Requirements

Construction Storm Water General Permit

Dischargers whose project disturb one or more acres of soil or where projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres, are required to obtain coverage under the General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit), Construction General Permit Order No. 2009-0009-DWQ. Construction activity subject to this permit includes clearing, grading, grubbing, disturbances to the ground, such as stockpiling, or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). For more information on the Construction General Permit, visit the State Water Resources Control Board website at:

http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml

Clean Water Act Section 404 Permit

If the project will involve the discharge of dredged or fill material in navigable waters or wetlands, a permit pursuant to Section 404 of the Clean Water Act may be needed from the United States Army Corps of Engineers (USACE). If a Section 404 permit is required by the USACE, the Central Valley Water Board will review the permit application to ensure that discharge will not violate water quality standards. If the project requires surface water drainage realignment, the applicant is advised to contact the Department of Fish and Game for information on Streambed Alteration Permit requirements. If you have any questions regarding the Clean Water Act Section 404 permits, please contact the Regulatory Division of the Sacramento District of USACE at (916) 557-5250.

Clean Water Act Section 401 Permit – Water Quality Certification

If an USACE permit (e.g., Non-Reporting Nationwide Permit, Nationwide Permit, Letter of Permission, Individual Permit, Regional General Permit, Programmatic General Permit), or any other federal permit (e.g., Section 10 of the Rivers and Harbors Act or Section 9 from the United States Coast Guard), is required for this project due to the disturbance of waters of the United States (such as streams and wetlands), then a Water Quality Certification must be obtained from the Central Valley Water Board prior to initiation of project activities. There are no waivers for 401 Water Quality Certifications. For more information on the Water Quality Certification, visit the Central Valley Water Board website at: https://www.waterboards.ca.gov/centralvalley/water_issues/water_quality_certification/

Waste Discharge Requirements – Discharges to Waters of the State

If USACE determines that only non-jurisdictional waters of the State (i.e., “non-federal” waters of the State) are present in the proposed project area, the proposed project may require a Waste Discharge Requirement (WDR) permit to be issued by Central Valley Water Board. Under the California Porter-Cologne Water Quality Control Act, discharges to all waters of the State, including all wetlands and other waters of the State including, but not limited to, isolated wetlands, are subject to State regulation. For more information on the Waste Discharges to Surface Water NPDES Program and WDR processes, visit the Central Valley Water Board website at:https://www.waterboards.ca.gov/centralvalley/water_issues/waste_to_surface_water/

Projects involving excavation or fill activities impacting less than 0.2 acre or 400 linear feet of non-jurisdictional waters of the state and projects involving dredging activities impacting less than 50 cubic yards of non-jurisdictional waters of the state may be eligible for coverage under the State Water Resources Control Board Water Quality Order No. 2004-0004-DWQ (General Order 2004-0004). For more information on the General Order 2004-0004, visit the State Water Resources Control Board website at:

https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2004/wqo/wqo2004-0004.pdf

Dewatering Permit

If the proposed project includes construction or groundwater dewatering to be discharged to land, the proponent may apply for coverage under State Water Board General Water Quality Order (Low Threat General Order) 2003-0003 or the Central Valley Water Board's Waiver of Report of Waste Discharge and Waste Discharge Requirements (Low Threat Waiver) R5-2018-0085. Small temporary construction dewatering projects are projects that discharge groundwater to land from excavation activities or dewatering of underground utility vaults. Dischargers seeking coverage under the General Order or Waiver must file a Notice of Intent with the Central Valley Water Board prior to beginning discharge.

For more information regarding the Low Threat General Order and the application process, visit the Central Valley Water Board website at: http://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2003/wqo/wqo2003-0003.pdf

For more information regarding the Low Threat Waiver and the application process, visit the Central Valley Water Board website at: https://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/waivers/r5-2018-0085.pdf

Limited Threat General NPDES Permit

If the proposed project includes construction dewatering and it is necessary to discharge the groundwater to waters of the United States, the proposed project will require coverage under a National Pollutant Discharge Elimination System (NPDES) permit. Dewatering discharges are typically considered a low or limited threat to water quality and may be covered under the General Order for *Limited Threat Discharges to Surface Water* (Limited Threat General Order). A complete Notice of Intent must be submitted to the Central Valley Water Board to obtain coverage under the Limited Threat General Order. For more information regarding the Limited Threat General Order and the application process, visit the Central Valley Water Board website at: https://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2016-0076-01.pdf

NPDES Permit

If the proposed project discharges waste that could affect the quality of surface waters of the State, other than into a community sewer system, the proposed project will require coverage under a National Pollutant Discharge Elimination System (NPDES) permit. A complete Report of Waste Discharge must be submitted with the Central Valley Water Board to obtain a NPDES Permit. For more information regarding the NPDES Permit and the application process, visit the Central Valley Water Board website at: https://www.waterboards.ca.gov/centralvalley/help/permit/

If you have questions regarding these comments, please contact me at (916) 464-4684 or Peter.Minkel2@waterboards.ca.gov.

Peter Minkel

Peter Minkel
Engineering Geologist

cc: State Clearinghouse unit, Governor’s Office of Planning and Research, Sacramento

April 31, 2023

Solano County Water Agency
810 Vaca Valley Parkway, Suite 203
Vacaville, CA 95688

Subject: Nishikawa Project Initial Study / Mitigated Negative Declaration

I am pleased to have the opportunity to provide my comments addressing the Nishikawa IS/MND. I am also including my reaction to responses to the comments I made which apply to 2022 Lower Putah Creek PEIR, which are relevant to the Nishikawa project.

I have been a resident of Winters for 23 years and of Yolo County for 55 years. I obtained my BS in Biological Science from UC Davis in 1973 and was a business owner in Davis for 42 years. Beginning in 1999 1 volunteered with Jeannie Wirka to plant the native oaks, toyon, elderberry, creeping wild rye, sedges, coyote brush, and other plants that landscape the upper level of the Winters Putah Creek Park (WPCP). I was the founding chair of the Winters Putah Creek Committee and served for four years. Since then I have worked independently to control invasives, particularly yellow star thistle, and have participated in numerous organized weed control and cleanup activities.

I will leave it to others to comment on environmental law perspectives and focus my comments on my observations following the prior three WPCP phases with the hope that common sense will prevail in future restoration activities. My property backs up to the Nature Park and I have had many years to observe the creek, its habitat, and the impact of Phases 1-3 of creek re-channeling. I live with it daily. In a letter I submitted on July 21, 2016, I offered comments on the previous PEIR, several of which that were not adequately responded to. I will address those which are numbered 1-12 in the 2016 PEIR Comments and Responses document issued in October of that year.

1. I pointed out that attempting to restore the creek to its condition prior to Monticello dam is not possible given the regulated flows and infrequent high flows fed by Dry Creek and infrequent spillway overflows.

The response that stated "Program goals are to restore Putah Creek to improved geomorphic and ecological balance with the present day hydrologic/sediment regime and to provide conditions more suited to the native flora and fauna historically supported in Putah Creek" sounded to me like ecological jingoism designed to impress grantors and the unknowing public. In my observations, removing established native trees, scraping the land clean using heavy equipment, and moving the channel have done nothing to restore native flora and fauna and ecological balance. The kingfishers, egrets, and waterfowl are gone from the nature park. "Geomorphic improvements" are a construct of engineers, not nature. The reality is, the creek will naturally seek an ecological equilibrium governed by the historic and current flow regimes, water removed for irrigation, and our tampering.

The PEIR repeatedly lists goals such as "Restore natural channel form and ecological function", "Restore riparian vegetation to establish 50% canopy cover over the water surface of the channel", and "Remove invasive weeds." What is natural in an ecosystem that has been modified by dams, roads, farms, development, and now tampering with the historic channel? Though there have been valiant efforts to replant trees and shrubs in the nature park, milk thistle and other invasives grow in profusion without interference.

2. I commented that "A project of the scale of that proposed would be impossible to manage after construction is complete without substantial annual expenditures." I asked for public disclosure of how the grant funds would be spent on each stretch, suggesting they would be better applied to restoration of natural streams.

3. I stated that the PEIR does not provide sufficient detail to evaluate specific environmental risks or mitigations, and that individual EIRs should be required for each section that includes project-specific details. I asked for plans for post-project management. I pointed out that individual EIRs should be required for each stage of work that include engineering drawings and detailed descriptions of impacts and mitigations specific to each stretch.

4. I stated that declaration of low impacts presumes proper management following construction and asked where the plan for this is described and how it will be supported.

The responses to items 2-4 did not address whether there were any budget set-asides for ongoing management. It did indicate that each targeted project would be designed to address site-specific conditions. I have not seen detailed documentation of that in the updated PEIR, for example, for the Nishikawa phase where are the plans for rechanneling, how much fill will be imported, and how deep will the existing terrain be excavated? How is it possible to respond to an EIR that assumes that each proposed restoration segment is not unique? If plans for Nishikawa have been publicly disclosed, I am not aware of it.

Minutes from the LPCC meeting of April 14, 2022 included a Nishikawa Project Update as follows: "Programmatic Environmental Impact Report for all Putah Creek will be adopted as part of Nishikawa. Signed a contract to model pre and post flood water elevations for permitting. Scheduled the tree survey. A soil stratigraphy survey found lots of clay that will be difficult to plant into and little shallow groundwater. The grading plan will be revised to accommodate using adaptive management principles." That vague ªadaptive management" term is a convenient way of saying, "Trust us, we've got it covered." The revised PEIR should have disclosed the problems that were encountered in PCC Phase 3, the attempts made to resolve them, and the outcome. For example, the PEIR makes no mention of the challenges faced with re-planting and the futile efforts made to correct mistakes in disrupting the natural stratification of soils by digging trenches perpendicular to the creek and filling them with gravel.

5. I pointed out that there is nothing to prevent eventual concretion of spawning gravels.
The response to this comment was that "human intervention is now necessary to reset creek morphology/conditions to the current hydrologic/sediment regime." I have observed that introduction of spawning gravels and scarification have been needed to maintain spawning grounds. There have been only two years where I have observed significant spawning activity along WPCP. Despite the amount of flow, each year the spawning gravel is filled in with sediment making it impossible for fish to create redds without the addition of new gravel as was done the previous fall. That does not constitute restoration of "natural channel form and ecological function." What is the cost, and where do the funds come from? The elevation drop

6. I faulted the prior PEIR for not clearly articulating the goals of the project other than reducing water temperatures that would only benefit anadromous species and trout while ignoring species such as Sacramento Blackfish that thrive in warmer waters. The response states that the goal is to decrease water temperatures to encourage native fish and salmonids. Fish surveys have repeatedly identified only native fish above the 1-505 bridge between 2013 and 2020. For WPCP, the Normandeau reports show rainbow trout counts of 8, 9, 11, 2, 9, 7, 1, and 10 for those years respectively, which shows higher

trout populations are not trending despite the narrower channels. No surveys of water temperatures have been provided to show that restoration has reduced them or affected salmon migration.

7. I commented that no water temperature or BOD measurements were provided to support arguments for improved fish habitat. None were provided in the response.

8. I addressed the problem Winters is having with meeting tighter state standards for Chromium 6 concentrations in ground water and the lack of mention in the PEIR. The response said nothing about this topic, only that restoration efforts are not likely to affect groundwater without providing any evidence. Monitoring wells were installed near WPCP and it would useful to see the results.

9. The effect of stream shading provided by overhanging trees and shrubs has been acknowledged and the Nishikawa site (shown at right) has much to offer in that regard. The type of restoration proposed that involves stripping existing vegetation, stream narrowing, and replanting will take several decades to provide the kind of diversity and habitat that it now has. The relative barrenness of the Winters project phases are testimony to that.

10. I noted that no projections of the increase in stream turbidity resulting from construction work, nor monitoring of those impacts on downstream fisheries are presented. The response indicated it would be done for each project as required by permits, but I have not seen any data for WPCP.

11. I commented on the value of beaver to the creek ecosystem. I have only observed beaver occupying lodges in stream banks in stretches of the creek with calm pools. Their habit of feeding on aquatic plants (as observed) keeps the plant growth under control in calmer waters. The response made it clear that according to CEQA, if a species isn't listed then they don't matter.

12. The document did not list the Western Pond Turtle as being observed in the Winters Nature Park. They are now only observed in the back channel that was thankfully preserved though not included in the disclosed rechanneling plans. I appreciated the later information provided on Western Pond Turtle observations, but there was no indication of whether the WPCP project had any impact on their population or future plans to protect them.

I am hopeful that my comments will be taken seriously and that they may have an impact of future activities conducted under the Nishikawa IS/MND.

Respectfully Submitted,

David Springer
200 Madrone Ct.
Winters, CA 95694

COMMENTS ON INITIAL STUDY MITIGATED NEGATIVE DECLARATION: LOWER PUTAH CREEK RESTORATION PROJECT, NISHIKAWA REACH YOLO AND COLUSA COUNTIES, CALIFORNIA

I am Dr. Glen Holstein, a UC Davis PhD in global plant ecology with 21 years professional experience in riparian and wetland restoration in central California and author of *California Riparian Forests: deciduous islands in an evergreen sea* in the UC Press book *California Riparian Systems.* I represented the conservation groups Tuleyome and the California Native Plant Society in developing the Yolo Habitat Conservancy. Its Regional Conservation Investment Strategy/Local Conservation Plan (RCIS/LCP) is rated one of the three best regional conservation plans in California. For this and other conservation planning work I received the Environmental Council of Sacramento's Environmentalist of the Year award in 2013 and the Sierra Club Mother Lode Chapter's Conservationist of the Year Award in 2016.

In a famous metaphor, it is said that building a haystack is the way to hide a needle. Overall, this Initial Study/Mitigated Negative Declaration (IS/MND) does exactly that as it fails to disclose some very important environmental shortcomings about the project which fact is obfuscated amid hundreds of pages of data on things like tractor exhaust and soil outgassing. While these factors must be considered in this environmental disclosure document, they are irrelevant to the project's stated primary purpose that is to improve Putah Creek's biological environment. In this regard, the IS/MND makes demonstrably false anecdotal claims about the supposed environmental benefits while providing absolutely no data or substantial evidence to support those claims.

The IS/MND is a mitigated negative declaration derived from the *Program Environmental Impact Report for the Lower Putah Creek Restoration Project – Upper Reach Program* (PEIR)., a document consisting largely of similar misinformation and lack of disclosures that were thoroughly identified when it was critiqued by many, including myself, when issued in 2016. Despite this, those critiques are entirely ignored in the current IS/MND even though it is derived from the 2016 PEIR.

This new mitigated declaration document includes many more claims that are not supported by the facts. One example is its claim that the Putah Creek Nishikawa reach is "over-widened" and a goal of this project is to correct that. That claim is stated on pages 1-1, 2-1, 3-1, 3-8 and 3-12 and on 3-8 and 3-12. Additionally, it is claimed this "over-widening" results in the creek "receiving excessive solar radiation" which promotes "warm water temperatures", but it is evident in the document's pre-project aerial photograph (Figure 2) that the creek's Nishikawa reach is so narrow that it is almost completely shaded by a riparian gallery forest.

In fact, the only place water in the Nishikawa reach is even visible from above and thus exposed to solar radiation is a small area at the eastern end of the western third of the project. The dense native vegetation, superb habitat conditions, and narrow channel of the existing Nishikawa reach is ironically illustrated on the document's cover page. What the IS/MND document actually proposes for the Nishikawa project, however, will destroy this existing riparian habitat as illustrated in the IS/MND in Figure 3.

A very similar restoration project was actually done upstream at "Winters Putah Creek Nature Park Restoration", which the document explains on its Page 3-8 is its model for the proposed Nishikawa project. The primary reason the 2016 PEIR was such a repository of misinformation was its effort to hide the immense environmental destruction done by the Winters project. Similar to what is proposed for the Nishikawa project, the Winters project removed a rich riparian forest starting in 2011 and promised to provide extensive data on how it was subsequently revegetated and restored. That data has never been provided, however, because it would demonstrate that after 12 years what was once a rich native riparian forest through the Winters reach of Putah Creek is now an apparently permanent non-native weed field.

Professor Emeritus Michael Barbour, one of the world's greatest plant ecologists and a Winters resident, reported on this to the California Native Plant Society (CNPS) despite being terminally ill in what was likely his last public appearance before his passing in 2021. His widow, Valerie Whitworth, who helped him make this verbal report to the California Native Plant Society remembers it well.

The anecdotal unverifiable claims about the successes in the Winters Project are presented on Page 3.8. In fact, these claims actually hid the massive failures that were seen in that project. For instance, it is reported that salmon were seen spawning following the completion of the Winters project with no supporting information about when, how many, whether it was sustainable, or even who made the observation. Such vagueness about something so important for justifying the Nishikawa project dramatically contrasts with the hundreds of pages of data about things irrelevant to it like exhaust chemistry.

Next the Nishikawa IS/MND claims "the project increased the range of sensitive aquatic invertebrates" but provides no source or reference for this doubtful claim. Lastly, the IS/MND claims the Winters project increased riparian breeding birds and native fish, both of which are demonstrably false. For instance, reports on fish populations in Putah Creek provided by Normandeau Associates, a biological consulting firm, were the only ones on wildlife status released after the Winters' project construction and they clearly show an ongoing and drastic decline in native fish ever since the Winters project was constructed.

Additionally, a different report on bird populations in Putah Creek referenced by the IS/MND as proof of the rich bird diversity that can result from proposed creek restoration efforts such as in Winters, actually reported results that were recorded <u>*before*</u> the project was even completed. No similar results have been was published after the Winters' project completion but some Winters creekside residents have otherwise reported drastic declines in the birds once abundant around their nearby creek.

Just like its false claims about the creek's current "over-widening" condition, the IS/MND document's false claims about other issues are also obvious. For example, on page 3-15 it claims the "majority" of trees in the riparian gallery forest lining Putah Creek's Nishikawa reach it plans on removing "are non-native", but when this forest is described and its species identified on page 5-21, every one of its reported tree species is native. On Page 5-22 it says "the project site may support two natural communities that are considered rare: Elderberry Savannah and Great Valley Cottonwood Riparian Forest". Why the word "may", that indicates uncertainty, is used here is unclear since both these natural communities are clearly described as already being present and dominant on the previous page 5-21 and are clearly visible in the Figure 2 aerial photograph.

These habitats, especially Great Valley Cottonwood Riparian Forest, were also present and dominant at Winters (personal observation) before they were destroyed and replaced by weed fields by the project this document lauds. That was certainly a new negative impact as pointed out by world-famous plant ecologist Michael Barbour, but this IS/MND, despite using Winters as a model for doing the same thing at Nishikawa, claims it will cause "no new impact" on page 5-20.

On Page 5-103 the document claims the Nishikawa project would not conflict with any Solano or Yolo County land use policies, and specifically claims "the proposed project would not conflict with an adopted land use plan, policy, or regulation", but the Yolo Regional Conservation Investment Strategy/Local Conservation Plan (RCIS/LCP) was adopted by Yolo County in 2020 and is one of California's three designated model regional conservation plans. Despite the recognized prominence of that regional conservation plan, its findings are completely ignored in this IS/MND. The RCIS/LCP includes detailed discussion of how riparian zones should be treated and what makes them valuable.

It is plain from the discussion in the RCIS/LCP that the Nishikawa reach as it exists now and the Winters reach as it existed before the Winters project are/were ideal examples of what is most desirable in riparian habitats. These include shading by large old growth riparian trees and deep pools for aquatic species refuge. Such pools in the present Nishikawa reach are mentioned, although disparagingly, on Page 3-8 and shading of the creek by old growth native riparian forest trees is illustrated in Figure 2. Similar conditions existed in the Winters reach before they were completely destroyed by the Winters Project that Page 3-8 states is the model for this one. Everything done at the Winters Project and proposed for this one is the exact reverse of what is called for in the RCIS/LCP.

That is especially significant because the RCIS/LCP is also a federal and state-approved HCP/NCCP. Pages 5-33 and 5-34 of this document state how restoration projects affecting such plans must coordinate with appropriate federal, state, and local agencies, but there is no indication this has been done, is planned, or there is even awareness that the RCIS/LCP exists and is a state and federally approved HCP/NCCP. An example of insensitivity to such concerns is evident in the discussion of western pond turtle, a California species of special concern, on Page 5-45. It is described as common in the Nishikawa reach, which is not surprising since the document's description of its habitat needs match its description of existing conditions in the reach.

Moving any turtles seen before construction is considered adequate mitigation in the IS/MND. Unfortunately the planned project will leave the moved turtles with no habitat to go back to just as happened in the Winters reach, where they were common before that "model project" but have seldom been seen since. Similarly, most of the Winters' area other wildlife similarly disappeared after the project, which is why post-construction wildlife and vegetation surveys promised at the Winters project's start were never provided.

The document concludes on Page 5-142 by stating "the proposed project would not substantially degrade the quality of the environment [and] reduce the habitat, population, or range of a plant or animal species" even though the proposed Nishikawa project was modeled on the Winters project that did exactly that. In fact, the IS/MND for the Nishikawa project is tiered on the 2016 PEIR that demonstrably made many false and misleading statements and had significant disclosure shortcomings. This new IS/MND now adds many more as discussed herein and is thus insufficient as a disclosure document for CEQA compliance purposes..

Comments submitted by Dr. Glen Holstein

Comments on Draft Initial Study/Mitigated Negative Declaration, Lower Putah Creek Restoration Project, Nishikawa Reach, Yolo and Solano Counties, California. March 2023. Solano County Water Agency.

By Jeff TenPas

Table of Contents

I. Qualifications of Commenter

My name is Jeff TenPas, I live in Winters, California, and have resided in Winters for 27 years in a home with a back gate leading to Putah Creek. I am by education, training, and experience well qualified to make expert comment on this Project.

I am educated and trained and experienced as a soil scientist, hydrologist, and watershed restoration scientist. I hold a Masters in Soil Science degree from University of California-Davis. I am retired from the US Forest Service where I worked for 20 years in positions of soil scientist and hydrologist. During those years I served two details in national leadership positions in the Washington Office of the US Forest Service - as national program leader for Soil Science, and again as national program leader for Burned Area Emergency Response. I retired as Regional Soil Scientist and Regional Burned Area Emergency Response program leader for the 18 national forests and 20,000,000 acres in California. Prior to that I was regional leader of the Watershed Restoration program covering those 20,000,000 acres. Before that I had worked at the research branch of the Forest Service with the Rocky Mountain Research Station in Moscow, ID, and on three National Forests in California.

I know Putah Creek and the reach now called Winters Putah Creek Park (WPCP) very well. And I know as well as anybody the SCWA projects in WPCP and their impacts. I have the advantage that for the past 27 years I have lived with WPCP just out my back gate, as a dog owner I have walked along the creek daily for those 27 years, I am an acute observer of the creek and natural phenomena, and have the training and experience to understand the physical processes behind the phenomena. I had ten years to observe pre-project conditions before SCWA began its projects in WPCP in 2011. I observed SCWA's radical restructuring of the creek and the floodplain beginning in 2011. And I have had 12 years since to observe and interpret the outcomes.

II. Introduction

There is a fundamental flaw in the environmental assessment of this Project: there is a complete lack of consideration for the effects of the Project on the floodplain structure and groundwater hydrology.

The Project that Solano County Water Agency (SCWA) proposes for the Nishikawa Reach of Putah Creek has potential to do great, fundamental, and lasting harm to groundwater supplies by blocking groundwater flowpaths in the floodplains. This would permanently harm the riparian forest ecosystem including the wildlife, fish, and humans that depend on and use it, and it would permanently harm regional groundwater recharge rates.

The following comments pertain both to the proposed restoration of the entirety of Putah Creek (the "Program") as more fully described in the *Program Environmental Impact Report for the Lower Putah Creek Restoration Project – Upper Reach Program* (PEIR) and to the specific restoration project proposed for the Nishikawa reach of Putah Creek (the "Project") as more fully described in the ***Initial Study Mitigated Negative Declaration: Lower Putah Creek Restoration Project, Nishikawa Reach (IS/MND).***

These comments will review the proposed Project, the applicable science concerning groundwater processes in riparian areas, including how groundwater flow depends on floodplain structure, how the Project's will massively alter floodplain structure by machine, and how the alteration of floodplain structure will significantly impact on groundwater flow and groundwater supplies.

III. Description of the Program and Project and Fundamental Concerns

The Program proposed for Putah Creek constitutes a radical level of stream and floodplain alteration along 26 miles of Putah Creek. The Program divides 26 miles of Putah Creek into 17 subreaches and proposes "channel reconfiguration" activities in every one (PEIR, Table 2-3). The plans include moving the main channel in 16 subreaches and altering the channel to increase sinuosity in 16 subreaches.

This is an enormous amount of channel reconfiguration and earthmoving. The plans for this work focus solely on the ***surface*** conformation of the creek, its banks and floodplain. Meanwhile there is a comparable and enormous amount of collateral alteration happening to the ***subsurface,*** to the structure of the floodplains and to groundwater flowpaths, that is unrecognized, unstudied, and unmitigated.

The plans lack any consideration of groundwater and the planners seem to lack even cognition that groundwater is flowing beneath the surface. There is no information on current groundwater elevations in the floodplains or in the greater regional groundwater body. There is no information on the current rates of groundwater recharge occurring in the reach. There is no discussion or analysis of Project alterations to floodplain structure and groundwater flowpaths or how that might directly affect groundwater supply to the riparian ecosystem and groundwater recharge

The Project proposed for the Nishikawa Reach of Putah Creek involves relocation of 0.5 miles of the channel of Putah Creek. A total of 37,500 cubic yards of earth would be excavated, the equivalent to 3,750 dump trucks loads. About 14,000 cubic feet of material would be cut and placed to completely fill the existing channel. The construction plans include what are described as "reverse French drains", a series of 31 trenches to be dug transverse to the channel, connected to the channel, and back-filled with one foot of gravel and rocks then topped with floodplain material mixed with mulch.

The focus of groundwater concerns are those activities that would intersect and disrupt the existing groundwater flowpaths, including the floodplain excavation and grading, the fill placed in the existing channel, the construction of "reverse French drains", and the excavation of the new channel. The fill of the existing channel in particular creates a continuous linear body of fill running the full 0.5-mile length of the project, separating the one side the floodplain from the new channel, and separating one side of the stream canyon from the channel.

IV. Natural Floodplain Structure, Sorting, Stratification, and Groundwater Conductivity

Earth scientists concerned with groundwater recognize that groundwater mounds are common below streams. The mounds are stream water on its way to merge with the regional groundwater. Groundwater mounds spread out from a stream somewhat horizontally beneath the floodplain and gradually tail off until reaching the regional groundwater level. Groundwater mounds show that groundwater flows horizontally in floodplains in preference to following gravity to fall vertically.

The reason groundwater flows horizontally in preference to vertically lies in the structure of the floodplain soil materials. Floodplains are built up of relatively horizontal layers of sediment deposited by successive floods. Some layers are coarse and some are fine depending on flow velocity and sediment supply of the flood waters. Groundwater moves more easily through coarse layers than through fine, just as water drains into sands vary fast and into clays very slow. Groundwater follows the easy path of horizontal flow through coarse layers, and is impeded by fine layers from draining vertically. Where a material has a physical property which has a different value when measured in different directions it is called anisotropic. This is in contrast to isotropic, where the physical property has the same value when measured in all directions.

In general, the floodplain sediment layers follow Steno's Laws of Horizontality and Continuity. The layers are generally horizontal and continuous to greater or lesser degree. The layers can be thick or thin and distinct or so faint as to be invisible to the naked eye. Flowing water sorts and deposits sediments in accord with Stoke's Law so that coarse sediments drop out at a given time and place where water velocity is high and finer sediments deposit at a given time and place where water velocity is low. The result is that surface flood waters over time lay down a floodplain with contrasting horizontal layers and create favorable conditions for horizontal flow of groundwater.

The rate of water flow through the deposits of granular materials follows Darcy's Law, where each sediment size or material has an empirical coefficient of permeability representing the ease of water flow through it. Water flow through clay is slow, and through gravels is fast. It is useful to consider the magnitude of difference in permeability that can exist between adjoining sediment layers in Putah Creek. For example, permeability ranges from 10^{-7} m/s in silty sand to 10^{-3} m/s in sandy gravel (Figure below). That is four orders of magnitude difference between layers that could easily be found one above the other in the floodplains of Putah Creek. To put it in context, a one square foot cross-section unit of the sandy gravel in the stream bank or floodplain has the potential to allow as much groundwater flow as a 10,000 square foot cross section of silty sand.

Clearly sorting and layering matters tremendously.

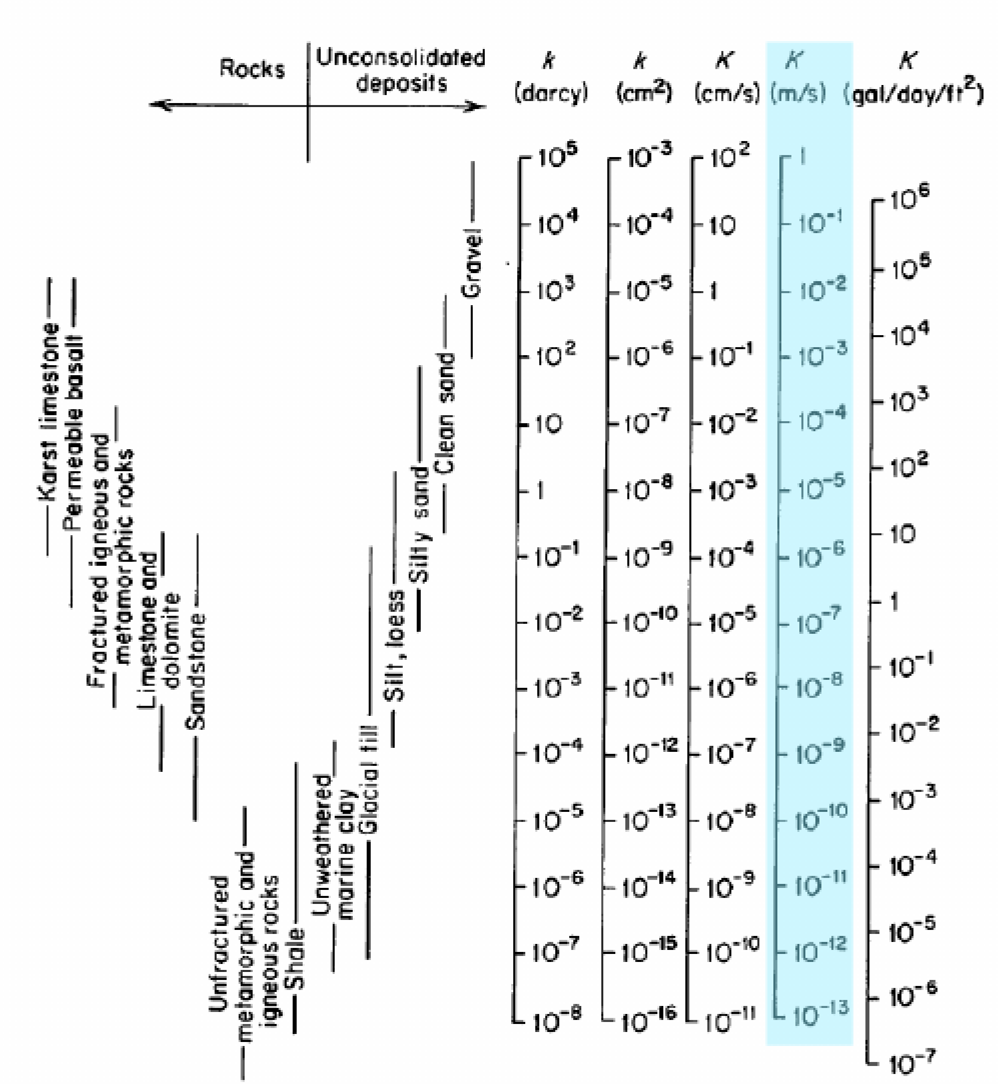


Figure 1. Hydraulic Conductivity of Various Geologic Materials (CC BY-SA 4.0; Freeze, R. A., & Cherry, J. A, edited by Taryn Lausch, via Wikimedia)

V. The Case of Winters Floodplain Stratigraphy

SCWA has considerable information of floodplain stratigraphy on Putah Creek that was not shared in the PEIR or IS/MND. SCWA dug nine trenches across the floodplain in their Phase 2 project area in Winters. These trenches were made by excavator and were wide enough for a person and 8 feet deep. SCWA also dug at least three exploratory trenches in the Nishikawa Project area. SCWA can and should provide photos and information from all the trenches as basis for analysis of groundwater impacts of the Project.

I had the good fortune to be able to observe a single trench in Winters. What I observed in the Winters trenches was in keeping with the description above of a floodplain built up of sorted and stratified layers. The layers were in fact remarkable to me for their thickness, horizontality, and continuity. You can detect it even in a photograph (Figure 2).

Figure 2. Trench in Winters. Sorted and stratified sedimentary layers.

VI. From Sorted to Mixed: From Permeable to Impermeable: How Diesel Geomorphology Changes Floodplains

What earthmovers and bulldozers do to a sorted and stratified floodplain built up by flowing water is to push and scrape and tumble the delicately-sorted, finely-stratified layers of natural sediment. The sorting and layering is immediately undone. The machines deposit the jumbled material as fill.

Given that particle size makes many orders of magnitude difference in the permeability of sediment layers, then mixing sediment layers of various particle sizes matters tremendously. The rule for mixed sediments is that if the finer component is present in an amount sufficient to fill the voids between the coarser particles, then the finer component prevails in determining permeability. In other words, when an earthmover scrapes up a sandy-gravel layer and mixes it with an equally deep silty layer and redeposits them as a single mixed layer, then permeability falls by multiple orders of magnitude (Before: 1*1 + 1*10,000 = 10,001, and After: 1*1 + 1*1=2)

Applying this science to the Project, the earthmovers are pushing and scraping up natural floodplain layers from the floodplain surface, mixing in the process, and depositing them as fill in the old Putah Creek channel. That fill will have the lowest permeability of its components (silt) and the fill will perform as a barrier or impermeable wall in the floodplain. Likewise, the Project includes proposed "drains" that will transmit water along a gravel base course, and block water in the backfill above. The bed and banks of the new channel will be scraped and bulldozed to sculpt them, and the sorted sedimentary layers will be mixed and ground up by traffic, and the bed and banks may be the first barrier to groundwater leaving the channel.

Comparing landscapes created by flowing water (fluvial geomorphology) to landscapes created by machine (diesel geomorphology):

> Flowing water creates order in sorted and stratified sedimentary layers. These layered sedimentary bodies will support groundwater flow.
>
> Diesel geomorphology mixes and creates disorder and isotropic masses. Fills placed by machine are inherently barriers to groundwater.

Compaction by heavy machines is a further source of injuries to the floodplain. Compaction occurs as heavy equipment presses down on soils and increases its density while decreasing the pores that water can move through. Compaction will compound the negative impacts of the loss of stratification and is simply another factor in reducing permeability. Compacted soil is on the order of 1/10 as permeable as uncompacted soils. Earthmoving projects result in extraordinary levels of compaction: first, because rubber-tired earthmovers have extraordinarily high ground pressures (on the order of 80 psi, as compared to 18 for tracked equipment). Secondly, earthmovers ordinarily construct fills in layers (called lifts) of about 6 inches. Each lift is compacted by the next pass of equipment placing the next lift, and on and on, until a fill is completed. This produces a mass of earth compacted by the highest of tire pressures to the full depth of the fill. Rain will stand in puddles on a dirt road until it evaporates rather than infiltrate into the compacted road. Imagine then that what when an earthmover fills the old channel of Putah Creek with unsorted, unstratified, compacted fill to the full depth of the floodplain, that is a barrier water will not pass.

VII. The Case Against Moving the Channel to the Middle of the Floodplain

The Project proposes to move the stream channel from its current location, where it runs mostly near one side or the other of the Putah Creek canyon, and move it to the middle of the floodplain. This is a mistake so far as recharge of regional groundwater is a concern. Consider that the Putah Creek runs in a canyon 40 or so feet deep that is cut into an “old” geologic formation. Lining the bottom of the canyon is a bed of recent sediments.

For water to get from the creek to the regional groundwater the path runs from the stream, through stream banks, through recent floodplain sediments, and then into the old geologic formation. The connection from the flowpath in recent floodplain sediments to a good flowpath in the old geologic formation is a potential pinch point in the flow.

Where the stream cuts up against the edge of its canyon and right up to the old geologic formation, there is a short cut to regional groundwater. The path is more direct. Moving the channel to the middle of the floodplain will likely make the path to regional groundwater more indirect and slow the flow.

In floating and walking the creek I have seen exposures of gravel bodies where the current stream bank cuts up against the old geologic formation. These gravel bodies looked like channel fills. They are probably long, and they have high permeability. Cutting the stream off from these potential flowpaths could greatly decrease groundwater recharge potential.

The SCWA should survey the current stream banks for exposures of gravel and not separate the stream from them. The same principle could apply wherever the stream is near the canyon side and the path to regional groundwater is likely shorter and faster.

VIII. The Importance of Groundwater in Riparian Systems

For groundwater and the groundwater dependent riparian ecosystem, what is happening subsurface during the Project is more critical than what happens at the surface. The plan states an intent to increase surface flooding. There is a surface flood connection between the stream and the floodplain only a few days a year, and the Program or its Projects will only marginal change the term of any flooding. But below ground, streams are connected (or disconnected) to their floodplains 365 days a year. The below ground connection of stream to floodplain is critical to riparian ecosystems, for groundwater to support the riparian ecosystem, for hyporheic exchange between the stream and floodplain, and for groundwater recharge.

Groundwater is the defining element for a riparian ecosystem. Without shallow groundwater, a riparian cottonwood forest will not grow. If it grows, the riparian forest is a hotspot of ecosystem productivity and diversity. If the riparian forest fails there will be a loss of a shaded understory, shade for the stream, habitat to birds, a continuous wildlife corridor from the Coast Range to Sacramento Valley. A riparian cottonwood forest provides a shade for people recreating at the stream. All this is dependent on the groundwater conditions in the floodplain.

IX. Groundwater Analysis in the IS/MND and PEIR

1. PEIR

The IS/MND tiers from a Final PEIR (August 2022) which contains absolutely no facts, data or analysis of the Project impacts on Groundwater Hydrology. The PEIR simply disclaims any need for environmental assessment of groundwater impacts because "the Project has no potential to affect". There is nothing to support that claim.

True to its word, never in the course of a 791-page document does the PEIR provide data or information on groundwater levels or address the potential impacts of the Project. The subject of groundwater is discussed only in the context of water quality topics. The PEIR states:

> The following CEQA Guidelines Appendix G hydrology topics are not addressed in this PEIR
> because the Project has no potential to affect them:
>
> • Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)

B. The Nishikawa Project IS/MND

The IS/MND states a conclusion of "No New Impacts" with regard to the Project impacts on groundwater hydrology. The are no facts, data, or analyses to back up this conclusion. There is no expert opinion based on facts. The IS/MND analysis is as follows:

> 5.10.1 Background - 5.10.1.3 Groundwater

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

5.10.3 Impact Analysis

b. Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

(No New Impact)

The project involves restoring a section of active channel that is currently in an over-widened
condition. Project activities include stream recontouring, in-channel structural improvements (e.g., natural stone feature construction), and low-flow channel reconfiguration to prevent erosion, minor bank stabilization, and habitat enhancement following a vegetation management plan. The proposed project would not result in an increase in impervious surfaces or require groundwater dewatering. Implementation of the proposed project would not significantly affect groundwater supplies and groundwater recharge and would not cause a net deficit in aquifer volume or a lowering of the local groundwater level. No new impacts or substantially more severe significant impacts related to groundwater supplies would occur.

e. Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

(No New Impact)

As discussed in Section 5.10.3.a, the proposed project would be required to comply with requirements set forth by the Construction General Permit, the CDFW Lake and Streambed
Alteration Agreement, and CWA Section 401 Water Quality Certification which require the
implementation of construction BMPs to control stormwater runoff and discharge of pollutants.
With adherence to these regulatory requirements, the project would not result in water quality
impacts that would conflict with the Regional Water Quality Control Board's Water Quality Control Plan (Basin Plan) for the Central Valley Region. Therefore, impacts related to conflict with a water quality control plan would be less than significant.

The proposed project would not conflict the California Sustainable Groundwater Management Act (SGMA), which took effect on January 1, 2015. SGMA established a framework of priorities and requirements to facilitate sustainable groundwater management throughout the State.[55] The intent of SGMA is for groundwater to be managed by local public agencies (e.g., water districts, irrigation districts, etc.) and newly formed Groundwater Sustainability Agencies (GSAs) to ensure a groundwater basin is operated within its sustainable yield (no long term overdraft) through the development and implementation of Groundwater Sustainability Plans (GSPs). As described in Section 5.10.1, Background, the project site is located within the Solano Subbasin, which has been designated as a medium priority subbasin and is therefore required to develop a Groundwater Sustainability Plan. A group of Groundwater Sustainability Agencies (GSAs) in the Solano Subbasin formed the Solano Subbasin GSA Collaborative and developed The Solano Subbasin Groundwater Sustainability Plan which was finalized in December 2021. The proposed project would not conflict with the GSP for this area, given the fact that the proposed project would not include any on-site groundwater utilization, nor would it significantly reduce groundwater recharge. Therefore, no impact related to groundwater sustainability or conflict with a GSP would occur. No new impacts or substantially more severe significant impacts related implementation of a water quality control plan or sustainable groundwater management plan would occur.

C. Missing Groundwater Data for the Project

A SCWA contractor dug a set of exploratory trenches perpendicular to the creek across the Nishikawa Project site to look at floodplain structure and groundwater. That shows SCWA had a concern for potential impact and has information about groundwater conditions that is not being disclosed. As a result of that work, the Project plan includes some work variously called "soil mitigation trenches" or "reverse French drains" in the IS/MND. These trenches are discussed later in these comments.

SCWA should provide the information discovered in those exploratory trenches:

What are the groundwater levels (GWL) at the Nishikawa Project site?
What is the structure and stratigraphy of the floodplain?

D. Summary of CEQA Analysis of Groundwater Hydrology

In the Final PEIR (791 pages) and the IS/MND (227 Pages) not one page is given to discussion and analysis of groundwater impacts. There is no data, information or analysis. There is no expert opinion based on facts.

Groundwater is important. Groundwater issues have been raised numerous times in comments on this Project and the Program and backed up by facts. SCWA itself has voluminous data and reports on groundwater levels along Putah Creek, a collection of scientific reports going back 100 years on how the stream and groundwater are connected, and the creek's contribution to groundwater recharge. Evidence has been provided to SCWA of the impacts of the WPCP project on groundwater. SCWA has information on groundwater and floodplain structure at the Project site gleaned from the exploratory trenches. There is no conceivable reason to justify a stubborn refusal to address the issue.

X. Evidence of Negative Impacts

A. Science

Based on science there is ample basis for an inference that the Project will have new significant impacts on groundwater supplies. The science and analysis were discussed above.

B. Evidence from Winters Putah Creek Park Project

The WPCP project was implemented beginning in 2011 for Phases 1 and 2, and in 2018 for Phase 3 and NAWCA 3. It was not long after 2011 when the riparian vegetation began to show signs of water stress, followed by multiple signs of adverse groundwater impacts.

In approximately sequential order of occurrence, the signs of negative impacts were trees dying, a dry desiccated floodplain with a narrow green border along the stream, and failures of replantings. Then at my urging SCWA investigated groundwater conditions in trenches crossing the floodplain, and that revealed excessively low groundwater conditions. At this point I discovered there was a nearby well included in the state's groundwater monitoring program, and the data showed that groundwater elevations had fallen in that well concurrently with the WPCP projects. After that I learned there were stream gauges above and below WPCP, and processed data from those gauges to see if the stream gauges might show the effects of the projects as changes in flow, and they did.

One might try to dismiss one or two of these pieces of evidence as happenstance. When six lines of evidence line up to point at one explanation, it is hard to ignore. There is substantial physical evidence now that those WPCP projects had negative groundwater impacts. The Nishikawa Project alterations to the stream and floodplain are similar to the WPCP project work.

1. Death of remnant cottonwood trees

Like the proposed Nishikawa Project, the Winters Project began with near total clearing of the floodplain, destroying a mature and mostly native riparian forest. A handful of mature native trees were spared, some perched on pedestals, others having endured heavy traffic pounding over the root zone. In subsequent years, the remnant mature trees spared in the Project died as a result of the project.

Figure 3. Remnant cottonwoods that died after Phase 1 of WPCP project.

2. Failure of tree plantings

At the same time as the mature trees were dying, replantings were failing. There are areas in WPCP where trees have been replanted three times and still after 10 years remain almost barren save for weeds.

Figure 4. Winters Putah Creek Park – Phase 2 – 2019. Replanting again, eight years after "restoration", and two previous failed plantings.

3. Greenline Effect

Massive, unsorted, unstratified fill lines the banks of Putah Creek in Winters. The fill was put there to narrow the channel to meet SCWA's channel width objective. The fill is so impermeable and blocks groundwater so much that there is only enough water penetrating the banks to water a thin 4 foot greenline of vegetation along the bank (Figure 5). To explain the effect in scientific terms, what we see is that the permeability of the stream bank is equal to the transpiration from four feet of floodplain vegetation. This is exemplary of the effect of a linear fill, and shows how the filling of the old stream channel as proposed at the Nishikawa Project would block groundwater from moving across the fill.

Figure 5. The Greenline Effect – When a bank is nearly impermeable, there is only enough water penetrating the bank to water a thin greenline of vegetation.

4. Trenches and deep pit

SCWA dug trenches across the floodplain in the Phase 2 project area of WPCP in 2017. The trenches revealed extraordinarily low groundwater levels. A fuller description is provided in the next section.

5. Groundwater monitoring well

There is a groundwater monitoring well located about 200 feet away from the creek and directly across from the WPCP and SCWA's projects there. The data go back to 1931. What the groundwater elevation data show is a significant drop in water levels subsequent to the implementation of SCWA's projects in 2011. This suggests that there was a drop in groundwater recharge due the WPCP project in 2011.

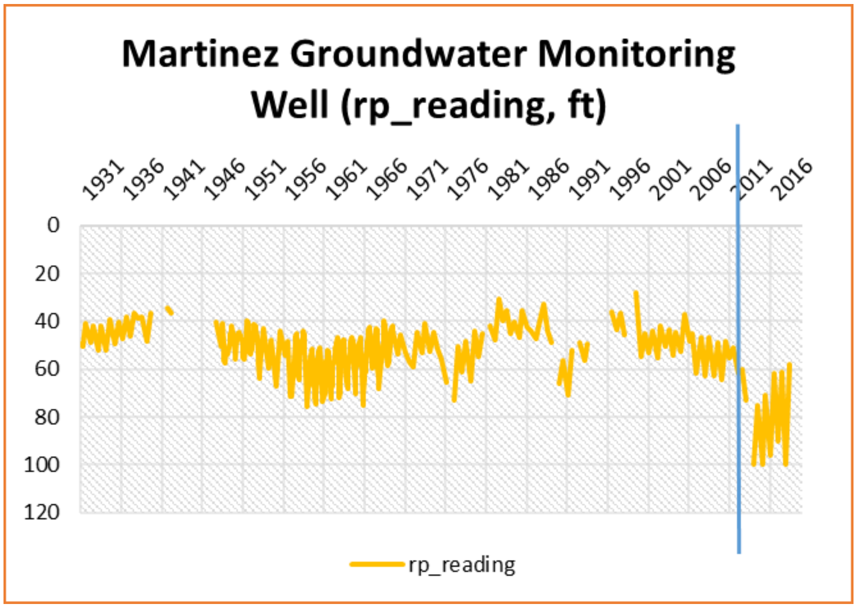


Figure 6. Groundwater Levels, Martinez Well, near Winters Putah Creek Park. Blue line indicates implementation date of Winters Project and the beginning of groundwater decline.

6. Stream gauge data

SCWA collects stream flow data at a gauge above the Winters project at the diversion dam west of Winters, and there is a second gauge at I-505 just below the Winters project. This part of Putah Creek normally loses water and the lost water goes into groundwater recharge. In theory, if the Winter projects were blocking groundwater recharge, and the amount were relatively large, it should show up in stream gauge data. There is comparable data going back to 2008, three years before project implementation, and forward to the present. Those data were examined to see if they would show impacts of the WPCP projects. Data for August and September were analyzed because those are months with minimal perturbations by unmeasured riparian pumping withdrawals or precipitation.

The data for August and September of 2008 to 2010 showed an average decrease of flow between the upstream and downstream gauges of 15.5 cubic feet per second (cfs), implying an equivalent fall contribution to groundwater recharge (TenPas, J. 2018. Declaration on Phase 3).

The data for 2013 to 2017 showed that the average stream loss decreased to 9.8 cfs, implying a 5.6 cfs reduction in the rate of groundwater recharge. On an annual basi, 5.6 cfs comes to 4,054 acre feet of water, water not going to recharge the aquifer that supplies municipal water to the City of Winters. That reduction is over 2x the annual pumping by the City of Winters. In a word it is a very significant reduction to groundwater recharge on an annual basis, and even more significant on a permanent basis.

C. Evidence: SCWA's Actions

In the years since the WPCP project began in 2011, SCWA has taken several actions that betray their knowledge of abnormal groundwater conditions in WPCP since their projects were implemented.

1. Groundwater Mitigation Trenches Installed in 2017 in WPCP

By 2017, there had been several successive failures of tree and shrub plantings in WPCP Phase 2. At my suggestion, SCWA investigated groundwater conditions and attempted mitigation for the conditions it found. SCWA's actions prove it recognized the adverse groundwater conditions created by the restoration project.

SCWA installed a set of 9 trenches in WPCP. The trenches were 8 feet deep and extended from the stream and across the floodplain. The trenches revealed post-project groundwater conditions and floodplain structure. I was told (personal communication with Vic Clausen) that the trenches were dry except for one. One would expect shallow groundwater near the creek to be near the elevation of the surface water.

As those trenches were dug, the excavator operator took photographs and video of the trenches (personal communication with Duc Jones, 11/22/2017). I explored one of those trenches and observed multiple alternating layers of coarse and fine sediments, layers which were relatively horizontal, continuous for up to 100 feet, and well-sorted. The coarse layers were a highly permeable potential flowpath for groundwater. However, the stream-ward end of the layered floodplain sediments ended in a plug of compacted fill emplaced by SCWA project to narrow the stream. The fill separated the stream from the layered floodplain sediments blocked groundwater.

To mitigate the adverse groundwater conditions, SCWA laid a base course of gravel in the trenches and then backfilled with the excavated material. Then SCWA connected the trench to the stream in an attempt to bring groundwater back under the floodplain. SCWA installed pipes to monitor groundwater levels. Friends of Putah Creek subsequently requested the monitoring data and the photo and video records for the trenches, but this public information was never provided.

2. SCWA September 4, 2019 Work in WPCP

SCWA investigated further into Phase 2 groundwater levels and attempted further mitigation in September 2019. When I observed the work, a 16 ft. deep exploratory pit had been dug about 20 feet from the stream. The groundwater level was an astounding 15 feet below the surface and 14 feet below surface water elevation. SCWA proceeded with mitigation work. As of 2023, this area in Phase 2 can be described as a treeless floodplain desert (TenPas, J. 2019. Winters Putah Creek Nature Park update)

3. Phase 3 Planting Tree Planting in Wells and Irrigation

In the 2018, SCWA implemented another project in WPCP during which the channel was relocated and the old channel filled (as in the proposed Nishikawa Project). For subsequent tree plantings, SCWA mitigated for project effects and low groundwater levels by excavating pits until reaching groundwater and backfilling with amended soil. SCWA has been watering these tree plantings ever since, including 2022. Trees in a natural undisturbed floodplain should never need either special planting preparation or long term irrigation. SCWA betrays that they know the project has negatively impacted groundwater levels.

D. SCWA's Tacit Admission of Concern for Negative Groundwater Impacts at the Nishikawa Project

The IS/MND for the Project is silent as to groundwater conditions and disclaims any potential for effects. There is however one detail in the project plan that amounts to a tacit admission that SCWA is concerned about groundwater impacts. SCWA is proposing a set of 31 trenches, referred to as "reverse French drains", that they describe as being there to sub-irrigate floodplain disturbed by the Project. This detail is shown as "Proposed Soil Mitigation Trench(es)" in the Project design drawing (Fig. 3, IS/MND p. 3.9, Proposed Soil Mitigation Trench) and discussed in the text (Section 3.3.3.2 Reverse Drainage and Subsurface Irrigation).

> IS/MND p 3-15
>
> 3.3.3.2 Reverse Drainage and Subsurface Irrigation
>
> The current floodplain of the project area is underlain by a thick layer of clay. In some places, this layer exceeds 12 feet. Recontouring the floodplain would bring the actual surface closer to this clay layer and may expose it in places. Due the impermeability of the clay layer, planting trees may be challenging. Therefore, reverse drains are designed to bring water from the design channel to the trees in subsurface "reverse French drains". These drain channels would be constructed as a perpendicular trench leading from the design channel into the newly created floodplain. Trenches would be dug to the elevation of the design channel bottom and would be sloped slightly downward from the channel to provide a flow gradient for moisture away from the channel. The drain would be filled with up to 1 foot of coarse gravel and rocks and then backfilled to grade with regular floodplain material, mixed with mulch. Trees would be planted into these drains, while shrubs and willows would fill the interstitial spaces between the drain locations. This design ensures that the entire floodplain is quickly re-populated with site-adapted trees and shrubs. Over the years, as the drains fill with sediment, trees and shrubs would have completely conquered the available rooting zone.

The "drains" reveal that SCWA has concerns that the Project may impact groundwater and leave the riparian forest without groundwater. The "drains" are mitigation for potential impact. The IS/MND does not own up to the potentially significant impact, and the mitigation is not disclosed as mitigation. This contradicts the IS/MND determination of "No New Impact".

Unfortunately, the SCWA stopped short of considering the full scope of the potential impact and did not consider that recharge to regional groundwater would be affected too. The floodplain after all gets the first draft from groundwater flows, but most water flows on past the floodplain toward deeper regional groundwater. If the floodplain trees need groundwater mitigation, then so does regional groundwater recharge.

E. SCWA was Knowledgeable of the Evidence for Potential Impacts

SCWA had knowledge of conditions in Winters Putah Creek Park. SCWA took actions to mitigate groundwater conditions in WPCP. SCWA was in receipt of written comments that presented facts concerning impacts in WPCP. SCWA knew all this when it certified the PEIR. These facts should have been but were not included in the later Nishikawa Project IS/MND.

The failure to disclose these facts deprived public agencies and the public of information on the environmental impacts of the Nishikawa Project. The SCWA's failure to disclose these facts was grossly negligent or intentional.

XI. Conclusions

Based on facts and science, I infer that the Project will put in place masses of unsorted, unstratified, compacted fill created from sorted, stratified floodplain materials. The fills will be much less permeable to horizontal flow and will function as nearly impermeable barriers to groundwater flow. Based on that, I conclude that the proposed Project would harm groundwater flows and groundwater supplies.

Logical inferences from physical science for the effects of the Nishikawa Project:

- Wherever the Project puts fill, it will block groundwater flows
- Fill of the existing channel will block groundwater to the channel footprint and beyond to the floodplain on the other side
- The transverse "Soil Mitigation Trench(es)" will block groundwater flows parallel to the stream and hyporheic exchange between channel and groundwater
- Cutting and forming the bed and banks of the new channel will line the channel with a low permeability barrier to groundwater
- Lack of shallow water beneath the parts of the floodplain cutoff from groundwater will cause die-off of some or all remnant forest and permanently prevent the growth of a healthy riparian forest
- Failure of the riparian forest will have negative effects on habitat for birds, wildlife, fish, and for human recreation
- The Project will permanently block recharge to regional groundwater along one side of the stream

I have seen the evidence in SCWA's past projects in WPCP of harms to groundwater supplies. These projects that were similar in important ways to the proposed Project. I conclude that the proposed Project would harm groundwater flows and supplies.

I have seen the evidence that SCWA in fact recognized the harm to groundwater supplies in Winters and now recognizes a threat to groundwater flows and supplies at the Project.

There is data and information critical to agency and public understanding of the Project's potential environmental effects that has been negligently or willfully suppressed and not disclosed in the environmental analyses for the Program and the Project.

XII. Expert Opinion

My opinion as a scientist is that the proposed Program and Project will have significant negative impacts on floodplain structure, groundwater flowpaths, and groundwater flows, and significant negative impacts on groundwater supplies to the groundwater-dependent riparian ecosystem in the Project area, and significant negative impacts on recharge to regional groundwater. These negative impacts were not adequately disclosed and analyzed, nor were proper mitigations proposed and discussed in the IS/MND or the PEIR.

XIII. Recommendations

Proposed Rules for Fill in Floodplains

Due to the significant effects of fill on groundwater processes in floodplains and riparian zones, certain assumptions should be made and rules followed.

Assumptions

- That earthmoving mixes earth into an unsorted disordered mass that is isotropic with respect to groundwater permeability
- That fill placed by machine will be only as permeable as the least permeable of the components in the mix
- That fill will not support horizontal groundwater flow or maintain a groundwater mound beneath a stream
- That the surface area and depth of fill matter
- That the distance of fill from the channel matters
- That the continuity of a body of fill matters

Rules

- That fills are low permeability and isotropic barriers to groundwater
- That floodplain alterations that disturb fluvial sediments and disrupt floodplain stratigraphy should be avoided or minimized
- That fills must disclosed and analyzed for their groundwater impacts in environmental reviews

XIV. Attachments

TenPas, J. 2016. Comments on draft PEIR - Lower Putah Creek restoration project

TenPas, J. 2018. Declaration on Phase 3

TenPas, J. 2019. Winters Putah Creek Nature Park update

TenPas, J. 2022. Comment letter to LPCCC re Nishikawa

Jeff TenPas
Winters Friends of Putah Creek
24 East Main Street
Winters, CA 95694

July 22, 2016

Solano County Water Agency
Putah Creek PEIR
810 Vaca Valley Parkway, Suite 203
Vacaville, CA 95688.

By email to:

Roland Sanford, Executive Director, Solano County Water Agency: rsanford@scwa2.com
Chris Lee, Dir. of Env. Compliance, Permitting, and Habitat Conservation: clee@scwa2.com

Comments on Draft Program Environmental Impact Report – Lower Putah Creek Restoration Project

Dear Mr. Sanford, thank you for leading the SCWA and overseeing its stream restoration efforts. This is an endeavor we can all fully support. Please consider the following comments on the draft PEIR for the Lower Putah Creek Restoration Project in the spirit with which they are given, coming from a supporter and a group supporting Putah Creek restoration and who would like to help and to achieve the best outcome for the creek.

Yours Truly,

/Jeff TenPas/

Intro

My name is Jeff TenPas, and I live at 24 East Main Street, Winters, California. I am a trained and experienced environmental scientist with an MS in Soil Science and over 20 years of experience in watershed restoration and environmental assessment. For the last 14 years I have worked for the USDA Forest Service. For 10 years my duties included being the regional watershed improvement program manager for the 18 forests in California. I am considered an expert in soils, water and soil interaction, soil water storage and movement, soil impacts from management activities like timber harvest and heavy equipment traffic, and environmental planning for watershed restoration projects.

I am intimately familiar with Putah Creek in Winters. For the last 20 years I walked the dog daily up and down the creek, first one dog, then the next. I opened up trails along the creek to promote public access. As much as anyone, I have observed the creek and floodplain on a daily basis, and read the landscape with a scientific eye.

I am deeply concerned with the environmental impacts of the program of work as proposed. Don't get me wrong, I am in full support of restoration, but I question the heavy-handed methods, the narrow one-species focus on salmon, and the significant impacts.

Overarching Comments

The scope and scale and intensity of disturbance from the proposed Program is huge but difficult to comprehend from the PEIR. I begin with some overarching comments about the overall project, the disclosure in the draft PEIR, and CEQA compliance.

1. Disclosure of Past Projects. The Program is an extension of a program of work that the SCWA has been carrying on for more than ten years. There is quite a bit of information from past projects that could and should have been used to inform the assessment of the effects and cumulative effects of the current plan. That includes especially information about the revegetation failures and wetland mitigation failures of the past projects Phases 1 and 2 of Channel Realignment in Winters. The analysis should include a discussion of these past projects and how these circumstances will be avoided in the future. The past project history cannot be left out without leaving out cumulative effects and without calling into question the good faith of the analysis.

   Comment 1: In the Final please include a list of past projects, and an assessment of compliance with mitigation requirements, and compliance with conditions of permits of approval.

2. Project Costs. The PEIR should discuss the Program costs. The program work done so far in Winters has cost over $5 million for one mile, so the work on 24 miles might exceed $100 million. While costs are not a direct environmental issue or effect, an indirect effect of spending so much on Putah Creek is that there is less money to go to potentially more cost-effective and beneficial salmonid or stream or watershed restoration projects elsewhere. It helps to consider costs too as a factor in the likelihood of funding for the proposed project or a lower cost feasible alternative.

   Please include projected Program costs in the PEIR.

3. Good Faith Effort at Analysis Commensurate with the Project Cost and Scope. The scope and scale and cost of this project is huge. For this, one would expect a thorough and comprehensive assessment of existing resources, including biological surveys and mapping where needed, and a serious effort to identify impacts and alternatives. This PEIR needs more depth and analysis. The project activity description is too much a discussion in generalities. The impact assessment is too conclusory without support.

   Please improve the PEIR by basing the analysis on biological surveys, mapping, soil analysis, etc to build a PEIR that is commensurate with the scale of the project.

4. Public Participation. There has been too little opportunity for public participation in planning and analysis of such a large programmatic project (Guidelines, Sec 15201). There was one single scoping session for the PEIR in Winters, and one single public meeting on the draft PEIR in Winters where the agenda was mostly dominated by presentations to the public instead of taking public comment. There were no public meetings in Davis, the largest part of the public affected by the project, or outreach to landowners, the people most directly affected by the project.
    a. There should be public meetings on the program in Davis.
    b. There should be outreach to abutting landowners.
    c. There should be true public hearings on the draft PEIR, not public meetings with and agenda dominated by talking at the public.

5. Standards for Adequacy of an EIR (Guidelines, Sec 15151)). I suggest that the draft PEIR does not achieve a full disclosure of the scope of the project, and the potential impacts of this kind of work that are known to the agency. The SCWA knows there are problems with similar past projects. The SCWA knows of other environmental issues that were raised but not included in the PEIR, including the very important issue of the effect on ground water recharge. I have submitted information to the agency to show that the sort of work now proposed in the Program is detrimental to floodplain groundwater hydrology and groundwater recharge. These issues are known to the agency and should without question have been included in the PEIR.

6. Recreation Impacts and Recreation Planning. It is noticeable and regrettable that the Program neglects to include improving swimming and other recreational opportunity. One would hope that a planning effort and environmental assessment of this scale would consider swimming as a significant use to be protected and enhanced.

Program Objectives

The SCWA proposes this Program in part to reduce stream temperatures for the benefit of salmonids. In relation to Program Objectives, the PEIR provides little information to show what the limiting factors are for salmonid habitat or how this project addresses the limiting factors. One of those factors is identified as stream temperature, but there is no data on existing temperature, nor analysis of the Program's potential effect. The PEIR should give substantially more effort to present the program objectives.

7. The PEIR should show where (spatially) and when (diurnally and seasonally) that there is a need for temperature reduction.
8. The PEIR should assess whether the bottoms of the deep pools that the Program will eliminate are not cold water refugia on a hot day.
9. The PEIR should present the water temperature data that the SCWA has.
   I have seen such data presented at past meetings of the Lower Putah Creek Coordinating Committee, and the Winters Putah Creek Committee.

Disclosure of Project Activities and Disturbance

The PEIR needs work on its Project Description. A PEIR is not expected to include site specific project designs. What we should expect is a good faith effort to describe the program of work, what will occur on the ground, how it will occur, how much work will be done, what impacts it might have, and how much cumulative impact may be.

Here is the minimal description the PEIR gives for the activity of filling an old channel and creating a new channel it says:

"Reposition Thalweg (p.2-10) .. Thalweg repositioning would involve excavating a new thalweg and/or filling all or portions of the old thalweg with the excavated material"

In practice, moving a stream channel creates an extreme level of disturbance that the PEIR description does no justice to. A better description might say:

Channel realignment requires building an access route, trees are cut, the banks(s) are cleared of vegetation, the stream channel is blocked, the stream is rerouted through a pipe, the channel is dried up, earthmovers and bulldozers disturb most of the floodplain, banks, and channel. The mature riparian cottonwood forest that is cleared will take a generation to regrow, the streambed, banks, and channel are rearranged and compacted, undercut banks are gone, and any mussel beds are destroyed. The hyporheic zone is entirely disturbed.

10. The PEIR should include a thorough description of each Program Activity, describing the steps and what disturbance there will be to the floodplain, banks, channel, soils, wildlife, fish and aquatic organisms.

Disclosure of Cumulative Extent of Project Activities

If the purpose of the PEIR is to improve the assessment of cumulative effects, then the PEIR needs to include an estimate of the cumulative total of project work and its footprint as a first step. Then the PEIR can go on to estimating the cumulative total of project effects. This will give the PEIR the advantage over multiple separate project-level CEQA documents by including a more exhaustive consideration of the program as a whole and the cumulative effects and alternatives. This allows the lead agency to consider program-wide mitigation measures "at an early time when the agency has greater flexibility to deal with basic problems or cumulative impacts" (CEQA Guidelines, Section 15168, subd. [b]).

11. The PEIR should estimate, summarize, and discuss the cumulative totals of each individual channel reconfiguration activity, including total stream length affected and stream area affected.

12. The PEIR should estimate how much total pool area there is existing, how much pool area will be filled, and how much will remain.

13. The PEIR should estimate the total acreage of floodplain that will be (1) cleared , (2) trafficked, and (3) compacted by heavy machinery.

14. The PEIR should disclose the estimated area of floodplain that will be cleared and the estimated number of trees that will be cut.

Potentially Significant Environmental Effects That Need Assessment and Mitigation

There is evidence for additional potentially significant environmental affects that were not identified in the PEIR and need to be assessed and then mitigated should be considered as appropriate.

Soil compaction. On this I am a scientific expert. Any heavy equipment traffic will compact soils, and soil compaction is detrimental to growing plants and soil hydrologic function. In forest soil management, we aim to limit compaction to a minimum, and in riparian areas may do that by excluding equipment entirely. This Program proposes what appears to be a great deal of heavy equipment use in the riparian area. I have witnessed and can attest to the soil compaction and its detrimental effects produced by past projects by the SCWA on Putah Creek. The SCWA is in fact currently struggling to establish vegetation on the floodplain in Winters due in part to soil compaction.

15. The PEIR should include an assessment of the extent of the area that will be affected by heavy equipment traffic and the degree and extent of compaction that will result.
16. The PEIR should include mitigation measures to avoid, minimize, and ameliorate compaction. Mitigation measures could include limiting the equipment traffic to limited travel routes, and using moveable pads to travel on.

Riparian cottonwood forest. Riparian cottonwood forest is a special aquatic habitat and a habitat that has been broadly affected by land and agricultural development. Prior SCWA projects in Winters avoided some cottonwood trees. The past projects however disturbed and compacted the surrounding soil and floodplain to an extreme extent (Jeff TenPas, expert opinion of a soil scientist) and the remnant trees are stressed or dead. The Program has the potential to detrimentally affect a significant portion of the existing mature healthy riparian cottonwood forest extent along Putah Creek.

17. The PEIR should include an assessment of the area of mature riparian cottonwood forest that will be affected, the relative amount of the total that will be affected, and the effect on the age distribution of forest.
18. The PEIR should include mitigation measures to avoid and minimize disturbance to riparian cottonwood trees and the surrounding floodplain.

Floodplain groundwater hydrology and water supply to riparian cottonwood forest. Floodplains and their riparian forests are dependent on their groundwater connection to the surface water in the stream. Riparian forests exist only because of a water subsidy from surface water. Water movement from the stream through the stream bank and the floodplain soils is controlled by the porosity and water potential gradient in accord with Darcy's Law. This is an area of my scientific expertise. Alteration of the floodplain soil material by imported fill, by mixing, and by compaction alters water movement. This has occurred in Winters in the SCWA's Phase 1 and 2 projects, where a clayey fine-textured fill was imported, placed, and compacted detrimentally reducing the groundwater hydrology and supply of water to the floodplain and forest. This is based on my professional knowledge, observation, and testing of the fill, its texture, and observation of its placement by earthmoving equipment.

The SCWA has reason to know, given its expertise in canal design and construction, that a clayey material has permeability that is an order of magnitude less than a normal sandy loam floodplain soil. The SCWA has bored holes in the floodplain after doing Phase 1 and 2 in Winters, the holes were up to ten feet deep and just ten feet from the creek, and most of the holes came up with dry holes, where there should have been free water at near the elevation of the stream water. I have observed this and measured this in those holes.

The Program proposes to import more fill, and place it with heavy equipment, to reduce the stream bed and bank size and area. This will inevitably reduce groundwater movement and supply to the floodplain, first by decreasing the channel surface area, second by compacting the material with heavy equipment traffic, and third by substituting finer textured soil material than was originally present.

We have seen in Winters Phases 1 and 2 the significant detrimental effects of the channel-modification projects on floodplain groundwater movement and supply to riparian forest.

19. The PEIR must include an analysis of the amount and type of fill to be used, and its permeability after emplacement, with a comparison to existing conditions.
20. The PEIR must include mitigation measures designed to fully maintain floodplain groundwater hydrology.

Groundwater Recharge. Groundwater is an increasingly important resource, and Winters relies upon it for its City water supply. The proposed Program will have an effect on it, a potentially significant and detrimental effect.

SCWA has on its website information relating to losses of Putah Creek instream flow to groundwater, showing that in the reach from the Diversion Dam to I-505 that is an average loss over 4.3 cfs in the June to October period. This represents a great deal of groundwater recharge. Movement of water from the stream to groundwater is described by Darcy's Law, where the quantity of recharge is related to the infiltration area, permeability of the material, and the water potential gradient. The proposed program proposes to decrease the area available for recharge by filling in pools, narrowing the channel, and filling gravel pits. The Program also proposes to import as fill the spoils of digging the South Putah Canal, a material that is clayey and naturally lower in permeability than a sandy loam floodplain or a gravel deposit. It will be impossible not to diminish groundwater recharge.

I have supplied the SCWA with estimates showing that just the past projectw in Winters may have decreased groundwater recharge in an annual amount greater than the City of Winters annual water use. This additional Program would have a cumulative effect on groundwater recharge that could potentially exceed 5000 acre feet per year. One could improve the estimate, but the effect is unavoidable, and must be recognized as a potentially significant effect of the Program. The gravel pits that are proposed to be filled are probably a focal point for recharge. One might still choose to fill the pits, but must be preceded by analysis and disclosure of the effects.

Groundwater recharge potential will be further diminished during flooding if the floodplain material and permeability are altered, as by importing fill and compaction due to machinery traffic.

21. The PEIR must include an assessment of the effects of the Program on deep groundwater recharge through the bed and banks of the channel and gravel pits. The existing surface area and permeability of the stream bed and banks, including the gravel pits, should be estimated. The post-project surface area and permeability should be estimated. An analysis should be made of the effect on ground water recharge potential.

22. The PEIR must also include an analysis of the reduction in recharge through the floodplain during flooding by considering the effects of changes in floodplain material where fill is imported and where there is compaction due to heavy machinery traffic.

23. The PEIR should also analyze the effects where the stream normally gains water from shallow groundwater. Here the effects to consider are how the lowering of permeability or groundwater discharge may affect stream flow and moderation of stream temperature by the mixing of cold groundwater with warm stream water.

Impacts on Swimming and other recreation impacts. Pools and gravel pits in the creek are potentially important swimming and recreational sites. These sites are important to consider even if they are now not accessible to the public, because they might be next year or 100 or 200 years from now. A previous SCWA project in Winters eliminated a very popular swimming hole where annual usage was far over 5000 user days per year. There is another project proposed in Winters that will eliminate a smaller yet still popular pool. There has already been a significant reduction in swimming in Winters, and any further loss increases the cumulative effect. Any pool and every pool presents some opportunity, and there is currently little good public access to swimming, and that is a precious commodity in a hot climate. The Program proposes channel reconfiguration activities that will result in a cumulative filling in pools and gravel pits up and down the creek that will result in a reduction in current and future swimming opportunity. This should not occur without a clear and focused cumulative analysis of the change in total pool area and swimming opportunities.

24. The PEIR should map and inventory the pool sites and gravel pits, both those that are proposed for filling and those that will remain, and assess current and future prospects for public swimming opportunities.

Loss of hyporheic zone and its water temperature and nutrient processing functions. The Program channel reconfiguration activities will disturb and alter the hyporheic zone over a large part of the stream. The hyporheos depends on continuity of flow paths through permeable layers and lenses of material. It would be very difficult for heavy equipment and project constructed channels to duplicate the complexity involved in stream deposits and duplicate the permeable lenses and layers that make up the hyporheos.

25. The PEIR should assess how the channel reconfiguration activities will affect the hyporheos, the proportional extent, and the impacts on stream temperature and nutrient conditions.

Loss of mussels. The Program channel reconfiguration activities will destroy any mussel beds currently existing in the project areas. Mussel populations are likely already rare in Putah Creek and are in serious decline in the state. Channel modifications to a large fraction of the stream bed risk extirpating mussel populations entirely from Putah Creek. Channel scarification projects that seem on the surface less impactful, may also be targeting and harming mussel habitat.

26. The environmental assessment should include with a survey and mapping for mussels.

27. The Program should include a plan component to protect and even improve mussel populations and habitat.

Failure to Consider Suitable Alternatives

The PEIR has not considered the full range of feasible alternatives that would avoid potential significant effects, in part because it has neither considered the cumulative area affected or the full range of significant effects. In particular the draft PEIR does not consider the effect of the Program on groundwater movement, groundwater recharge, floodplain groundwater hydrology, riparian forest water supply, and the other effects cited in the preceding comments.

The proposed Program employs a heavy machinery approach to stream restoration. This heavy machinery approach results in a maximum of ecosystem disturbance and impacts. This approach brings with it a high potential for significant unintended and unidentified impacts.

28. The PEIR should consider a new alternative to avoid the potential significant effects of the Program as proposed. The new alternative should take a comparatively light-handed and bio-engineering approach to stream restoration, and avoid to the maximum extent the disturbance of the floodplain by heavy equipment. The approach could continue the vegetation management activities as currently proposed. This approach should consider maintaining the gravel pits for their groundwater recharge benefits. This approach could include instream work to augment salmon spawning habitat and thereby address one major limiting factor to salmon.

Need to Consider New Mitigation Measures

New mitigation measures need to be considered for the previously unidentified, unassessed, impacts that are raised in the preceding comments.

LAW OFFICES OF DONALD B. MOONEY
DONALD B. MOONEY (SBN 153721)
417 Mace Boulevard, Suite J-334
Davis, California 95618
Telephone: (530) 758-2377
Facsimile: (530) 758-7169

Attorneys for Petitioner
Friends of Putah Creek

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SOLANO

FRIENDS OF PUTAH CREEK Petitioner v. CENTRAL VALLEY FLOOD PROTECTION BOARD; AND DOES 1 THROUGH 21 Respondents	**Case No. FCS 051040** **DECLARATION OF JEFF TENPAS IN SUPPORT OF REQUEST FOR TEMPORARY RESTRAINING ORDER**
SOLANO COUNTY WATER AGENCY; CITY OF WINTERS; and, DOES 21 through 100 Real Parties in Interest	Judge: The Hon. D. Scott Daniels Dept. 6 Date Action Filed: June 18, 2018

I, JEFF TENPAS, declare as follows:

1. I am a resident of Winters at 24 East Main Street. I am by education, training, and experience a soil scientist, hydrologist, and watershed scientist. I have worked as a soil scientist and hydrologist for the US Forest Service for over 19 years. For eight years I was regional manager of the Forest Service's watershed restoration program for the 18 forests in California. For the last six years I have been regional soil scientist and manager of the burned area emergency response program. I am an expert in the soil-water interactions including the infiltration and movement of water into and through soil.

2. Based on my professional expertise, I conclude without a doubt that the Phase III and NAWCA 3 projects proposed by the SCWA will irreparably harm groundwater movement, floodplain groundwater conditions and riparian forest health, and groundwater aquifer recharge. This conclusion is supported by evidence of the harms that have already resulted from SCWA's Phase I and II projects in Winters, and the likeness between those earlier projects and the Phase III and NAWCA 3 projects. The conclusion is borne out by evidence of the structure of the floodplains and channel and analysis based on the science of soil water interactions.

3. Evidence of Phase I-II Harms. The evidence of Phase I-II harms includes dying trees, failed plantings, "deserts" in the floodplain, falling groundwater levels in monitoring wells, and stream gauge data that definitively shows less water is moving from the stream and into the groundwater aquifer.

4. Death of Riparian Cottonwoods. When the Phase I-II projects were implemented in 2011, some mature cottonwoods were spared. There trees were at that time mature, healthy, vigorous trees. Since the projects, these trees have been slowly dying. These trees are in the floodplain beside flowing water in a stream with a regulated flow that has not decrease, in fact it increased, so were unaffected by the recent drought in precipitation. They were affected by a loss of groundwater, which was cutoff when the nearby stream channel was narrowed, partially filled, and compacted.

5. Photo 1 - Dead and Distressed Cottonwoods in Phase I. The left photo shows the channel and floodplain alteration. The trees are to the right side. The left photo shows the cottonwoods after several years.


6. Greenline, Death of Plantings, and Floodplain Desert. The effect of the bank and floodplain alterations in Phase I-II is so severe at some points that only enough water penetrates the banks to support a thin green line of vegetation along the creek (Photo 2). This has resulted in multiple failures of plantings. This has resulted in virtual "desert" on the floodplain in some places where the project used such poor fill and made it so dense with earthmoving equipment that neither water nor plant roots can penetrate the soil material.

7. Photo 2 – Greenline along Putah Creek in Phase II. The green vegetation to the right of the photo is on the bank of the stream and about four feet wide. This four foot "greenline" is characteristic in Phase I and II. Streambed and bank alterations resulted in a lack of normal groundwater movement and causes "riparian desert" conditions further than four feet from the stream. The floodplain has been planted repeatedly without success.

8. Stream Gauge Data. Stream gauge data gives incontestable evidence of ground water recharge effects. The gauge data is reliable and quantitative, and confirms all the other lines of evidence. FOPC obtained the gauge data from SCWA for the water years 2008 to 2017. FOPC analyzed the data for the months of August and September when irrigation withdrawals are not permitted and rainfall and runoff are non-existent. FOPC looked at the loss of stream flow in the reach with the Phase I-II projects, between a gauge at the SCWA diversion dam and I-505. The measured loss of stream water is approximately equal to water that is going into groundwater recharge. A small part is due to evaporation from the stream and transpiration from the floodplain vegetation, but that remains constant between pre and post-project years. Any decline in water loss between pre and post-project years is therefore attributable to project impact on reducing groundwater recharge.

9. What the data show (Figures 1 & 2) are that the Phase I-II projects reduced the amount of stream water going into groundwater recharge by and average of 5.6 cfs. This is based on comparing the monthly average water loss pre and post the project implementation. To put this in perspective, 5.6 cfs on an annual basis is equal to 4,054 acre feet, about 2.7 times the total annual water use in the City of Winters, or enough to irrigate 1,350 acres of almonds.

10. The groundwater recharge effect will be permanent and cumulative. And the effect is showing up in a nearby monitoring well.

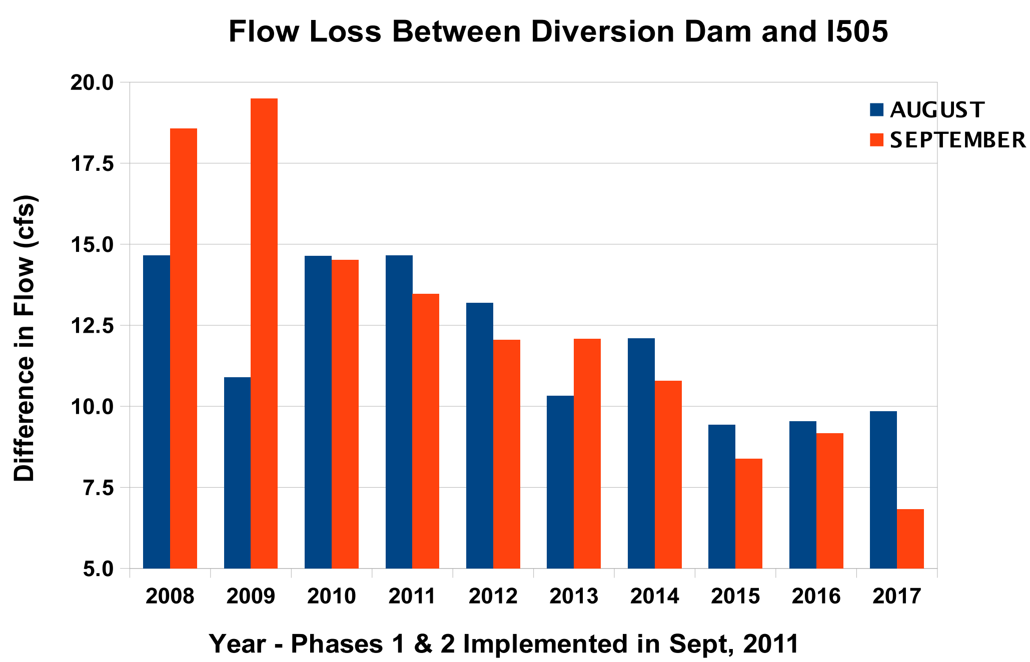
11. Figures 1 and 2– Stream Flow Data. After implementation of Phases I, II in 2011, significantly less water moves from the creek to recharge the groundwater aquifer.

	AVERAGE DIFFERENCE (CFS)			
MONTH / YEAR	**AUGUST**	**SEPTEMBER**	**2 MONTH AVERAGE**	**MULTI-YEAR AVERAGE**
2008	14.6	18.6	16.6	15.5
2009	10.9	19.5	15.2	
2010	14.6	14.5	14.6	
2011	14.7	13.5	14.1	
2012	13.2	12.0	12.6	
2013	10.3	12.1	11.2	9.8
2014	12.1	10.8	11.4	
2015	9.4	8.4	8.9	
2016	9.5	9.2	9.4	
2017	9.8	6.8	8.3	
			DIFFERENCE	5.61

From City of Winters Water Use Report-2013: "The City of Winters, populat ion 6624, is served by 2041 water connect ions. Over 497 million gallons of water were supplied in 2013, the average per day use delivered per resident ial connect ion was 436 gallons and 1156 gallons for non-resident ial."

Summary: The potent ial annual aquifer water recharge loss of 1.32 billion gallons per year is approximately 2.66 t imes the total annual City of Winters annual water use of 497 million gallons or enough to irrigate 1,351 acres at 3 acre-f t per year.

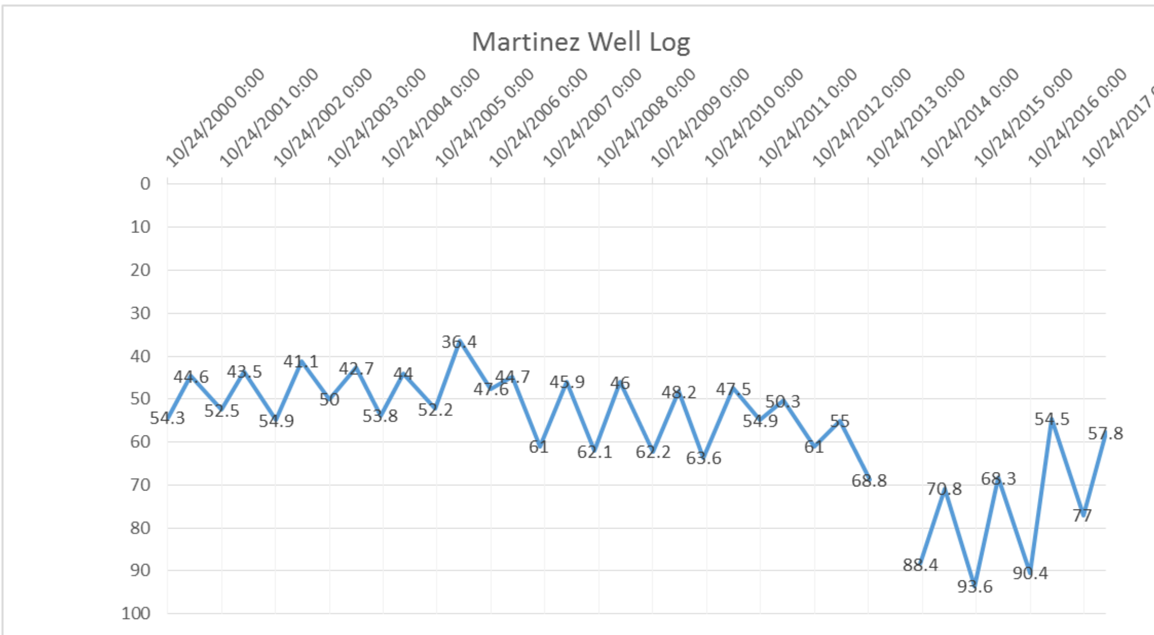
Extrapolated annual recharge water loss		
CF/YR	**GAL/YR**	**AC-FT/YR**
176,601,600	1,320,979,968	4,054



12. Monitoring Well Data. The effect of the decrease groundwater recharge is in evidence in the data from a groundwater monitoring well that is within several hundred feet from the Phase I-II projects on the Martinez Ranch. What the groundwater well data shows is a serious decline in groundwater levels that began concurrently with the Phase I-II projects (Figure 3).

While all the data is not shown, the lows of the last four years are below any other lows recorded since 1930.

13. Figure 3 – Groundwater Monitoring Well – Martinez Ranch. After the Phase I and II projects in 2011, groundwater levels in a monitoring well (within several hundred feet) dropped to historic lows.



14. <u>Phases I-II and Phase III and NAWCA 3 Construction Methods</u>. Phases I-II and Phase III and NAWCA 3 share in the same construction methods. The intent is to reduce the stream channel which is achieved by partial fills. The fill puts a low permeability barrier between the stream and the floodplain gravel layers. In other places, filling the floodplain blocks bodies of gravel that outcrop to the floodplain and valley sides. Constructing new channel and new banks destroys the layering and entry point for water at the new bank. Laying banks back to a 2 to 1 slope causes sedimentation and blockage in any gravels that might be exposed – in contrast the existing banks are undercut so that gravel layers remain open and free of sediment deposition. Use of heavy earthmoving equipment compacts all fill. Compaction

alone decreases soil permeability by a factor of 10. Clearing the floodplain of much of the mature vegetation is planned, destroying mature 50 year old trees.

15. How Construction Alters Groundwater. Water moves through soil according to Darcy's Law which says water flux is proportional to the permeability of the soil it is flowing through. In the case at hand, we are concerned with stream water that leaves the channel and flows through channel bank and then through the floodplain sediments. The rate of water leaving the stream is not equal all over, but varies by four or more orders of magnitude, being fast through the gravel layers and slow through silt layers that make up the floodplain. Given horizontal layering of the floodplain strata, flow is relatively faster horizontally in the gravel layers, with a gradual downward flow. This forms the typical mound of groundwater below the stream.

16. Stream and floodplain alteration such as in Phase I-II or Phase III and NAWCA 3 negatively impacts the potential for groundwater flow in numerous foreseeable ways, and positively impacts potential in no foreseeable way. The negative impacts are: reduction in the wetted perimeter of the stream, the compaction of bank and floodplain soils, importation of low permeability fill, mixing of high and low permeability layers, and most importantly by blockage or interruption of continuity of high permeability flow paths.

17. Photo 3 shows a trench in Phase II in fall 2017. The stratification of the natural floodplain is visible as well as the plug of fill at the stream end that blocks water from moving from the stream to the floodplain.

18. Photo 3 – Trench in Phase II. The left hand photo shows how dry is the stream bank end of a trench separated by just six to eight feet of soil from the stream. A plug of fill at the stream-end of the trench blocks the connection of the stream to high permeability layers in the floodplain. The remainder of the trench and the stratified structure of the floodplain are shown in the right hand photo. The entire trench was dry, no groundwater is reaching the floodplain due to the altered stream channel, banks, and floodplain.

19. SCWA Admission of Harms. SCWA has by its actions admitted the groundwater problems with Phase I-II. SCWA has been trying for years to revegetate the floodplains here without success, while the remnant of mature trees left were dying. FOPC has been pointing out the failures and advising that the cause lay in groundwater problems. SCWA admits problems with soils and water availability, and has since 2016 been experimenting with soil amendments to improve planting success. Soil amendments did not work to save plantings or the dying cottonwoods.

20. In 2017, SCWA hired consultants and implemented a project to restore groundwater conditions to the floodplain in Phase II. SCWA implemented the design by digging nine trenches, 3 feet wide, eight feet deep, and 40 to 100 feet long, that were dug across the floodplain and connecting to the stream. The trenches were intended to improve groundwater flow and supply water to a floodplain forest, and were partially filled with a gravel layer as a groundwater conduit.

21. Based on the very limited addition to floodplain permeability, it is readily calculable that this work in no way restored permeability to pre-project conditions. It is possible

that there will be enough groundwater to support trees planted on the trenches. This work did not by any stretch replace lost permeability enough to restore aquifer recharge.

22. This work was kept out of the public eye, was not reviewed under CEQA, was not permitted, did not have Clean Water Act Section 401 or Section 404 approval, and did not have a state Streambed Alteration Section 1600 permit.

23. <u>Irreversibility of Project Impacts and Irreparable Harms</u>. These projects are irreversible and irreparable in physical, political, and economic terms. Physically, the effect of the Phase III and NAWCA 3 projects will be to disrupt groundwater flow paths by filling the channel, blocking stream connection to high permeability layers, mixing layers into low permeability material, breaking the continuity of high permeability layers.

24. Earthmoving by its nature mixes material, making low permeability material out of it all, and breaks continuity of horizontal gravel layers laid down by flowing water. It is near impossible to undue mixing and resort the materials into gravels and silts, and to restore the floodplain layers. Only over thousands of years will the stream rework and resort the floodplains.

25. From a political perspective, there is political will now to go forward with more damaging work, not to slow down, or study the problems, and make a new plan. If there is no will to re-examine or change the methods now, there is no likelihood there will be the will to admit publicly and to funders the need to redo it later.

26. From an economic perspective, no funding is likely for a project area where $5 million was already spent on one mile of stream. Funding is unlikely for an expensive mitigation of a restoration.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed this 3rd day of September 2018, at Winters, California.

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Jeff TenPas

Winters Putah Creek Nature Park Update
Jeff TenPas
September 5, 2019

The Streamkeeper gave a report on the last months work in Putah Creek. And SCWA has been doing a lot of earthwork and ground disturbance during August and September in the Phase II project area of Winters Putah Creek Nature Park. And it wasn't reported. How can the LPCCC or SCWA for that matter direct the operations of this work if it doesn't know the facts.

Why is there work now in Phase II? This area was "restored" and revegetated in 2011 and 2012.

SCWA is doing work because after eight years most of Phase II has not been successfully revegetated, and is not meeting the conditions of the CEQA Mitigation and Monitoring Plan, the Clean Water Act Section 404 permit, the state Water Quality Certification, or the Stream Alteration Permit.

An excavator and backhoe have been at work, digging deep holes, and creating new stream bank disturbances. On Wednesday September 4 I observed a trench, about 16 feet deep, about 20 feet from the creek. SCWA employees and contractors were there and observing the groundwater level, which was about 15 feet below ground, very low when so near the creek. Such a low groundwater level shows the floodplain groundwater is disconnected from the stream. The hydrologic disconnection between the floodplain and stream is an outcome of altering the natural stream bed and floodplain with fill and diesel power, altering and destroying the natural groundwater flow paths. That extremely low water table explains why past revegetation attempts have failed.

There were 25 to 30 fresh breaks in the stream banks by excavator. This is presumably part of an attempt by SCWA to restore groundwater. The trenches are backfilled now, and because the work was neither described in a permit application or disclosed to scientific review it is impossible to fully evaluate the possible effects. This work is a whitewash, trying to fix a problem, without notice. The trenches may or may not help a few trees to grow, but this further use of diesel geomorphology may just as easily further damage groundwater flow and make real substantive mitigation of groundwater recharge even more difficult.

After an eight year-long failure of revegetation efforts in Phase II, the evidence is clear, but you are not informed by staff. The type of stream alteration practiced here - using earthmoving, fill, and heavy machinery to drastically alter the stream and floodplain and below ground structure - has great potential for negative effects that were never considered in the project plans or in any environmental assessment before the work was started. It is clear this type of stream alteration needs careful review.

The problems in Phase II must not be repeated in future projects. But the LPCCC is already on a path to more of the same in new projects already planned. And again without the science and environmental assessment needed and required. I know you are not all scientists, but you do have staff resources. Please inquire into this, and please give science a chance. I would be honored to help.

Friends of Putah Creek

2736 Brentwood Place, Davis, CA 95618 - www.friendsofputahcreek.org

Memorandum

To: Max Stevenson (mstevenson@scwa2.com), Roland Sanford (sanford@scwa2.com)

From: Jeff TenPas, Friends of Putah Creek

Date: January 13, 2022

Re: Proposed *Nishikawa Chinook Salmon Restoration Project* on Putah Creek

Dear Max and Roland,

Please convey this correspondence to the LPCCC Board.

The purpose of the communication is to formally advise you and the LPCCC of significant shortcomings in the proposed *Nishikawa Chinook Salmon Restoration Project* on Putah Creek as submitted by the Solano County Water Agency (SCWA). The problems with the project are further described in the following report which summarizes the problems of a project of very similar design (the Winters Putah Creek Park project) located several miles upstream from the proposed Nishikawa project. The Winters Putah Creek Park project was also constructed by SCWA on a 1.25 mi long reach of Putah Creek through Winters, Ca in several phases beginning in 2010.

The problems of the Winters project are a reliable predictor of the outcomes to be expected of the proposed Nishikawa project. We therefore strongly believe that an independent technical review of the design of the Nishikawa project must occur before the grant is awarded and further damages to the creek occur under the guise of "restoration".

We believe this review should involve unaffiliated experts in riparian restoration, fish biology, and riparian hydrology who can objectively review the proposed project in light of the adverse results seen in the project in Winters and then advise as to the suitability of this design approach.

Toward that end, we are willing to assist in whatever manner in most appropriate and would like to schedule a Zoom meeting or conference call to discuss the possibilities. Please feel free to contact me if you have any questions or wish for any additional information.

Respectfully submitted,

Jeff TenPas

Review of the Proposed *Nishikawa Chinook Salmon Restoration Project*

Part I – Description of the Proposed Project

The proposed *Nishikawa Chinook Salmon Restoration Project* is a radical experiment in stream alteration involving the bulldozing and removal of virtually the entire riparian forest in a ½ mile reach of Putah Creek. This is followed by complete realignment of the stream and complete alteration of floodplain contours and importation of tens of thousands of cubic yards of a foreign, non-native fill. The fill would be spread and compacted with massive earth-movers into a uniform planar surface over the entire floodplain.

SCWA's detailed grading plans (see Sheet 5 of the attached project proposal) for Nishikawa show an extreme cut and fill alteration of about 3,000 feet of Putah Creek and its floodplain using the following plan:

- Complete clearing of 11 acres of mature riparian forest save for a few trees
- Complete regrading of all 11 acres of existing floodplain to a uniformly planar and featureless floodplain
- Use of 22,000 cubic yards of non-native, off-site excavation spoils to fill in the old stream channel and cut a new man-made channel

The proposed design includes the following major shortcomings:

- The plan for massive alteration on the floodplain is completely misaligned with the project's stated objective – constructing instream spawning habitat
- The cost for clearing and earthmoving on the floodplain ($750,000) is much greater and disproportionate to the minor investment otherwise required for cobble and gravel to construct salmon spawning habitat
- The existing mature riparian forest is mostly native species and would be functionally completely destroyed by this stream alteration plan
- The proposed plan for diesel-geomorphology is completely contrary to Best Riparian Conservation Practices approved for Yolo Co by CDFW (see below)

Also note that most of the project area is free of invasive plants and does not need to be disturbed for their management as shown in the following figure from the Lower Putah Creek Watershed Management Action Plan.

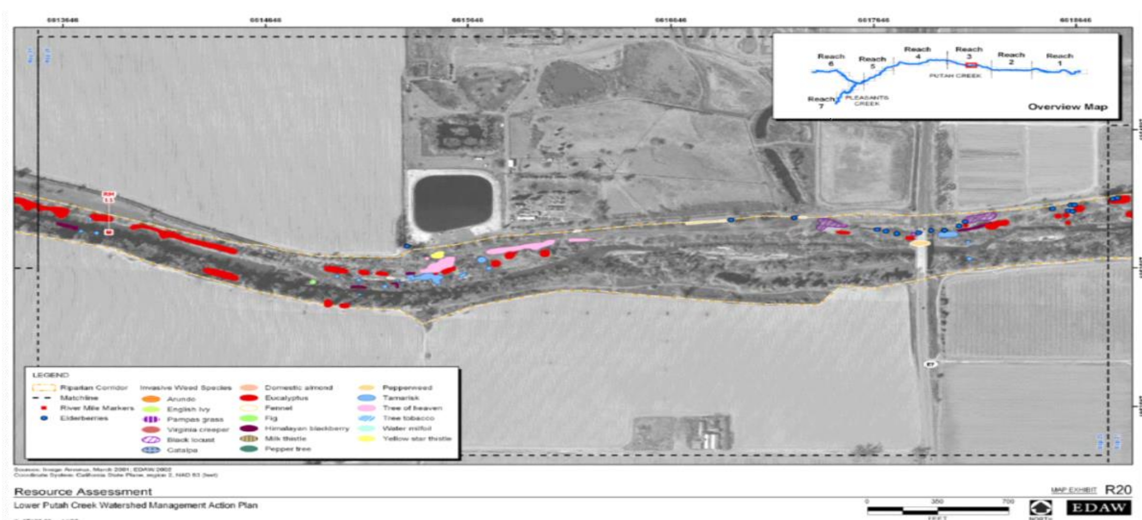


Figure 1. Invasive Plants in Nishikawa Project Area

The following figure shows the result of such a project as proposed for Nishikawa.

Figure 2. Winters Putah Creek Park in 2011. Floodplain cleared, filled, flattened, and compacted.

Part II – Conflict with Best Riparian Conservation Practices

Best Riparian Conservation Practices are identified in the Yolo County Resource Conservation Investment Strategy/Land Conservation Plan (RCIS-LCP, the "*Conservation Strategy*") as adopted by the Yolo Habitat Conservancy and approved by CDFW (see https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=157451&inline). The proposed Nishikawa project, with its extreme reliance on heavy machinery to remake the stream and floodplain, is in direct conflict with these established best practices in the following manner;

1) To attain the goal of "*Maintaining the integrity of natural communities*" the *Conservation Strategy* recommends using only native soils and specifically advises against the use of imported fill, soil disturbances and compaction. The Nishikawa project plans call for complete regrading of the floodplain and importing 22,000 cubic yards of excavation spoils to use as fill. The fill will be spread and highly compacted by large earthmovers to a uniform planar surface that will be nearly impermeable to water movement. This sharply contrasts with the naturally stratified and porous structure of the existing floodplain.

2) To attain the goal *"Improving dynamic hydrologic and geomorphic processes in watercourses and floodplains in a way that increases structural and habitat diversity*", the *Conservation Strategy* recommends:

- "*Creating secondary channels and overflow swales that add riverine and floodplain habitat values by allowing channels to meander and naturally laterally move through the floodplain;*
- *"Providing greater topographic and hydrologic diversity, recognizing that depressional features such as ponds and back channels and high ground provide important refugia for species such as western pond turtle and that higher ground in floodplains can serve as wildlife refugia from floodwaters."*

Instead the plan for the Nishikawa project calls for clearing almost the entire floodplain, making way for importing 22,000 cubic yards of fill, and grading the floodplain to a flat and featureless expanse.

3) To attain the goal of "*Maintaining fluvial equilibrium and protecting lacustrine/riverine systems supporting American beavers*", the *Conservation Strategy* recommends avoiding stream channelization, avoiding unnecessary vegetation removal, and targeting portions of streams that support American beavers for protection including protection of existing beaver dams.

Instead, the Nishikawa project would destroy existing beaver dams and dens, relocate the stream to a new narrower and shallower channel, decrease open water, fill ponds supporting beaver colonies, and replace high banks supporting occupied beaver dens with low shallow banks unsuitable for dens.

4) To attain the goal "*Maintaining and/or restoring and protecting stream processes and conditions*", the *Conservation Strategy* recommends maintaining subsurface flow, connecting groundwater hydrologically to stream flow, and expanding and protecting riparian vegetation. Instead the Project's proposed land-forming, fill, and earth-moving would destroy floodplain structure, disrupt and block groundwater flow paths, and disconnect the stream from the floodplain, as has occurred at Winters Putah Creek Park Project.

Part III – The Problems with the Winters Putah Creek Park Project

The proposed Nishikawa Project is almost identical in scope and design with the Winters Putah Creek Park Project which was designed and implemented by SCWA over the last 10 years. In the Winters project, the floodplain was almost completely cleared and graded to a planar surface sloped at 1-2% towards the stream, just as proposed for the Nishikawa project. The stream channel was almost completely altered to make it narrow and shallow, just as proposed for the Nishikawa project. And riffles were constructed for salmon spawning in Winters just as is planned for the Nishikawa project. According to the SCWA (TRPA, May 2020) "*Three existing riffles were augmented with additional gravel substrates and 14 new riffles were created at 200-foot intervals by importing 2,000 tons of salmon spawning gravel mix (Rich Marovich, personal communication).*"

The outcome is reviewed in the attached two documents that objectively present and discuss the Winters Putah Creek Park Project (see "*Winters Putah Creek Park - Part 1 - Case Study of a Failed Project_June-2018*" and "*Winters Putah Creek Park - Part 2 - Analysis of Project Failures_August-2019*"). We also strongly recommend a tour of the Winters project to gain first-hand understanding of the damaging impacts of the currently proposed project design.

1. Failure to create self-sustaining salmon spawning habitat. In Winters the remade channel and the 14 new manmade riffles with spawning gravels failed under the impact of natural fluvial geomorphic processes. Today, in the upper half mile (Phase 1) constructed in 2011 there is no measureable spawning habitat. In next reach (Phase 3) constructed in 2018, there are about 100 feet of spawning habitat but that is no measureable increase from pre-existing. In the next reach (Phase 2) there is fragmentary spawning habitat at stream edges and in the last reach (NAWCA 3) the small amount of spawning habitat was there before the Project. Riffles that were built were not resilient according to SCWA's own reports. Altogether there is an estimated 100 feet of spawning habitat that survives in the whole 6000 feet of altered stream. The 14 new riffles were scoured away or submerged by silt.

In the 2020 annual counts of fish on Putah Creek, the aquatic biologists reported, "*...the high flows associated with Lake Berryessa spills during the late winter and early spring of 2019 resulted in sand deposition throughout the Winters Park channel restoration area that filled in many of the pools and covered many of the gravel riffles and the upper weir site* " (see p. 15, "*Results of October 2020 Lower Putah Creek Fish Surveys*", June 10, 2021, by Tim Salamunovich, TRPA Fish Biologists).

In another report by a different consulting aquatic biologist to SCWA on the effectiveness of different strategies employed from 2003 to 2020 to enhance salmon habitat, projects were ranked from 0 (lowest effectiveness) to 5 (highest effectiveness). All of the Winters Putah Creek Park project phases were ranked 0 reflecting the overall ineffectiveness of massive stream alteration and channel realignment to improve salmon spawning habitat. (see p. 41, Report 6873, "*Lower Putah Creek Gravel Bed Scarification Final Report*" (Amended), April 30, 2021 by Ken Davis).

SCWA's attempts to build man-made spawning habitat were easily overridden by natural stream processes of scouring or silting. As stated in the widely read authoritative riparian restoration manual, "*Low-Tech Process-Based Restoration of Riverscapes: Design Manual"***,** "*The desire to reduce uncertainty and precisely predict restoration outcomes has led to practices that tend to emphasize the stability of channels. Constructed features and attributes such as plan-form, channel width, location of pools and riffles are designed in such a way that they do not change through time. The emphasis on stability requires detailed engineering designs, modeling, and heavy equipment, all of which contribute to the high cost of restoration… However, population level response of target species [e.g. salmon and steelhead] to these restoration actions is equivocal*."

2. Decrease in native fish and other wildlife populations. Native fish populations have declined in Winters Putah Creek Park over the past decade instead of gaining which was the whole intent of that project. Native fish counts in the Winters Putah Creek Park are typically less than in immediate upstream and downstream reaches of the Creek

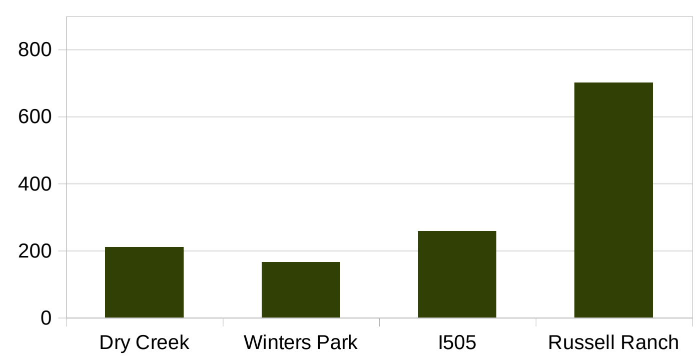


Figure 3. 2019 Fish Counts

Narrowing and reducing stream size likewise reduces in-stream habitat for fish – especially for small fry. Altering channels destroys undercut banks and replaces them with out-sloped banks lacking in cover for fish and this is reflected in the small number of salmon fry in the Winters Putah Creek Park compared to both upstream and downstream creek reaches.

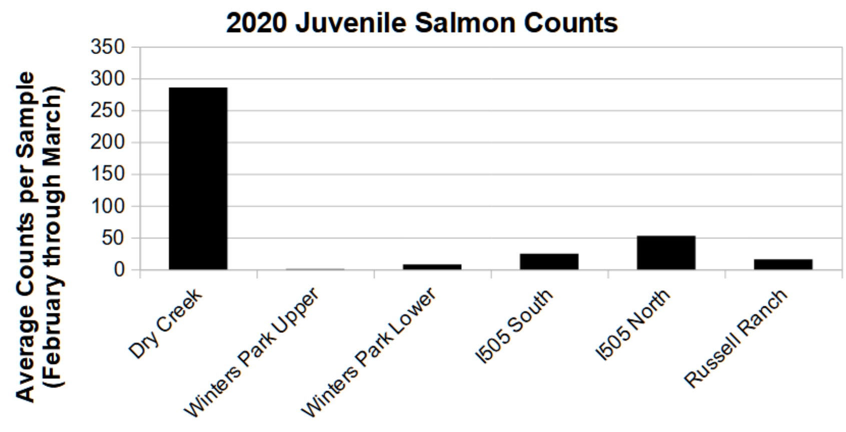


Figure 4. 2020 Juvenile Salmon Counts

There have also been noticeable drops in almost all other aquatic animals throughout the Winters Putah Creek Park since project completion including beavers and Western Pond turtles which are both indicative of a healthy creek ecosystem. This is entirely attributable to the extensive alteration and loss of stream and riparian habitat directly caused by the stream alteration project.

3. Riparian forest loss and failure in revegetation. Like the proposed Nishikawa Project, the Winters Project began with near total clearing of the floodplain, destroying a mature and mostly native riparian forest. A handful of mature native trees were spared, some perched on pedestals, others having endured heavy traffic pounding over the root zone. In subsequent years, the mature trees spared in the Project died as a result of the project. At the same time as the mature trees were dying, replantings were failing also. There are areas where trees have been replanted three times and still after 10 years remain almost barren save for weeds.

Figure 5 Winters Putah Creek Park – Phase 2 – 2019. Replanting again, eight years after "restoration", and two previous failed plantings.

Figure 6. Winters Putah Creek Park – Phase 3 - Trees Spared. Spared but perched on pedestals and dead or dying.

Figure 7. Winters Putah Creek Park – Phase 1 – Cottonwoods. Trees spared during construction, but cutoff from groundwater and dead.

4. Blockage of groundwater flow. Natural floodplains are stratified, with both coarse and fine layers, and the coarse sandy gravelly strata are highly permeable and carry groundwater laterally from the channel to the riparian forest. Earthmovers churn up these strata, destroy the structure of the floodplain, and build back massively compacted monolithic blocks of impervious fill. The fills block groundwater flow, deprive the riparian forest of groundwater, and block groundwater recharge.

The visible impacts of blocking the groundwater connection between channel and floodplain include the slow death of trees that were spared during the clearing (Figure 7), the failure of replantings (Figure 5), and a green line of vegetation about four feet wide at the streambank that is the visible indicator of the limit of available water (Figure 8).

Figure 8. The Greenline Effect – When a bank is nearly impermeable, there is only enough water penetrating the bank to water a thin greenline of vegetation.

The further result is a very significant drop (4000 acre feet annually) in groundwater recharge, evidenced by falling groundwater levels in a nearby monitoring well (Figure 9), and by stream gauge data that clearly shows a decrease in water loss from the stream. Finally, in 2017 SCWA investigated groundwater levels by digging a set of trenches which revealed groundwater levels had fallen more than 8 feet below the surface just 10 feet from the stream bank.

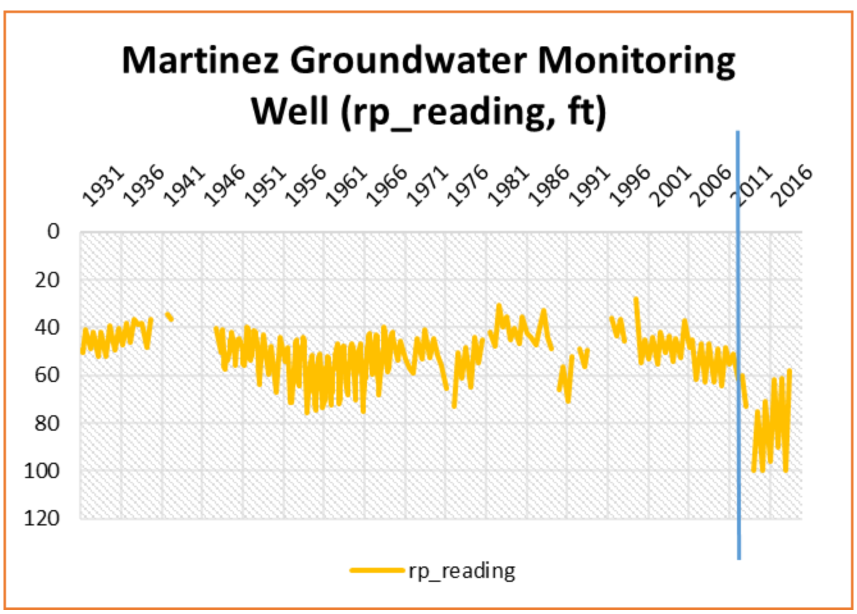


Figure 9. Groundwater Levels, Martinez Well, near Winters Putah Creek Park. Blue line indicates implementation date of Winters Project and the beginning of groundwater decline.

Part IV- Conclusions and Recommendations

It would truly be a mistake and a waste of restoration dollars to repeat at Nishikawa the experiment that has failed in Winters on so many levels. Cutting a mature riparian forest and importing, spreading, and compacting massive amounts of foreign excavated spoils with earth-moving equipment is destructive, not restorative. As has been clearly demonstrated in Winters, the exact same type of man-made channels and riffles proposed for the Nishikawa project will prove similarly destructive to the stream's ecology.

Friends of Putah Creek alternatively recommends that all restoration projects in Putah Creek must follow Best Riparian Conservation Practices selected for the region and approved by CDFW. These include:

- To retain as much as possible of the existing floodplain native plant canopy and root structure, do not use bulldozing as a primary means of removal of native and non-native vegetation.
- To prevent disconnection between the groundwater with the stream and to maintain optimal water mobility for plant growth, avoid dislocation and alteration of the existing floodplain soil strata and structure by, grading and importing and compacting non-native fill.
- Avoid using heavy machinery wherever possible to avoid plant damage and soil compaction.
- Work with the flow characteristics and topography of the stream itself and only augment spawning gravel where the existing conditions (depth and velocity) are already suitable for a sustainable spawning reach.
- Restore the riparian forest by only removing invasive vegetation and replanting with appropriate native species.

Attachments:

Nishikawa Chinook Salmon Restoration Application
Winters Putah Creek Park - Part 1 - Case Study of a Failed Project_June-2018
Winters Putah Creek Park - Part 2 - Analysis of Project Failures_August-2019

Comments Submitted for the IS/MND for the Nishikawa Project and the Underlying PEIR for Lower Putah Creek

by Alan Pryor

Qualifications of Commenter

I have BS in Biology and a BA in Chemistry from the University of California, Santa Cruz and an MS in Environmental Health Sciences from the University of California, Berkeley. Growing up in Merced Co, I spent countless hours fishing along the length of the Merced River from Yosemite to the east side of the San Joaquin Valley which has given me an intimate understanding of creek and river dynamics and wildlife.

Summary of Comments

The IS/MND needs substantial revisions in terms of disclosure and discussion of serious past environmental degradation that the lead agency, the Solano County Water Agency (SCWA), experienced after implementing a very similar previous restoration project at Winters Putah Creek Park.

The IS/MND is also insufficient in terms of disclosure and discussion of possible mitigations to eliminate or reduce these potential adverse environmental impacts such as occurred at Winters Putah Creek Park.

Substantial evidence exists that the failures seen in that project will also likely be seen in the newly proposed Nishikawa project due to the almost identical restoration objectives and strategies involved in both projects. These project failures include failure to decrease-stream water temperatures, failure to improve native fish populations and habitat including salmon spawning riffles, failure to improve wildlife habitat and increase wildlife populations, and failure to successfully revegetate the floodplain with a native riparian forest.

A further unintended consequence at Winters Putah Creek Park is that the project disconnected the stream from the underlying aquifer resulting in a substantial and measurable drop in recharge of the aquifer by infiltration from Putah Creek.

Further, none of these problems were disclosed or addressed nor mitigation proposed in the underlying 2016 Lower Putah Creek Program EIR (PEIR) which was amended and recertified in November, 2022 and on which the IS/MND for Nishikawa is tiered

SCWA has not provided any substantial evidence that these efforts by SCWA in the Nishikawa project include proven mitigation measures that will be any more successful in achieving these objectives than the failure to achieve similar objectives in the Winters Putah Creek Park project.

In particular, these comments will focus on failure to meet three of the prime objectives of the Nishikawa project which are to I) reduce stream temperatures, ii) successfully establish a healthy new riparian forest after bulldozing the entire floodplain, and iii) improve fish habitat (including by establishing new stable salmon spawning riffles) and populations.

Substantial evidence is presented that the Winters Putah Creek Park project 1) did not reduce stream temperatures as claimed, 2) failed to reestablish a healthy riparian forest, and 3) resulted in a substantial reduction in native adult fish and juvenile salmon fry compared to other immediate upstream and downstream reaches of the creek, and did not result in stable salmon spawning riffles as a result of the project. No substantial evidence is presented in the IS/MND that such problems will not reoccur in the Nishikawa project

All of these failed objectives are also claimed project objectives in the Nishikawa project yet potential failure to achieve these objectives in the failed Winters Putah Creek Park project has not been adequately disclosed and discussed nor has proper additional proven mitigation been proposed to alleviate similar failures in the Nishikawa project.

All of these failures can be traced to the fundamental problem that SCWA is planning to employ a now disproved radical stream alteration technique in the Nishikawa project known as "*geomorphic engineering*". This strategy involves massive earth-moving to completely move the existing stream bed and overlay it with a compacted soil to create a fixed, "self-maintaining" stream channel. Unfortunately, this design methodology has uniformly failed to produce the desired results in the Winters Putah Creek Park project in which the same methodologies were employed.

Substantial evidence of these failures have been extensively reported in two publications authored by Friends of Putah Creek entitled *Winters Putah Creek Park - Part 1 - Case Study of a Failed Project_June-2018* and *Winters Putah Creek Park - Part 2 - Analysis of Project Failures_August-2019*; both of which were distributed to all of the members of the Lower Putah Creek Coordinating Committee and the SCWA Board of Directors and many SCWA staff and which are attached to these comments and incorporated herein by reference. Some of that information is additionally updated and reported here.

Description of a Previous Similar Restoration Project Failure in the Winters Putah Creek Park

The methodologies used in the Winters Putah Creek Park project are almost identical to those disclosed for the Nishikawa project. Unfortunately, the Winters project did not achieve any of those stated objectives and instead resulted in serious degradation of a robust and mature creek habitat which degradation has not been adequately discussed nor even disclosed by SCWA in either the IS/MND nor the underlying PEIR on which the current IS/MND is tiered as otherwise required by CEQA disclosure guidelines.

The project was designed by the Solano County Water Agency (SCWA) to alter the stream bed and riparian floodplain in three phases along the entire 1.2 miles of Putah Creek flowing through the City of Winters using a now disproved methodology called "geomorphic engineering" which entail radical displacement of the stream channel using massive diesel-powered earth-movers.

The first of the Winters Putah Creek Park project's 3-phases was begun in 2011 and each phase involved bulldozing and/or clear-cutting nearly the entire mature riparian forest of almost all native and non-native trees from stream bank to stream bank. Then over 70,000 cubic yards of mixed fill was imported to overlay the clear-cut stream channel. The imported soil was graded flat and smooth with a slight 2 percent slope from the original floodplain banks down toward the creek. The new floodplain and channel were then heavily compacted to prevent future erosion leaving only a new narrow channel meandering through the approximate center of the former stream bed. The final depth of the compacted fill varied from about 2 to over 12 ft. with a new channel width of from about 28 ft to 30 ft.

This process removed all previous creek and floodplain topographical features such as wetlands, ponds, swales, back-channels, undercut banks, and deep pools that create ecological diversity and complexity. The newly-formed barren floodplain was soon replanted with thousands of native plants including trees, shrubs, and herbaceous species. The intention was to quickly provide a fully functional riparian habitat complete with undercut banks and creek-side shading suitable for the entire food chain to thrive. The project was functionally completed in 2017 but many of the failures indicated above continue to this date as otherwise discussed below.

The stated objectives of the Winters Putah Creek Park project were functionally identical to those now specified for the Nishikawa project which, among others, were to enhance the overall habitat of the section of Putah Creek running through Winters by:

1) Lowering creek water temperatures in the project area and downstream to improve native fish habitat into these sections of the creek;

2) Reestablish a vibrant riparian forest of native species; and

3) Improving overall fish habitat to increase native fish populations and successful salmon spawning.

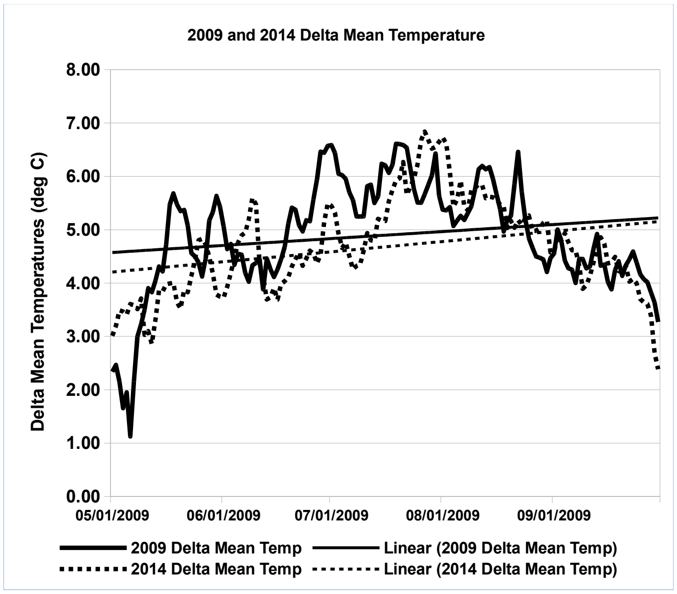
Objective Proven Previous Project Failures

Unfortunately, the Winters Putah Creek project has failed to deliver on any of these objectives.

1. Failure to Reduce Creek Temperatures

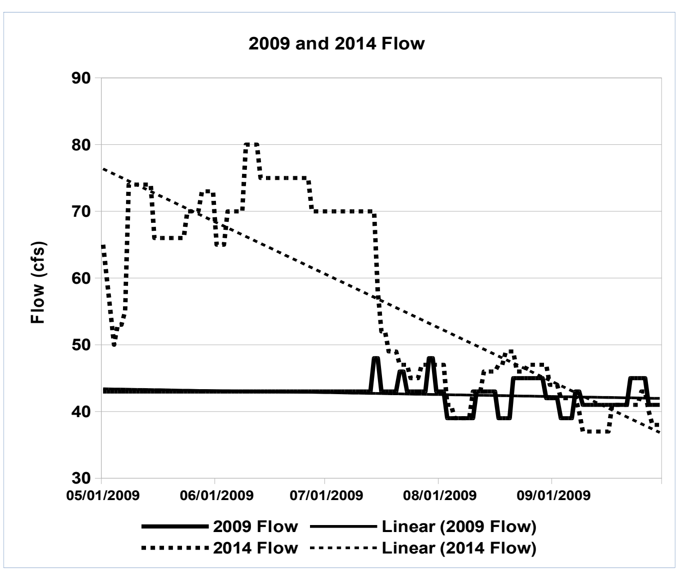
Reducing creek temperatures to improve trout and other native fish habitat was to be a major benefit of the Winters Putah Creek Park project and these benefits are also claimed to result from similar rechannelization proposed in the IS/MND and underlying PEIR. The objectives are based on a flawed geomorphological engineering design. Unfortunately, SCWA has failed to provide any substantial evidence that such a beneficial effect has occurred as a result of the Winters Putah Creek Parkway project or will likely occur in the Nishikawa project or other reaches of the Creek as proposed in the underlying PEIR.

One problem in determining the success or failure in meeting this objective is that there were few temperature sensors maintained by the SCWA in locations in the Creek before the project. This limited detailed “before and after” comparisons. According to SCWA, only one pair of sensor sites located at Winters Bridge (directly upstream of the project) and downstream at the Stevenson Bridge provided sufficiently reliable temperature measurement data from May 1 through September 30 in 2014 and 2019. This period covered both a year before the project started and a year after completion of Phases 1 and 2 of the project. The following graph shows the daily mean temperature differentials between these two sites for both 2009 and 2014.



As shown, the mean daily temperature differential between Winters Bridge and Stevenson Bridge site was approximately 0.25 – 0.5 deg C lower from April 1 to July 15 in 2014 (post-project) compared to 2009 (pre-project); albeit with large daily fluctuations. Beginning in August the mean temperature differential was not statistically different between 2009 and 2014.

SCWA engineers have stated that these decreased temperature differential spreads between these two sites, at least in May - early July of 2014 compared to 2009, is “compelling” evidence supporting their thesis that the Winters Putah Creek Park rechannelization project is producing cooler downstream temperatures. *We strongly disagree with their conclusions*. We subsequently obtained and also graphed the daily stream flow data over the exact same 2009 and 2014 time periods as the temperature data (shown in the following graph).



As is apparent in this 2nd graph, the modest difference in temperature differentials shown in the first graph between 2009 and 2014 for the May to July period are directly correlated to and very likely entirely attributable to the average *75%* *greater in-stream flow* released from the diversion dam in 2014 compared to 2009. By comparison, in August of both years when in-stream flows were near equal, there was virtually no difference in mean temperature differentials between the pre- and post-project years.

Thus SCWA's claim that this temperature data indicates that the rechannelization project does, in fact, reduce downstream temperatures is without merit and simply failed to account for the dramatically increased in-stream flow in 2014. This information was not disclosed in the IS/MND nor in the underlying PEIR on which the IS/MND is tiered as is otherwise required by CEQA guidelines. There is no other data or substantial evidence suggesting that rechannelization in and of itself has resulted in cooler downstream Creek temperatures as otherwise claimed by SCWA.

Proponents of the rechannelization project simply claim that just moving the water downstream faster will result in cooler water temperatures and this can be accomplished by channelizing the stream and removing large deep preexisting ponds. However, additional factors affecting Creek temperature have not been quantitatively considered by the SCWA. The temperature regime of a stream like Putah Creek is the product of a complex set of variables including not just the linear velocity or speed at which water is moving downstream relative to the amount of solar radiation striking the creek.

One factor is evaporative cooling from the water surface during the day. Larger surface area of pools provide greater evaporative cooling than narrow channels. This would be even more likely if those cooling pools in question were heavily shaded to protect the water surface from solar radiation heat gain as existed pre-project.

Pools with large surface area would also provide more convective cooling and black body radiation cooling at night. Additionally, deeper pools will provide substantial buffering capabilities due to the reservoir of cooler water deeper in the pools where heat gain is minimized because the Creek water contacts with cooler groundwater sources and earth.

None of these factors were disclosed, discussed, or considered in either the IS/MND nor the underlying PEIR on which the IS/MND is tiered.

2. Failure to Establish a Healthy New Riparian Forest and Floodplain Habitat

Stream floodplains often provide ideal conditions for growing trees since sediments deposited on them are typically laid down in layers comprised of alternating fine sediments and gravel coarse enough to be well aerated as well as being rich in organic matter and mineral nutrients deposited by occasional floods. The same porosity of the gravel layers which allows good aeration also permits horizontal movement of water from streams to the roots of trees through the stratified soil layers comprised of both organic sediments and course gravel depositions.

Consequently the term "riparian forests" is increasingly used to describe such rich and productive plant communities lining streams throughout the United States. Such forests are highly ecologically significant since they are oases of wildlife plant and animal productivity such as providing habitat for nesting and migrant birds due to the forests high productivity in additional to providing habitat for insects, mammals, amphibians, and fish; all of which were thriving in the section of Putah Creek through Winters prior to implementation and construction of the Winters Putah Creek Park project.

Such riparian forests are so ubiquitous in the United States it is often assumed trees always line streams, but that is not the case. Take away any of the factors, such as the lateral mobility of water provided by the mixed layers that make floodplains good for growing trees and the riparian forests disappear. Too much floodplain clay can also prevent trees from growing since it reduces soil porosity and thus prevents passage of air and water to their roots. Mixing of soil layers and compacting of soils such as occurred by the radical bulldozing and movement of soils in the floodplain will also reduce the lateral mobility of soils such that the only plants that can grow in such conditions are shallow-rooted herbs and weeds or if immediately adjacent to or in very close proximity to the creek or stream.

That is exactly what happened at the Winters Putah Creek Park project and there is a definite risk of such replanting failures at the Nishikawa project which failures and risks have not been properly disclosed. The Winters Putah Creek Park projects promoted by SCWA destroyed a riparian forest and then replaced a typical riparian soil that once supported abundant floodplain tree growth with clay-heavy mixed soils that when deposited and further mechanically compacted in the floodplain quickly hardened into a brick-like material impervious to air, water, and tree roots. Consequently ten years of attempts to grow native trees, shrubs, and herbaceous plants in the creek floodplain through Winters have functionally failed and the primary remaining vegetation remains herbaceous weeds and stunted, dying trees and shrubs other than in a thin band of vegetation immediately adjacent to the newly formed creek channel.

The Winters' projects thus destroyed a once rich riparian forest and replaced it with compacted soils that cannot support tree or large shrub growth to maturity. Further, SCWA inexplicably claims that all of the vegetation planting and replantingiswere done without keeping any records as to the numbers and types and locations and success/failure rates of the replants without which disclosures no substantial evidence exists that the similar restoration techniques in Nishikawa will otherwise be successful.

Literally thousands of seedlings and saplings have been replanted in the project in the years following completion of the different phases. Almost all the tree and large shrub replants that were not planted immediately adjacent to the Creek have since died for lack of water because water cannot move from the stream to the trees through the dense compacted fill. In some parts of the project, dense compact impermeable fill extends more than 12 ft deep and blocks water from reaching remaining trees on the periphery of the floodplain which have also since died or are dying due to lack of water. The impermeable fill has completely disconnected the new creek channel from the original porous, gravelly, permeable floodplain preventing both lateral migration of water from the creek and infiltration of rain or applied irrigation water necessary for replant growth.

Not only have replants failed to survive and grow, this has also caused serious stress and even death of the few uncut trees remaining on the periphery or within the bulldozed floodplain. You see this in most every cottonwood on the south bank below the railroad bridge. New plant growth is now dominated by a patchwork of invasive grasses and herbaceous plants including, Bermuda grass, Italian rye-grass, Johnson grass, cockle-bur, and Star thistle except for a thin band of soil immediately adjacent to the creek.

Figure 1 Winters Putah Creek Park – Phase 2 – 2019. Replanting again, eight years after "restoration", and two previous failed plantings.

Figure 2. Winters Putah Creek Park – Phase 3 - Trees spared but perched on pedestals and dead or dying.

Figure 3. Winters Putah Creek Park – Phase 1 – Cottonwoods. Trees spared during construction but cutoff from groundwater and dead.

The reason that revegetation has substantially failed in the Winters Putah Creek Park Project is due to the floodplain construction techniques employed. Natural floodplains are stratified, with both coarse and fine layers, and the coarse sandy gravelly strata are highly permeable and carry groundwater laterally from the channel to the riparian forest. Earth-movers used in the Winters Putah Creek Park Project channel realignment churned up these strata, destroying the structure of the floodplain in the process, and then massively compacted the new deposited soil into monolithic blocks of impervious fill. The fills block groundwater flow, deprive the riparian forest of groundwater, and block groundwater recharge.

The visible impacts of blocking the groundwater connection between channel and floodplain include the slow death of trees that were spared during the clearing (Figures 2 and 3 above), the failure of replantings (Figure 1 above), and a green line of vegetation about four feet wide at the stream-bank that is the visible indicator of the limit of available water (Figure 4 below).

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Figure 4. The Green-line Effect – When the soil near a bank is nearly impermeable, there is only enough water penetrating the bank to water a thin green-linee of vegetation.

As noted above, a precise accounting of the number of removed, replanted, and current status of native species on the floodplain has not been provided by SCWA pursuant to repeated requests by Friends of Putah Creek under the California Freedom of Information Act (FOIA). Amazingly, SCWA claims that they had not been keeping ANY records of the replants successes or failures of the thousands of new plantings and repeated replantings of trees, shrubs and various herbaceous plantings during the entire construction and post-construction phases despite disclosures of such planting and replanting failures to SCWA on numerous occasions.

Many of the same conditions that existed in the Winters Putah Creek Park Project will also exist in the new Nishikawa project which will employ the same misguided restoration techniques. The floodplain will first be functionally bulldozed to a flat planar surface which destroys lateral layers of soil necessary for lateral water migration. New soil will be added which has been mixed thus removing all interspersed layers of course gravel and sediments. The deposited soil will then be further compacted to prevent dislocation and removal in high flow flooding events in the future.

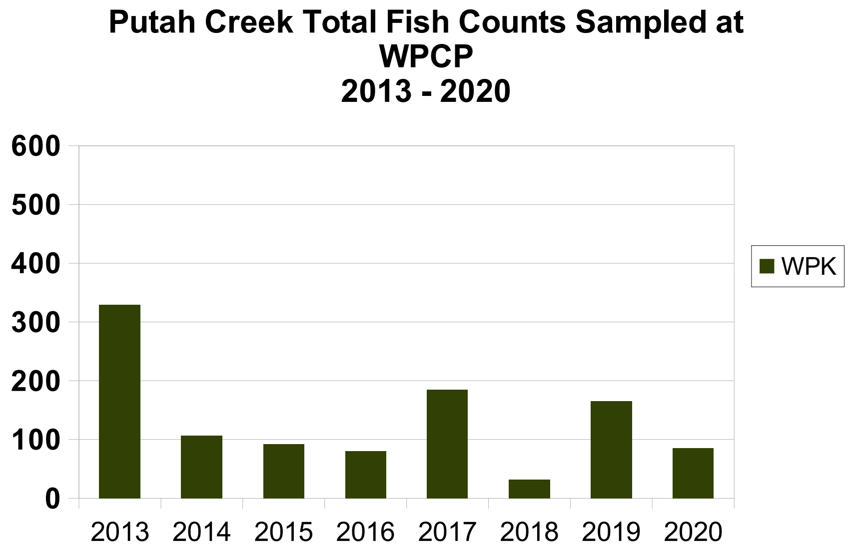
None of these past revegetation failures following rechannelization in the Winters Putah Creek Park project have been disclosed in either the IS/MND or the underlying PEIR on which the IS/MND is tiered as otherwise required by CEQA guidelines.. Further, SCWA has not provided any new substantial evidence or analysis that such efforts will be successful in the new Nishikawa project considered in the current IS/MND.

3. Failure to Increase Fish Populations and Salmon Spawning Habitat

a. <u>Substantial Evidence Exists and was not Disclosed that Native Adult Fish Populations Decreased and Remained Depressed in Winters Putah Creek Park Following Project Completion Compared to Upstream and Downstream Reaches of the Creek</u>

One of the primary objectives of the Winters Putah Creek Park project was to improve the Creek as fish habitat. However, this hypothesis has never been quantitatively tested with the results publicly disclosed and discussed even though the data has been available for SCWA to do so for many years.

SCWA has been collecting annual fish counts for the past several decades which results were obtained through FOIA requests by FOPC. Excerpts of this data are partially presented in the following graph (*see Appendix A for raw data*).



This shows an approximate average overall 67% decrease in total fish populations in the Winters Putah Creek Park project area over time since the first phase of the project was completed.

Indeed, fish counts have remained depressed in the Winters Putah Creek Park project every single year after establishment of baseline conditions in 2013. However, as shown below, fish counts in an nearby downstream section of the creek were either not as depressed or actually increased in the years following establishment of baseline conditions in 2013. This indicates that the decreases in fish populations in the Winters Putah Creek Park project were NOT due to conditions otherwise affecting the entire creek.

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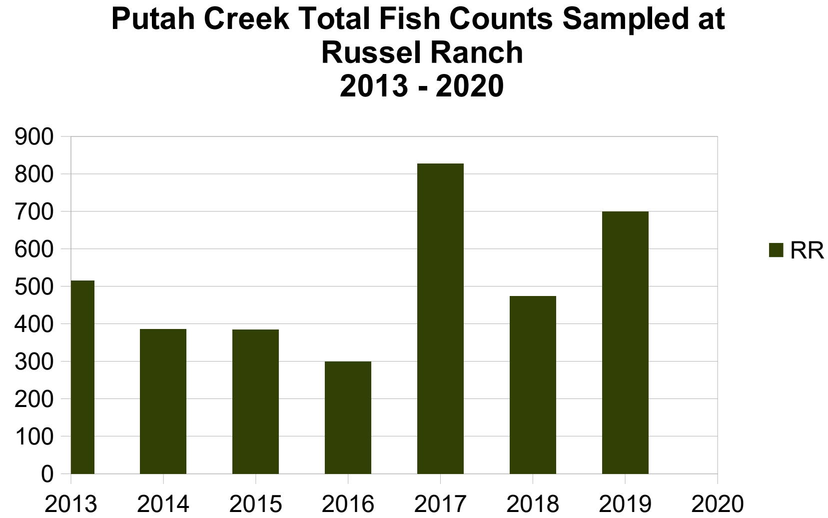
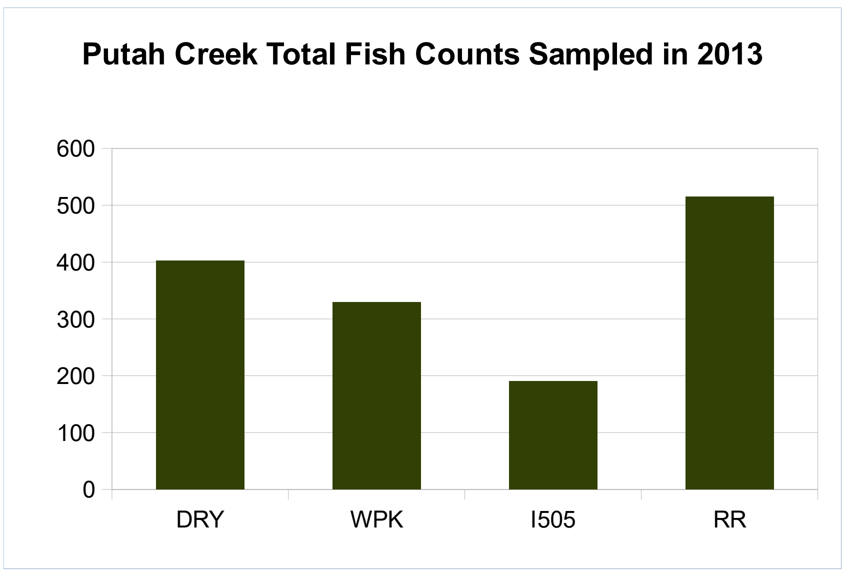


** Note: Fish Counts were not taken in the Russel Ranch reach of the creek in 2020.*

Additionally, fish populations at the Winters Putah Creek Park (WPK) were compared to those at sites immediately upstream (Dry Creek - DRY) and downstream (I505 – Interstate 5 and RR- Russel Ranch) for the years of 2013 – 2020 as shown in the following series of graphs.



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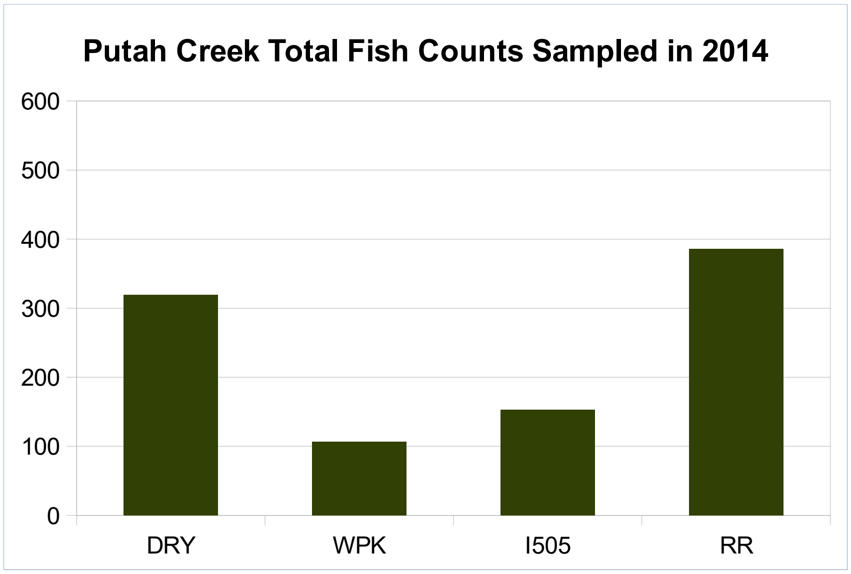
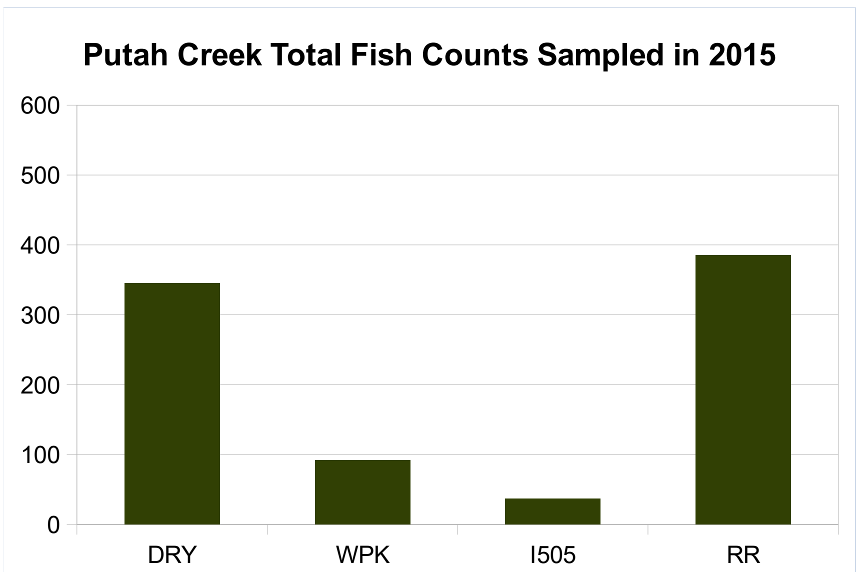
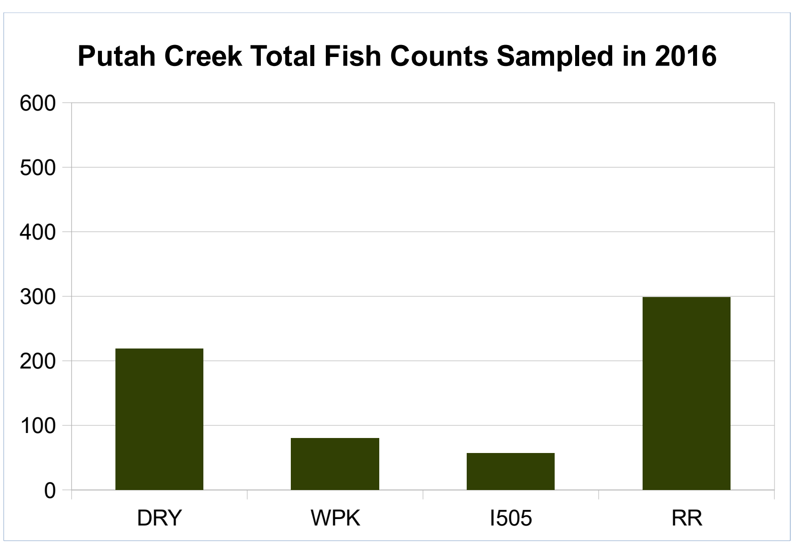
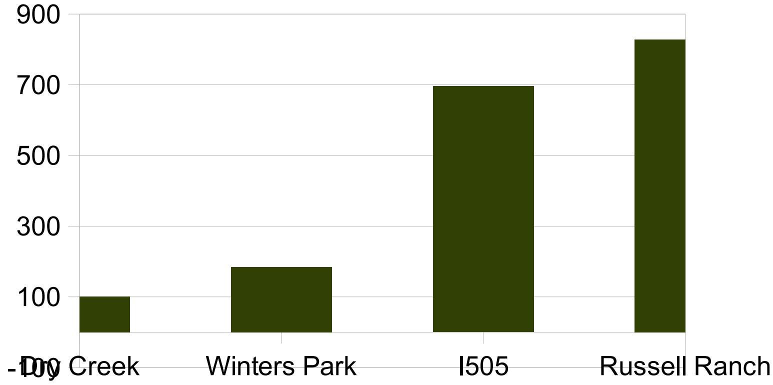

Putah Creek Total Fish Counts Sampled in 2014
600
500
400
300
200
100
0
DRY
WPK
I505
RR

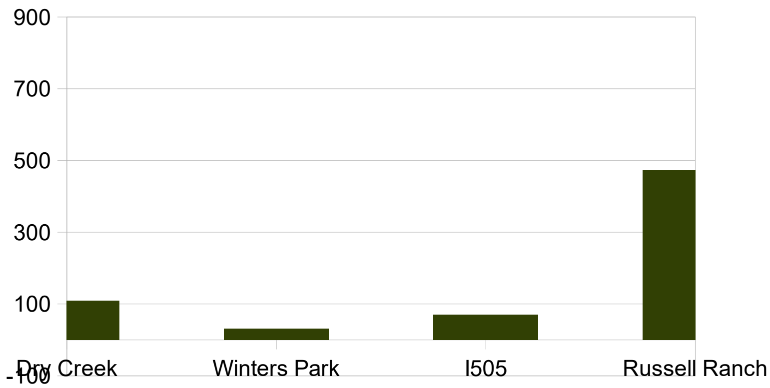

Putah Creek Total Fish Counts Sampled in 2015
600
500
400
300
200
100
0
DRY
WPK
I505
RR


Putah Creek Total Fish Counts Sampled in 2016
600
500
400
300
200
100
0
DRY
WPK
I505
RR

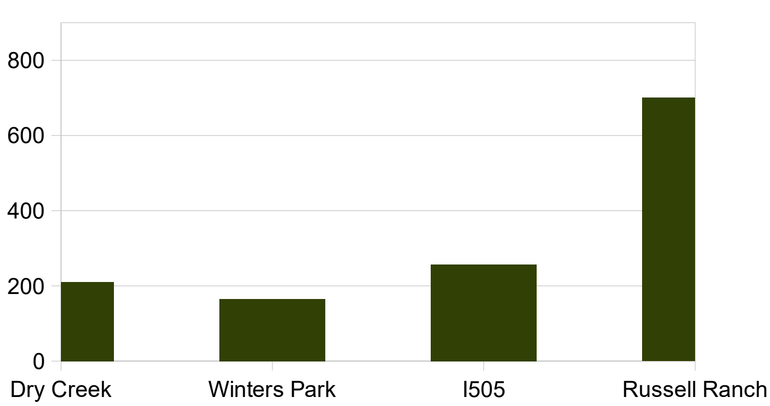
Putah Creek Total Fish Counts Sampled in 2017



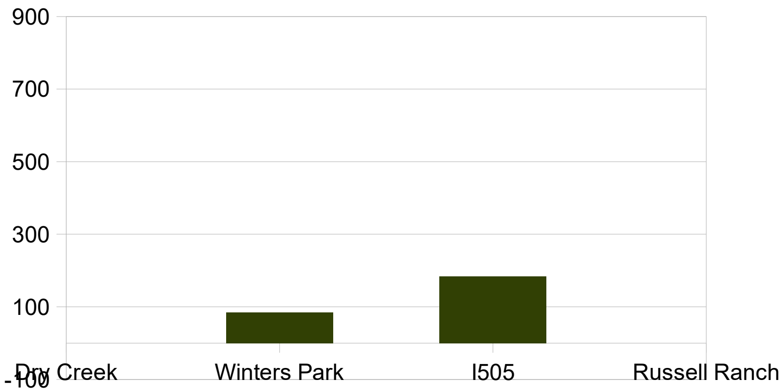
Putah Creek Total Fish Counts Sampled in 2018



Putah Creek Total Fish Counts Sampled in 2019



Putah Creek Total Fish Counts Sampled in 2020



Note: No fish population counts were taken in Dry Creek or Russel Ranch in 2020

These graphs conclusively demonstrate that in almost every year since construction of the Winters Putah Creek Park project, total fish populations in the Winters Putah Creek Park project and immediately downstream at I505 are, on average, severally depressed compared to fish counts made immediately upstream at Dry Creek and further downstream at Russel Ranch. This substantial evidence negates the claim that drastic geomorphological engineering can beneficially impacts fish populations by narrowing the channel as claimed by project proponents.

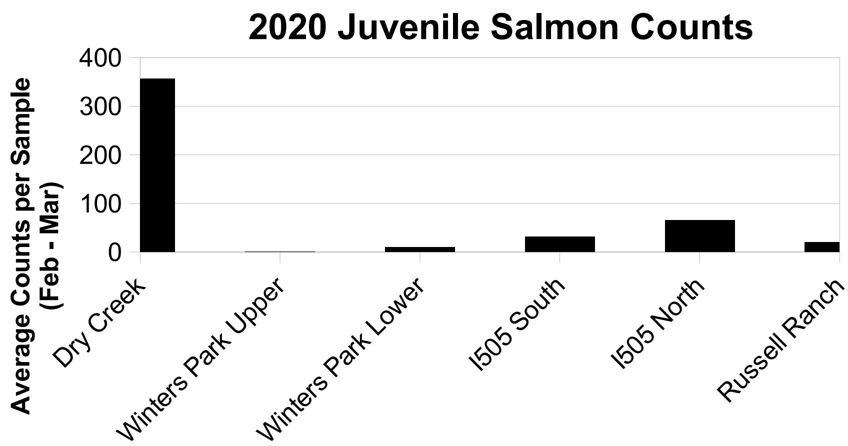
Project proponents otherwise claimed this decrease in fish populations was due to unusual drought conditions that existed for a number of years following the completion of the project.. However, the stream flow is strictly regulated under a court order and varies little from year to year. Because even in drought years, the flow of water through the creek is comparatively constant and these flows have been constantly maintained throughout both the drought and non-drought years, decrease in fish populations in Putah Creek cannot be attributed to reduced water due to drought.

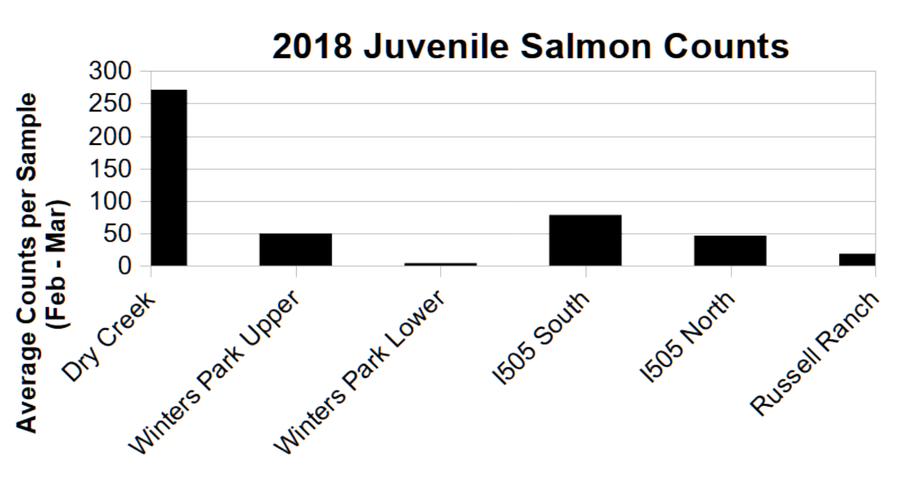
Further, trout populations were specifically projected to rise as a result of the geomorphological engineering work done in the Winters Putah Creek Park. Instead, that section of the Creek has not seen increasing trout populations over the recent years which have remained uniformly low and/or decreasing on average (See Appendix A).

In summary, based on the fish counts in the Putah obtained by SCWA there is substantial evidence that the geomorphological engineering used in this project did NOT beneficially improve fish populations in the Winters Putah Creek Park project area. Indeed, there is substantial evidence that the project design and implementation have decreased native fish populations in the Winters reach of Putah Creek which evidence was not properly disclosed or discussed or proper mitigation proposed in either the IS/MND or the underlying PEIR as otherwise required under CEQA guidelines.

b. <u>Substantial Evidence Exists and was not Disclosed that Juvenile Salmon Fry Populations are Depressed in Winters Putah Creek Park Following Project Completion Compared to Upstream and Downstream Reaches of the Creek</u>

Salmon fry were measured biannually in various sections of Putah Creek by an aquatic biologist (TRPA Fish Biologists) under contract to SCWA and such measurements were disclosed to SCWA and made available upon request. The Salmon fry counts taken during overlapping time periods (i.e. February through March - to allow for year-to-year comparisons) are graphically displayed below.





In as much as a primary objective of both the Winters Putah Creek Park project and the Nishikawa project were to improve fish habitat to increase survival of young salmon fry, this information constitutes substantial evidence that such objective was not met in Winters Putah Creek Park and may not be met in the proposed Nishikawa project. Such evidence should have been disclosed and discussed in the IS/MND and the underlying PEIR as required by CEQA guidelines.

Further, mitigations should have been proposed and discussed for the Nishikawa project should that project similarly result in reduced Salmon fry counts

c. <u>Substantial Evidence Exists and was not Disclosed that All Salmon Spawning Riffles Constructed in the Supposedly Stable, "Self-Maintained" Channel in Winters Putah Creek Park were Completely Silted over within Years of Construction and Rendered Useless as Future Salmon Spawning Habitat</u>

Shallow gravel and cobble-covered sections in Winters Putah Creek were constructed as salmon spawning riffles. Such riffles were designed to be "self-maintaining" as a primary stated objective to increase salmon spawning habitat as a part of the stream alteration process. Unfortunately, all of these riffles have since disappeared due to extensive sand and silt deposition.

As stated in the Memorandum authored by TRPA Fish Biologists to SCWA entitled, "*Results of October 2020 Lower Putah Creek Fish Surveys*" (June, 2021),

"*...the high flows associated with Lake Berryessa spills during the late winter and early spring of 2019 resulted in sand deposition throughout the Winters Park channel restoration area that filled in many of the pools and covered many of the gravel riffles and the upper weir site*."

In fact, the most recent inspection of the riffles showed that <u>*all*</u> of the riffles initially constructed as part of the project had been silted and rendered useless as salmon spawning habitat. This is a function of the design of the project wherein a shallow and narrow channel was constructed with gentle sloping banks. This design resulted in dispersal of flood energy out of the channel and spread it across the floodplain at low flows. Under such conditions, there is insufficient water velocity to carry sediment further downstream during flood events through the channel reach.

This information constitutes substantial evidence speaking to the inappropriate design of the Winters Putah Creek Park project which is functionally replicated in the proposed Nishikawa project. Further, this information regarding the failure of the project design parameters to provide sustained maintenance of riffles in the claimed "self-maintaining" stream channel was not properly disclosed and discussed in either the IS/MND or the underlying PEIR on which the IS/MND is tiered as otherwise required under CEQA guidelines.

d. <u>Substantial Evidence Exists which was Not Disclosed which Rated Channel Narrowing and Realignment in the Winters Putah Creek Park Project as a "Zero" on a Scale of 1-5 in Terms of Effectiveness in Establishing Stable Salmon Spawning Riffle Habitat</u>

In 2021, a report was prepared by Ken Davis under contract to SCWA entitled "<u>*Lower Putah Creek Gravel Bed Scarification, Final Report (Amended)*</u>, April 30, 2021 (Report 6873). Mr. Davis is a consulting aquatic ecologist with extensive experience studying Putah Creek fish and insect populations. This report contained a table entitled <u>Project Comparison</u> (see Appendix B) which ranked different strategies and methodologies used on Putah Creek to enhance salmon spawning habitat.

According to the report, the "*Matrix lists projects and actions (2003 - present) with emphasis on developing, enhancing or facilitating spawning salmon. Considers relevance, effectiveness, and cost. Projects ranked 1 - 5. Prudent to consider score when making management decisions.*". The highest ranked strategies (5) in terms of "*Impact on Salmon Spawning Success*" included "*Gravelbed Scarification*" and "*Beaver dam monitoring and notching*". The

Winters Putah Creek Park project phases 1-3 and a very similar creek realignment project downstream all were ranked as "Zero" indicating they had no substantive value in terms of "*Impact on Salmon Spawning Success*"

This information constitutes substantial evidence speaking to the inappropriate design of the Winters Putah Creek Park project which is functionally replicated in the proposed Nishikawa project. In as much as a stated primary objective of both the Winters Putah Creek Park project and the proposed Nishikawa project were to provide "self-maintaining" Salmon spawning habitat, this information regarding the failure of the project design parameters to provide sustained maintenance of riffles in the creek channel was not properly disclosed and discussed in either the IS/MND or the underlying PEIR on which it is tiered as otherwise required under CEQA guidelines.

Conclusions

The Current Proposed Nishikawa Project has many Similar Design Characteristics and Project Objectives as the Winters Putah Creek Park Project which Objectives were NOT Met in the Earlier Project.

The following project description for the proposed Nishikawa project is contained in Section 2.8 of the current IS/MND,

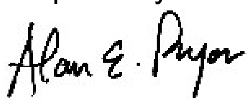
"*Description of Project:*
SCWA proposes to ***complete channel restoration involving re-contouring and realignmen t*** *along a 0.5-mile section of the low-flow channel of Putah Creek, upstream of the Pedrick Roa d Bridge near Davis, California in Yolo and Solano counties. The project is part of a series of re storation activities* ***intended to restore Putah Creek to a more natural condition that is self -maintaining and supports native plant and animal species****. The project involves restoring a section of active channel that is currently in an over-widened condition. This project aims to create a* ***narrow design channel in a more central, meandering form to create 0.5-mile of nearly continuous salmon spawning habitat across a gravel-rich floodplain****. The project design includes grading of 11 acres to floodplain elevation, and construction of 15 riffles and se veral rock vanes." (Emphasis added)*

It is clear from the above description for the current project and others proposed by SCWA in the PEIR that many of the objectives are nearly identical to those claimed for the Winters Putah Creek Park project. However, as shown and discussed above in these comments, many of the same objectives were not met in the Winters Putah Creek Park project.

Geomorphological engineering has not produced the beneficial objectives claimed for the Winters Putah Creek project when it was proposed. Indeed, the Winters Putah Creek Park project has resulted in a substantial failure to increase or even maintain native fish and Salmon fry populations due to loss of favorable habitat including removal of ponds with overhanging vegetation providing refugia for fish, particularly Salmon fry, and siltation of all of the supposedly "self-maintaining" Salmon spawning areas created in that project rendering them functionally useless for salmon spawning.

None of these past failures are disclosed in the IS/MND for Nishikawa nor the underlying PEIR on which it is tiered rendering these documents unsuitable for certification under CEQA guidelines.

Respectfully submitted,



Alan Pryor

Appendix A

Putah Creek Fish Counts

	DRY								WPK								I505								RR								
Native Fish	2013	2014	2015	2016	2017	2018	2019	2020	2013	2014	2015	2016	2017	2018	2019	2020	2013	2014	2015	2016	2017	2018	2019	2020	2013	2014	2015	2016	2017	2018	2019	2020	Total
Sacramento Pikeminnow	56	74	74	42	5	6	4		21	2	16	5	10	1	21	1	14	10	4	4	101	20	57	8	258	248	218	29	248	220	339		2116
Sacramento Sucker	196	105	134	65	36	44	103		92	10	17	8	71	5	84	8	83	36	11	3	385	14	86	15	52	25	42	97	340	97	186		2450
Rainbow Trout	19	24	28	12		4	8		8	9	11	2	9	7	1	10	4	5	8	5	1	4		12	1	2	1	1		2			198
Chinook Salmon																						4								1			5
Threespine Stickleback	1	3		1	1		13		49	2	1		1		2		19	3	1														97
Prickly Sculpin	14	15	10		34	49	48		49	31	7	9	71	19	35	59	19	2	3	3	101	26	50	137	136	32	16	2	13	3	8		1001
Riffle Sculpin	13	17	22	14	1		8		73	53	35	45	7		3	3				7	1		13	3		6	2						326
Tule Perch	103	80	75	85	20	7	24		37		5	11	16		12	4	51	91	7	30	106	2	49	9	56	67	104	152	220	139	157		1719
Pacific Lamprey		1													4																		5
																																	0
Exotic Fish																																	0
Red Shiner																																	0
Goldfish																																	0
Common Carp																																	0
Golden Shiner																																	0
Black Bullhead																																	0
White Catfish																																	0
Inland Silverside																										1							1
Western Mosquitofish															1							1											2
Bluegill															2															5			7
Redear Sunfish																																	0
Warmouth																																	0
Green Sunfish																		6	2		1				2				1				12
Unid'd Sunfish																																	0
Smallmouth Bass																										1	1				2		4
Spotted Bass																												3		1			4
Largemouth Bass			2		4		2												1	5			2		10	4	1	15	2	6	8		62
Striped Bass																													4				4
Bigscale Logperch																																	0
	DRY								WPK								I505								RR								Total
	2013	2014	2015	2016	2017	2018	2019	2020	2013	2014	2015	2016	2017	2018	2019	2020	2013	2014	2015	2016	2017	2018	2019	2020	2013	2014	2015	2016	2017	2018	2019	2020	
Total # Individuals	402	319	345	219	101	110	210		329	107	92	80	185	32	165	85	190	153	37	57	696	71	257	184	515	386	385	299	828	474	700		8013
# Native Fish	402	319	343	219	97	110	208		329	107	92	80	185	32	162	85	190	147	34	52	695	70	255	184	503	380	383	281	821	462	690		7917
# Exotic Fish	0	0	2	0	4	0	2		0	0	0	0	0	0	3	0	0	6	3	5	1	1	2	0	12	6	2	18	7	12	10		96

Appendix B

Comparative Salmon Spawning Effectiveness Table from *Lower Putah Creek Gravel Bed Scarification, Final Report (Amended)*, April 30, 2021 (Report 6873)

Lower Putah Creek - Project Comparison

Matrix lists projects and actions (2003 - present) with emphasis on developing, enhancing or facilitating spawning salmon. Considers relevance, effectiveness, and cost. Projects ranked 1 - 5. Prudent to consider score when making management decisions.

No.	Project	Deliverable(s)	Impact on Salmon Spawning Success	SCORE (0-5)
1.	Gravelbed Scarification	Open spawning gravel. Increase in salmon spawning success. Increase in BMI density and species.	Proven to be significant by providing numerous spawning areas.	5
2	Beaver dam monitoring and notching	Passable for salmon. Levee to levee dams can prevent salmon passage.	Major when dams are large. Possible to have 100% blockage.	5
3.	Downed / Submerged Alders & Other	Can impact water flow and enhance spawning areas. (Also habitat for juvenile salmon)	Significant impact for complex spawning areas	3
4	Gravel /Cobble size	Cobble size that matches need for quality salmon redds	Size can impact protection for eggs and juveniles	3
5.	Gravel Injection	More gravel for spawning fish (appropriate size) gravel mix	Potentially significant	3
6.	Los Rios Dam (board removal)	Salmon passage (timely)	Potential to affect salmon run reaching spawning area.	3
7.	Weirs	Wildlife habitat for aquatic and riparian species	Potentially significant	2
8.	Water Velocity Studies	Appropriate velocity aids in spawning, egg and juvenile survival, and BMI communities.	Significant when velocity is appropriate for width and depth	2
9.	Dry Creek Realignment	Increase in wildlife.	Has required Scarification adjustments	2
10.	Riparian Planting	Thriving riparian plants.	Possible positive impact by riparian plants shading the creek.	1
11.	Salmon Video Project	Video of salmon, spawning salmon, quality of redds. Other fish. Public Relations and educational materials.	Some impact in showing successful spawning, health of salmon and quality of the redds.	1

12.	Putah Creek ACCORD	Provided consistent water flows. Wildlife monitoring.	Small or negligible impact after 18+ years of flow regime.	0
13.	WPCP - Phase 1	Increase in Wildlife. Depth and cementation require scarification.	None (without scarification)	0
14.	WPCP - Phase 2	Increase in Wildlife. Depth and cementation require scarification.	None (without scarification)	0
15.	WPCP - Phase 3	Increase in Wildlife. Depth and cementation require scarification.	None (without scarification)	0
16.	Electrofish	Fish Data	None	0
17.	NAWCA 3	Wildlife Habitat and flood plain	None (without scarification)	0
18.	Otolith Study	Determination of origin of adult salmon.	None	0
19.	NAWCA 2	Flood Plain development	None (without scarification)	0
20.	Screw Trap	Data on down migrant juvenile salmon.	None	0
21.	Salmon Festival	Entertainment, education, PR.	None	0
22.	Juvenile Snorkel Project	Determine number of juvenile salmon relative to escapement	None	0
23.	Riparian soil studies	Improve success of riparian plantings.	None	0
END				

Comments Submitted for the IS/MND for the Nishikawa Project and the Underlying PEIR for Lower Putah Creek

by Friends of Putah Creek

I. Qualifications of the Commenter

Friends of Putah Creek (FOPC) is a California non-profit corporation founded in 2017 focused on the environmental and ecological health of Putah Creek. Previously active as a citizens' group known as Winters Friends of Putah Creek, our Board of Directors is comprised of scientists and environmentalists including riparian specialists with intimate knowledge of Putah Creek. Some have lived directly adjacent to the Creek for over 25 years and have first hand expertise on its vegetation, wild animal life, and hydrology. We and our members have been submitting extensive comments on various restoration projects performed by the Solano County Water Agency for well over a decade and have authored a number of papers on the failures of the Solano County Water Agency (SCWA) in prior restoration efforts on Putah Creek.

II. Disclosure and Assessment of Shortcomings of the IS/MND and PEIR

The IS/MND is deficient in terms of disclosure and assessment of potential adverse impacts on the environmental due to:

1) Incomplete Assessment of the Adverse Impacts on Biological Resources due to Failure of the Proposed Project to incorporate Best Management Practices Incorporated into Regional Conservation Plans.

2) Failure to Properly Analyze the Least Environmentally Damaging Alternative

Each of these deficiencies are also present in the *Program Environmental Impact Report for the Lower Putah Creek Restoration Project – Upper Reach Program (PEIR for the 22-mile stretch of Lower Putah Creek and are discussed more thoroughly below*

1) Incomplete Assessment of the Adverse Impacts on Biological Resources due to Failure of the Proposed Project to incorporate Best Management Practices Incorporated into Regional Conservation Plans - The IS/MND's of the proposal's effects on biological resources correctly describes the analytical framework for compliance such as with the federal Endangered Species Act and the California Natural Community Conservation Planning Act, including consistency with regional Habitat Conservation Plan/Natural Communities Conservation Plans (HCP/NCCP).

However, the IS/MND is silent on compliance or consistency with other environmental and conservation concerns and regulatory framework including the Yolo County Resource Conservation Investment Strategy/Local Conservation Plan (RCIS/LCP). RCIS/LCP is a conservation framework specifically intended to encompass the entire framework of conservation policies not covered by the HCP/NCCP. The Yolo County RCIS/LCP was approved by the Yolo County Board of Supervisors in August of 2020, and approved by the

California Department of Fish & Wildlife (CDFW) in October of 2020. The RCIS/LCP is part of a conservation framework that must also be considered by SCWA with respect to its approval processes, including CEQA reviews.

The RCIS is a framework for developing advanced mitigation planning approaches by interested parties (which may include state agencies, non-governmental organizations, or other private entities) that are consistent with the requirements of existing California law, as identified by AB 2087. The RCIS process is mandated to incorporate the substance of other California regulations and plans, including the adopted State Wildlife Action Plan (SWAP). The LCP is a conservation framework developed for the county and surrounding areas by the Yolo Habitat Conservancy, intended specifically (among other purposes) to encompass the policy framework not reflected in the HCP/NCCP.

Under the requirements of AB 2087, the RCIS/LCP is also fully consistent with, and does not adversely affect, the content or implementation of the HCP/NCCP. The RCIS/LCP, in conjunction with the HCP/NCCP, therefore represents a fusion of local, regional, and national conservation concerns in a single planning framework and essentially form a joint conservation planning framework for environmental resources that reflects all of the conservation priorities affecting different landscapes.

The Biological Resources section of the IS/MND and the PEIR on which the IS/MND is tiered does not includes an assessment of the proposed project(s) with respect to the RCIS/LCP framework including floodplain management and floodplain/riparian interactions, as well as effects on fish and other species and their habitats. Because such elements are indisputably applicable for the project(s), an assessment of the project's effect with respect to the RCIS/LCP framework should have been included in the IS/MND and the underlying PEIR, as the framework is directly relevant to the implementation of the project(s), as well as for state agencies that will participate in or review the project, including the Department of Water Resources (DWR) and the CDFW and the public. The failure to include such an assessment is a critical disclosure failure in both the IS/MND and the underlying PEIR on which the IS/MND is tiered.

For instance, in the introduction to Section 5.4 BIOLOGICAL RESOURCES (p.5-20) in the IS/MND, the following questions and responses were included.

> *“Would the project:*
>
> *b)Have a substantial adverse effect on any riparian habitat or other sensitive natural co mmunity identified in local or regional plans, policies, regulations or by the California De partment of Fish and Game or U.S. Fish and Wildlife Service? =>* ***No New Impacts***
>
> *d)Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Commu nity Conservation Plan, or other approved local, regional, or state habitat conservation p lan? =>* ***No New Impacts****”*

Both of the above statements are demonstrably false because the proposed project will certainly have material adverse impacts on the riparian habitat and conflict with best management practices for restoration of such similar riparian habitats as contained in the Yolo

Co RCIS/LCP and recognized expert authorities such as in *Low-Tech Process-Based Restoration of Riverscapes: Design Manual* (Utah State University Restoration Consortium, 2019). The potential adverse impacts would be similar to those found in the most recent SCWA "restoration" project utilizing very similar geomorphological engineering practices in the Winters Putah Creek Park project.

Previous work on the Winters Putah Creek Park project has produced less than acceptable results as quantitatively documented in a previous report entitled *Winters Putah Creek Park – Part 1 – Case Study of a Failed Project* by Friends of Putah Creek (FOPC). This report was submitted to the SCWA Staff and Board of Directors and the Lower Putah Creek Coordinating Committee in 2018; a copy of which is attached and made part of these comments.

The noted failures included 1) a reduction in native fish populations in the "restored" section of the creek compared to upstream and downstream reaches of the creek, 2) a failure to reestablish a riparian forest in the floodplain, and 3) failure to lower stream temperatures in the affected project and downstream of the project.

Additionally FOPC has since submitted quantitative flow data showing that the placement of the impervious compacted layer of indurated soil over the entire floodplain substantially reduced inflow into the underground aquifer from the creek thus disconnecting the creek from underlying groundwater.

The many causes of these documented failures were additionally analyzed in a second report prepared Friends of Putah Creek entitled *Winters Putah Creek Park – Part 2 – Analysis of Project Failures* which report was also submitted to he SCWA Staff and Board of Directors and the Lower Putah Creek Coordinating Committee in 2019; a copy of which is attached and made part of these comments by reference.

That report reviews the project practices and poor outcomes and provides context through the lenses of conservation strategies and best management practices recommended by the Yolo County RCIS/LCP and other proper riparian restoration principles such as recommended in *Low-Tech Process-Based Restoration of Riverscapes: Design Manual* (Utah State University Restoration Consortium, 2019).

a. Conflicts with Restoration Principles in the Yolo County Resource Conservation Investment Strategy/Local Conservation Plan (RCIS/LCP) - In particular, some of the restoration methods proposed by the Solano County Water Agency (SCWA) for Putah Creek in the PEIR and which are intended to be implemented in the Nishikawa project are compared to the best management practices in the RCIS/LCP as summarized in the following discussion

> i) To meet the goal of "...*maintaining the integrity of natural communities in restoration projects"*, the RCIS-LCP specifically advises against soil compaction.
>
> This recommendation was not discussed in either the PEIR or IS/MND which tiers off of the PEIR. These recommendations were ignored by SCWA in executing the Winters Putah Creek Park project wherein two to twelve feet of imported soil was deposited on the creek floodplain and then intentionally compacted to prevent washing away by future high water, high velocity flood events. SCWA similarly intends to compact the top-level

soil in the Nishikawa project to prevent removal in high water, high velocity events but does not mention any mitigation or other means to avoid the problems associated with such compaction in the PEIR or IS/MND.

iii) Under the goal of "...*improving dynamic hydrology and geomorphic processes in watercourses and floodplains in a way that avoids or minimizes impacts on terrestrial species habitat and increases structural diversity"*, the RCIS/LCP conservation strategy recommendations include:

- *Creating riparian management corridors that permit lateral channel migration;*
- *Creating secondary channels and overflow swales that add riverine and floodplain habitat values (e.g., resting or rearing areas for fish migrating downstream), allowing channels to meander naturally through the floodplain;*
- *Providing greater topographic and hydrologic diversity, recognizing that depressional features such as ponds and back channels that provide important refugia for species such as western pond turtle and that higher ground in floodplains that can serve as wildlife refugia from floodwaters.*

None of the recommendation in the RCIS/LCP are discussed in the PEIR or IS/MND. Instead, the new stream channel as engineered by SCWA is designed to be stable and self-maintaining. The floodplain as designed and constructed will be a functionally planar surface sloping at a uniform grade across the entire floodplain with little topographical diversity including ponds and high ground. Further, as discussed above, imported fill to be deposited on the top of the floodplain to form the new channel must be compacted so it does not all wash away during the first high velocity water event. This compaction will severally limit future lateral migration of the meandering form of the stream bed. SCWA has not proposed a proven mitigation measure to allow for such lateral mobility of the stream bed.

iii) Under the goal of "...*maintaining fluvial equilibrium and protecting lacustrine/riverine systems supporting American beavers"*, the conservation strategy recommendations include avoiding stream channelization, avoiding unnecessary vegetation removal, and targeting portions of streams that support American beavers for protection including protection of existing beaver dams.

None of the recommendation in the RCIS/LCP are discussed or analyzed in the PEIR or IS/MND. Instead, the proposed new channel will incorporate the same design considerations as in the Winters Putah Creek Park which provided for a highly channelized stream bed utilizing compacted soil. Just as in the failed Winters Putah Creek Park project, the majority of the vegetation in the existing Nishikawa floodplain will be removed by bulldozers, ponds that supported beaver colonies will be drained and filled, and high banks that can support beaver dens will be leveled. The once thriving beaver population in Winters was completely eliminated and the same processes are proposed for the Nishikawa project but are not adequately disclosed with proper mitigation proposed in either the PEIR or IS/MND.

iv) Under the goal of "...*maintaining and/or restoring and protecting stream processes and conditions"*, best conservation strategy recommendations in the RCIS/LCP include maintaining subsurface flow, connecting groundwater hydrologically to streamflow in each watershed, and expanding and protecting riparian vegetation.

Instead, at Winters Putah Creek Park earth-moving and deposition of compacted fill imported by SCWA disconnected the stream from groundwater. Efforts by SCWA to remediate the loss of subsurface flows by testing “French Drain” type channels were unsuccessful in reestablishing native growth in much of that reach of the Creek. Similar processes are proposed to be be employed at the Nishikawa project but the associated risks and past failures of implementing such restoration techniques are not disclosed and discussed nor mitigations proposed in either the PEIR or IS/MND.

v) Under the goal of “...*increasing the area of shaded riverine aquatic habitat for focal fish species and increasing the amount of large wood material in the stream”*, recommended conservation strategies include enhancing the biomass of overhanging or fallen branches and in-stream plant material to support the aquatic food web, restoring vegetation along stream-banks, increasing input of large woody material to streams, and installing large woody material directly into streams and along stream banks as a component of restoration or enhancement projects.

At Winters Putah Creek Park, all overhanging vegetation was removed when the floodplain was bulldozed and the stream channel was moved, and the majority of woody biomass was eliminated. The compacted earth fill created a dense, root-restricting soil strata that permanently retarded or prevented growth of woody riparian plants. Similar processes are proposed in the Nishikawa project and the adverse impacts of such processes are not adequately disclosed and discussed nor mitigations proposed and discussed in either the IS/MND or the underlying PEIR.

b. Conflicts with Restoration Principles in *Low-Tech Process-Based Restoration of Riverscapes: Design Manual* (Utah State University Restoration Consortium, 2019)

The *Low-Tech Process-Based Restoration of Riverscapes: Design Manual* is specifically intended to assist restoration professionals to achieve successful restoration of stream and riparian ecological health in ecosystems degraded by man-made structures and impacts. It provides the underlying design philosophy and tools enabling restoration scientists and practitioners to produce remarkable results in restoring salmon habitat, as referenced in a recent *Science* article (*Science*, June 8, 2018, Vol 360 - Issue 6393), by the use of low cost beaver dam analogs and other natural structures costing approximately $10,000 per mile of restored stream. This compares with the equivalent costs of almost $6,000,000 per mile spent on the Winters Putah Creek Park project which has yet to produce evidence that any salmon spawned in the creek are returning as a result of the project. It is apparent that there are substantial differences between the low tech and low-cost methods used by experienced professional restoration ecologists versus the unproven practices employed by SCWA on Putah Creek yet these differences are not disclosed or discussed in the IS/MND and underlying PEIR.

The Winters Putah Creek Park project engineering philosophy conflicts with the proven and cost-effective restoration strategies discussed in this design manual, which uses low-cost structures of natural materials and beavers themselves to add complexity and diversity to floodplains. This is inherently less expensive (by at least 2 orders of magnitude) than floodplain-damaging techniques that rely on massive earth moving machinery to create a constrained stream bed as was done at Winters Putah Creek Park and which techniques are planned to be employed in the Nishikawa project.

For instance, great effort was expended in the Winters Putah Creek Park project to obtain a "stable" and "self-maintaining" Creek form. Such a stable Creek form is also advocated for the Nishikawa project. But, as explained by the *Low-Tech Process-Based Restoration of Riverscapes: Design Manual*, these attempts are self-defeating. Quoting the manual, "*Stability is not a hallmark of healthy riverscapes. The desire to reduce uncertainty and precisely predict restoration outcomes has led to practices that tend to emphasize the stability of channels and in-stream structures. In the context of stream restoration, stability has often meant static. Constructed features and attributes such as plan-form, channel width, location of pools and riffles are designed in such a way that they do not change through time.* ***The emphasis on stability requires detailed engineering designs, modeling, and heavy equipment, all of which contribute to the high cost of restoration….However, population level response of target species [e.g., salmon and steelhead] to these restoration actions is equivocal****.*" (Emphasis added)

Certainly, the desired outcome of the work in Winters Putah Creek Park has been questionable. Despite a cost of over $7,000,000 to alter only 1 1/4 mile of Creek, there have been no quantifiable benefits to wildlife. After eight years some areas are still devoid of native vegetation despite extensive planting and replanting efforts and hundreds of replanted trees and shrubs have not survived. The loss of pools, undercut banks, and overhanging vegetation caused by the bulldozing of the original Creek channel and floodplain has compromised the kind of habitat that allows native fish populations to thrive.

Fish populations have consequently plummeted in the affected areas according to SCWA's own data and salmon fry are noticeably lower in the Winters Putah Creek Park because all refugia such as provided by pools with over-hanging vegetation were removed without suitable replacement of other habitat. There have also been noticeable drops in mammal, bird, and amphibian populations in this Winters Putah Creek Park project.

The target species that was supposed to benefit the most from the Winters Putah Creek Park project was fall-run salmon. Despite 2,000 tons of imported spawning gravel and carefully timed supplemental flow releases, after ten years following completion of the first two phases of the project there is still no evidence that salmon from eggs hatched in the creek have returned to spawn.

Indeed, a recent survey of all gravel-filed riffles installed during the construction of the Winters Putah Creek Park project showed that *all those riffles were filled with silt and unusable by salmon for spawning purposes*. As stated in the Memorandum authored by TRPA Fish Biologists to SCWA entitled, "*Results of October 2020 Lower Putah Creek Fish Surveys*" (June, 2021),

"*...the high flows associated with Lake Berryessa spills during the late winter and early spring of 2019 resulted in sand deposition throughout the Winters Park channel restoration area that filled in many of the pools and covered many of the gravel riffles and the upper weir site*."

In fact, the most recent inspection of the riffles by a representative of FOPC and reported to the LPCCC and SCWA Staff showed that _all_ of the riffles constructed as part of the Winters Putah Creek Park project had been silted and rendered useless as salmon spawning habitat. Additional gravel actually had to be brought in and placed in new areas of the Creek that were naturally developed as suitable for spawning purposes by fluvial geomorphology rather than in riffle areas created by the diesel-powered morphology utilized in the Winters Putah Creek Park project.

According to the above design manual, "*A central premise of process-based restoration is that restoration of natural systems (e.g., rivers streams, their floodplains and watersheds) is best achieved by 'letting the system do the work'. Process-based restoration recognizes that to restore ecologically functional riverscapes, we need to restore the physical and ecological processes responsible for creating and maintaining those conditions.*"

Friends of Putah Creek fully agrees with the basic premise of this gentle restoration approach in which the return of natural systems is facilitated by invasive plant removal and native plantings rather than by employing brute diesel force to reshape the ecosystem, as has been the hallmark of SCWA's methods. As Jared McKee, an environmental engineer with the US Fish and Wildlife Service and expert in riparian systems and habitat restoration appropriately asked:

"What if restoration was about stream power doing the work, not diesel power?"

Unfortunately, these considerations were not taken into account in the design of the Nishikawa project which instead will rely on wholesale reformation of the floodplain by massive earth-movers without adequate discussion of the potential adverse environmental impacts nor mitigations proposed in either the IS/MND nor the underlying PEIR. Nor is this reflected in the discussion of possible alternatives to the projects(s) in either the PEIR or draft IS/MND.

Further, one of SCWA's primary aquatic consultants for the past decade, Ken Davis, issued a report to SCWA in 2020 in which he rated the long-term effectiveness of different strategies in terms of providing suitable salmon-spawning habitat on Putah Creek. In that report he rated the usefulness of fixed stream bed channelization by SCWA, such as employed at the Winters Putah Creek Park project and planned to be employed at the Nishikawa project as a 0 (zero) on a scale of 1-5 in terms of relative effectiveness n creating salmon spawning habitat on Putah Creek while noting that such efforts only lasted a few years (as we reported to the LPCCC – see above). None of this information was reported or discussed in the IS/MND or in the PEIR when it was updated and recertified in November, 2022 as is otherwise required for disclosure under CEQA regulations.

Indeed, the advantages of using fluvial, stream-based geomorphology to create a dynamic adaptive stream channel structure and features compared to the fixed profile wrought by diesel-powered geomorphology actually had been recently recognized by the Lower Putah Creek Coordinating Committee as a future planned restoration philosophy and design consideration when they stated the following in the December 2022 minutes of the LPCCC, *"The concept of Process Based Restoration (PBR) was also discussed. PBR projects used less diesel and allow the power of water itself to do the work of changing channel geometries* *in a more natural approach that also turn out to be less expensive.*". None of this information was reported or discussed in the draft IS/MND or in the underlying PEIR as a project design alternative as is otherwise required for disclosure under CEQA regulations.

Finally, we note that the current Nishikawa Project Manager himself has questioned the effectiveness of the restoration strategies employed in the past in the Winters Putah Creek Park when he stated in a cover memo announcing the release of the IS/MND on March 8, 2023, "*Previously, specifically in The Winter's Putah Creek Park project, a big concern that Friends of Putah Creek have in regards for the environmental impact concerning these restoration projects was in the over-compaction of floodplain fill material. While this CEQA document doesn't cover specific details of construction, we are taking precautions not to create an impervious ground layer that impairs planting regrowth with plans to implement periodic trenches filled with a drainage friendly mulch/gravel mix and possible ground ripping/soil mixing where clay is present at the designed floodplain level. Additionally, the majority of earth-moving activities will be cutting material from high floodplains and minimal fill volume deposition with that fill material being primarily a sandy gravel mix taken from deposits on the floodplain as opposed to a more fine/clayey soil sourced externally. I hope this alleviates some concerns with the project, as we hope to continue improving riparian habitat on Putah Creek* ***while learning from mistakes made in the past***". (Emphasis added)

While we are certainly hopeful that past mistakes will not be repeated in future projects and the apparent mindfulness of such past mistakes on the part of the new Staff at SCWA is encouraging, none of this information regarding the past deficiencies and "mistakes" in the Winters Putah Creek Park project was reported or discussed in the PEIR when it was updated and recertified in November, 2022 nor is it disclosed in the current IS/MND for the Nishikawa project as is otherwise required for full and proper disclosure as a mitigation or project alternative under CEQA regulations.

2. <u>Failure to Properly Analyze the Least Environmentally Damaging Alternative</u>

The Draft IS/MND correctly states that the project will require review by the US Army Corps of Engineers (ACE) pursuant to section 404 of the Clean Water Act (CWA), which by law invokes a review by the California Water Boards under CWA section 401. The ACE requires that a proposed project be the least environmentally damaging alternative [CWA section 404(B)(1)] under a rebuttable presumption that a less-damaging alternative exists; it's the applicant's responsibility to rebut the presumption with a suitable analysis. The 'wetland procedures' adopted as policy by the State Water Resources Control Board (SWRCB) in 2020 have established a similar requirement for CWA section 401 reviews pursuant to the state's Porter-Cologne Act.

While these are separate permit approval processes from the CEQA review, subject to their own environmental documentation requirements, the identification and consideration of alternatives that avoid or minimize environmental effects is a subject for which local (such as SCWA) and state agency proponents (such as the DWR) are responsible pursuant to CEQA (e.g., PRC §21002; CCR §15002; many others). This is a basic substantive requirement of CEQA, and applies without respect to the use of a Negative Declaration or an Environmental Impact Report (EIR) to meet CEQA's procedural requirements.

Given the fact that the possible adverse environmental outcomes of the diesel geomorphology methodology employed by SCWA in the Nishikawa project are a viable concern based on the lack of prior success of SCWA in performing such radical stream alterations in the Winters Putah Creek Project, we believe it is imperative that a range of alternatives be considered to the radical stream realignment proposed for the Nishikawa project We also note that there is no substantial evidence that such a stream alteration methodology is successful without adverse environmental consequences and we have otherwise presented substantial evidence that the current approach selected by SCWA is likely to have substantial adverse environmental impacts as discussed earlier in this comment letter.

Unfortunately, there has not been an adequate analysis of alternative designs other than the proposed “fixed” meandering stream form using diesel-powered geomorphology which does not account for the dynamics and natural consequences of fluvial geomorphology. Alternative project approaches that address the hydraulic issues at the site might be a more cost-effective and less environmentally damaging long-term solution. That kind of consideration is, in fact, the specific reason that the Legislature directed lead agencies to consider alternatives in the CEQA process, and the reason that the CWA and the Porter-Cologne Act require alternatives assessments.

Specifically, it's not clear why SCWA is not considering an alternative design (or more than one) that could include, for example, using fluvial geomorphology to obtain a dynamic stream bed channel instead of the fixed bed channel design formed by diesel-powered geomorphology. The current proposal already includes all of the area that would be affected by such an alternative in the project footprint and the difference between the proposed project and such an alternative is primarily in the project design and the construction and mitigation installation processes. Such alternative design and construction considerations should have clearly been addressed in both the PEIR and the IS/MND as is required by CEQA guidelines.

Finally we note a rather large discrepancy between the fixed and immutable design stream bed channel width of 28-30 ft employed in the entirety of the Winters Putah Creek Park project and which was claimed to be derived from an analysis of the flow characteristics of the Creek. It was claimed this width was required to maintain its structure and function during future normal and high flow events in the Creek. However, the current maximum stream channel width in the Nishikawa project is only 18 ft wide along the entirety of the length of the project.

This channel width discrepancy and design ambiguity is not explained anywhere in the IS/MND and seemingly conflicts with the supposedly fixed and immutable design principles espoused in the earlier Winters Putah Creek Park project and the PEIR. In as much as the supposedly stable “proper form and function” of the stream bed channel is an integral part of the Nishikawa project, these discrepancies should have been disclosed and discussed In the IS/MND. and should have been discussed and analyzed in the IS/MND.

Conclusions

The IS/MND and the PEIR critically suffer from 1) significant and critical lapses in terms of the disclosure and discussion of potential inadequacies of the proposed stream channel design and construction and its compliance with regional conservation land use plans and 2) in terms of analysis of possible project alternatives. As such, the documents are deficient with respect to required public disclosure and analysis under CEQA guidelines and should be remedied before certification and filing of a Notice of Determination.

Winters Putah Creek Park - Part 1 - Case Study of a Failed Project

Description of the Project

The Winters Putah Creek Park project is a perfect example of good restoration intentions going awry and resulting in serious degradation of creek habitat by massive alteration of the natural form of the stream bed. This is being called “geomorphological engineering”.

The project was designed by the Solano County Water Agency (SCWA) to alter the streambed and riparian floodplain in three phases along the entire 1.2 miles of Putah Creek flowing through the City of Winters. The first phase was begun on the upper 1/3 end of the creek in 2011 by nearly clearcutting a mature riparian forest of native and non-native trees alike, from stream bank to stream bank, and importing over 70,000 cubic yards of alien, clayey fill. The soil was graded flat and smooth with a slight 2 percent slope toward stream. The floodplain and channel were heavily compacted and stream was left with only a narrow channel through the center of the former streambed. The final depth of the compacted fill varied from about 2 to over 12 ft.

Stream and floodplain features such as wetlands, ponds, swales, back-channels, undercut banks, and deep pools that create ecological diversity and complexity were completely eliminated in this process. The newly-formed barren floodplain was soon replanted with thousands of native plants. The intention was to quickly provide a fully functional riparian habitat complete with undercut banks and creek-side shading suitable for the entire food chain to thrive.

Phase 2 of the project on the lower 1/3 end of the creek was constructed using functionally the same process with grading also completed in 2011. Replanting also commenced almost immediately.

Phase 3 (the middle 1/3) of the project was prematurely started in 2014 but was stopped when it was discovered that SCWA had not applied for the appropriate permits from the Army Corp of Engineers and Central Valley Flood Control Board for any of the phases of the project.

The stated objectives of the project were to enhance the overall habitat of the section of Putah Creek running through Winters by:

1) Removing invasive species (such as Arundo, Himalayan blackberry, and Eucalyptus) and replace with native species to provide a natural riparian forest and shading alongside Putah Creek. This would benefit all creek-dependent animal life forms including insects, birds, fish and mammals.

2) Lowering water temperatures in Winters and downstream to entice more trout migration into these lower sections of the creek.

3) Improving overall fish habitat to increase fish populations.

It was also proposed that stream temperatures would be lowered by simply increasing stream velocity through the newly narrowed Creek channel along with more shading provided by the anticipated replanted native riparian forest.

Proven Objective Project Failures

Unfortunately, the Winters Putah Creek project has failed to deliver on any of these main objectives. It has also produced some serious unintended adverse side effects.

1. Failure to Reestablish a Riparian Floodplain Habitat

Literally thousandss of seedlings and saplings have been replanted in Phases 1 and 2 of the project in the years following completion of these phases. Almost all the replants have since died for lack of water because water cannot move from the stream to the trees through the dense compacted fill. In some parts of the project, dense compact impermeable fill extends more than 12 ft deep and blocks water from reaching the trees. The impermeable fill has completely disconnected the new creek channel from the original porous, gravelly, permeable floodplain .

This has also caused serious stress and even death of the few remaining trees on the periphery of the bulldozed floodplain. You see this in most every cottonwood on the south bank below the railroad bridge. New plant growth is now dominated by a patchwork of invasive grasses and herbaceous plants including, bermuda grass, Italian rye-grass, Johnson grass, cockle-bur, and star thistle.

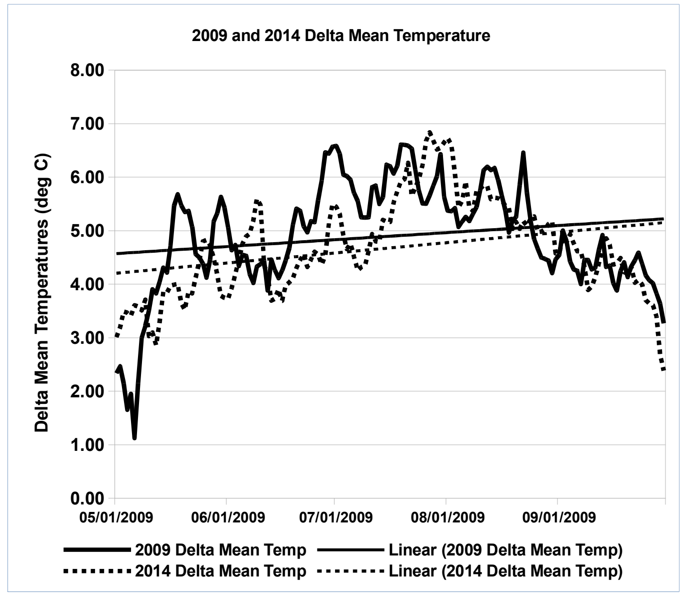
Although requested, a precise analysis of the number of removed, replanted, and current status of native species on the floodplain has either not been provided by SCWA.

2. Failure to Reduce Creek Temperatures

Reducing creek temperatures to improve trout habitat was to be a major benefit of rechannelization based on geomorphological engineering principles. Unfortunately, the Solano County Water Agency has failed to provide any evidence that such a beneficial effect has occurred as a result of the Winters Putah Creek Parkway project

One problem in determining the success or failure in meeting this objective is that there were few temperature sensors maintained by the SCWA in locations in the Creek before the project. This limited “before and after” comparisons. According to SCWA, only one pair of sensor sites located at Winters Bridge (directly upstream of the project) and downstream the Stevenson Bridge provided sufficiently reliable temperature measurement data from May 1 through September 30 in both 2009 and 2014. This represents data from both a year before and a year after completion of Phases 1 and 2 of the project. The following graph shows the daily mean temperature differentials between these two sites for both 2009 and 2014.

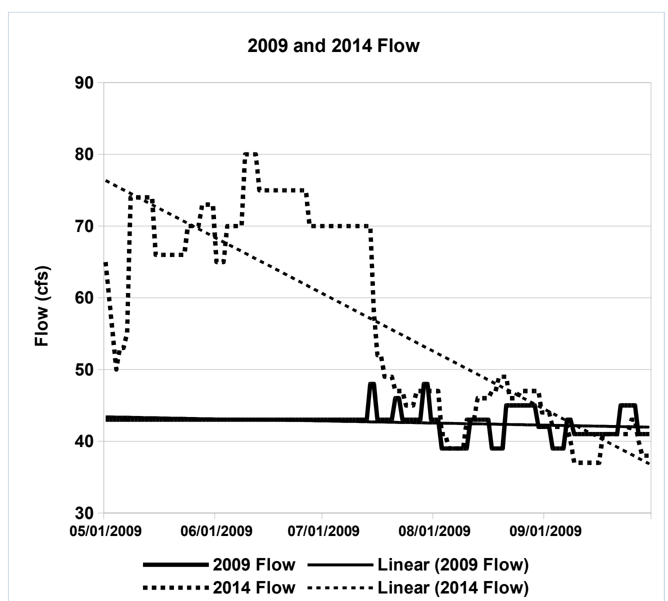
As shown, the mean daily temperature differential between Winters Bridge and Stevenson Bridge site was approximately 0.25 – 0.5 deg C lower from April 1 to July 15 in 2014 (post-project) compared to 2009 (pre-project); albeit with large daily fluctuations. Beginning in August the mean temperature differential was not statistically different between 2009 and 2014.



SCWA engineers have stated that these decreased temperature differential spreads between these two sites, at least in May - early July of 2014 compared to 2009, is “compelling” evidence supporting their thesis that the Winters Putah Creek Park rechannelization project is producing cooler downstream temperatures.

We strongly disagree with their conclusions.

We subsequently obtained and also graphed the daily stream flow data over the exact same 2009 and 2014 time periods as the temperature data (shown in the following graph).



As is apparent in this 2nd graph, the modest difference in temperature differentials between 2009 and 2014 for the May to July period (in the first graph) are directly correlated to and likely entirely attributable to the average *75% greater instream flow* released from the diversion dam in 2014 compared to 2009. By comparison, in August of both years when instream flows were near equal, there was virtually no difference in mean temperature differentials between the pre- and post-project years.

The SCWA's claim that this data indicates that the rechannelization project does, in fact, reduce downstream temperatures is without merit and simply failed to account for the dramatically increased instream flow in 2014. There is no other data suggesting that rechannelization has resulted in cooler downstream Creek temperatures. Proponents of the rechannelization project simply claim that just moving the water downstream faster will result in cooler water temperatures and this can be accomplished by channelizing the stream and removing large deep preexisting ponds. However, additional factors affecting Creek temperature have not been quantitatively considered by the SCWA.

The temperature regime of a stream like Putah Creek is the product of a complex set of variables including not just the linear velocity or speed at which water is moving downstream relative to the amount of solar radiation striking the creek.

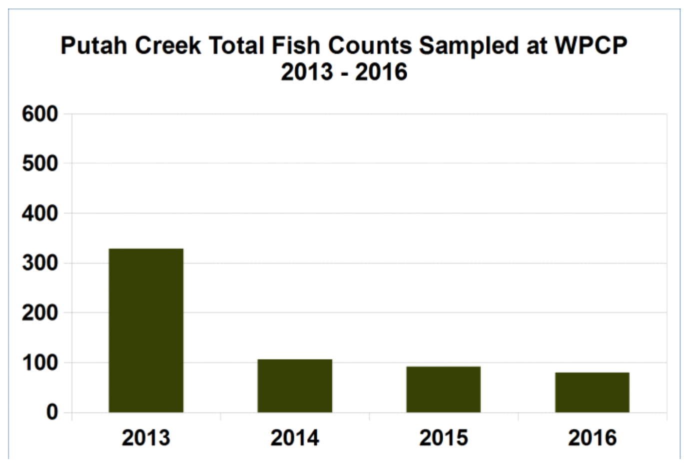
One factor is evaporative cooling from the water surface during the day. Larger surface area of pools provide greater evaporative cooling than narrow channels. This would be even more likely if those cooling pools in question were heavily shaded to protect the water surface from solar radiation heat gain as existed pre-project.

Pools with large surface area would also provide more convective cooling and black body radiation cooling at night. Additionally, deeper pools will provide substantial buffering capabilities due to the reservoir of cooler water deeper in the pools where heat gain is minimized because the Creek water contacts with cooler groundwater sources and earth.

3. Failure to Increase Fish Populations

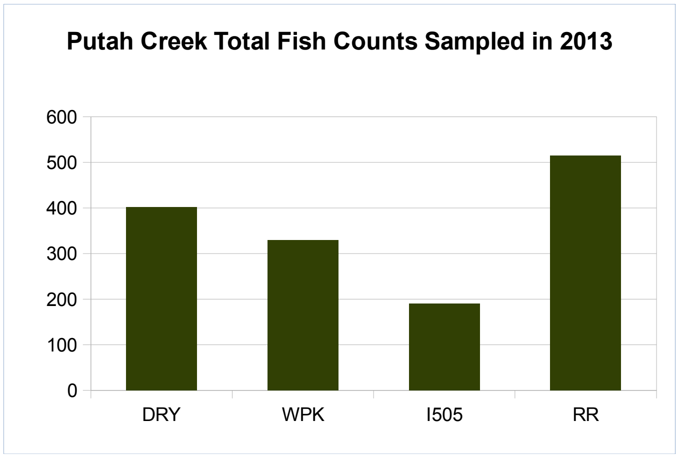
One of the cornerstone objectives of the Winters Putah Creek Park project has been to improve the Creek as fish habitat. However, this hypothesis has never been quantitatively tested with the results publicly disclosed even though the data has been available to the SCWA to do so for many years.

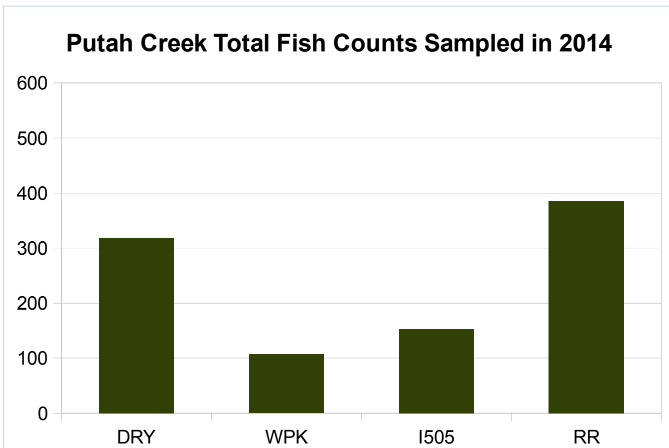
Although the SCWA has been collecting annual fish counts for the past several decades, they only recently publicly released fish count data for the years 2013 through 2016. Excerpts of this data are partially presented in the following graph.

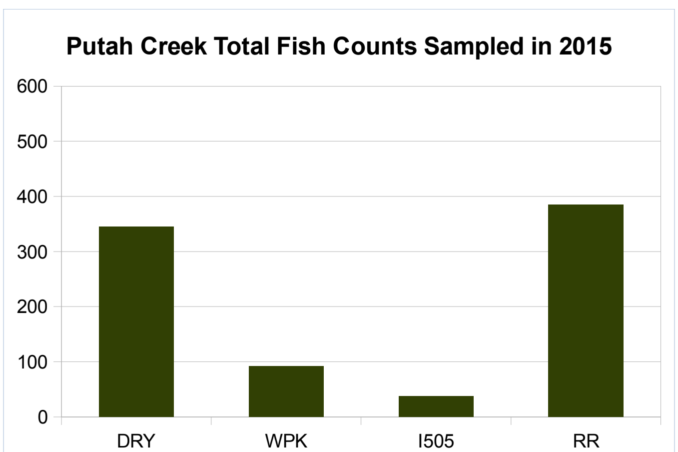


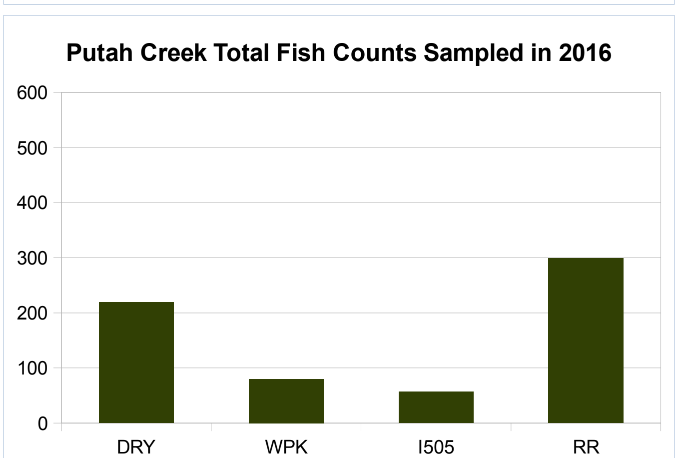
This shows an unmistakable 67% decrease in total fish populations in the Winters Putah Creek Park project area over time since the project was completed.

Additionally, the fish populations at the Winters Putah Creek Park (WPK) were compared to those at sites immediately upstream (Dry Creek - DRY) and downstream (I505 & RR- Russel Ranch) for the post project years of 2013 – 2016 as shown in the following series of graphs.









These graphs conclusively shows that the total fish populations in the Winters Putah Creek Park project and immediately downstream at I505 are severally depressed compared to fish counts made immediately upstream and further downstream. It further casts doubt on the entire premise that drastic geomorphological engineering can beneficially impacts fish populations by narrowing the channel as claimed by project proponents.

Project proponents otherwise claim this decrease in fish populations was due to unusual drought conditions that existed for a number of years following the completion of the project. . However, because the stream is protected by regulated flows as a result of the Accord and these flows have been minimally maintained throughout the drought years, this statement is factually incorrect.

Further, trout populations were specifically projected to rise as a result of the geomorphological engineering work done in the Winters Putah Creek Park. Instead, that section of the Creek has not seen increasing trout populations over the recent years which have remained uniformly low and decreasing on average.

In summary, the claim that the geomorphological engineering used in this project beneficially improved fish habitat in the Winters Putah Creek Park project area is not substantiated by the available evidence which is the actual fish counts themselves

4. Significant Reduction in Annual Groundwater Recharge due to the Impermeable Compacted Soils

This project also has an unseen but very serious side-effect which has not been recognized nor evaluated by the SCWA. It is decreasing groundwater recharge.

In historical times (i.e. before Monticelllo Dam was constructed and water flow was only regulated by rainfall), Putah Creek would frequently run dry in the hottest summer months as the low flow of water sank into the porous streambed as it passed through

Winters. The Creek reemerged miles downstream when impermeable layers of soil forced the Creek back up to the surface.

Thus, due to the high porosity of the sandy, gravelly original bed of Putah Creek through Winters. Putah Creek water was a very significant source of groundwater recharge. This is the groundwater relied upon by the City of Winters for municipal needs and by surrounding farmers for irrigation needs.

As a result of the importation of unsuitable fill and compaction by heavy equipment, the stream bed and banks are now sufficiently nearly impermeable to the extent that it probably meets specifications for a landfill lining or a canal lining.

The potential maximum reduction in groundwater recharge water is easily calculated based on Solano County Water Agency's own data. SCWA has continuous data on flows upstream at the diversion dam and downstream at I-505. The lower flow at I-505 represents the water loss to groundwater and evapotranspiration.

According to SCWA data and as shown in Appendix A, there was an average loss of 15.5 cubic feet per second (cfs) of flow in the 4.2 mile reach from the Diversion Dam to I-505 during the months of August and September in the pre-project years of 2008 – 2010.

The months of August and September were chosen for investigation because they would presumably be unaffected by irrigation diversions from the Creek (which are not allowed after July 15) nor influenced by rain and/or surface runoff. During the post project years of 2013 – 2017, the average difference in flow during August and September decreased to 9.8 cfs. This represents a reduction in the difference of average flows from the pre-project period to the post-projects period of 5.6 cfs.

The volume of water potentially lost for aquifer recharge on an annual basis can thus be calculated in different units as follows:

5.6 cfs x 86,400 sec/day x 365 days = 176,600,000 cf/yr.

176,6000,000 cf/yr x 7.48 gal/cf = 1.32 billion gallons/yr.

176,000,000 cf / 43,560 cf/ac-ft = 4,054 ac-ft/yr.

These lower differences in flow between the pre-project and post-project years represents water that is not percolating into the ground as a result of the impermeable floodplain laid down by the project.

1.32 billion gallons of water not recharging the local aquifer is equal to about 2.7 times the annual water usage of Winters (497 million gallons/year). In other units of volume, 4,054 acre-ft of water is enough to irrigate about 1,350 acres at 3 ac-ft per year.

Winters municipal water supply is entirely groundwater sourced as is irrigation water for many nearby ranches. This loss of groundwater will have a severe affect on the municipal water supply of the City of Winters and the availability of groundwater to local farmers that will only become more evident over time

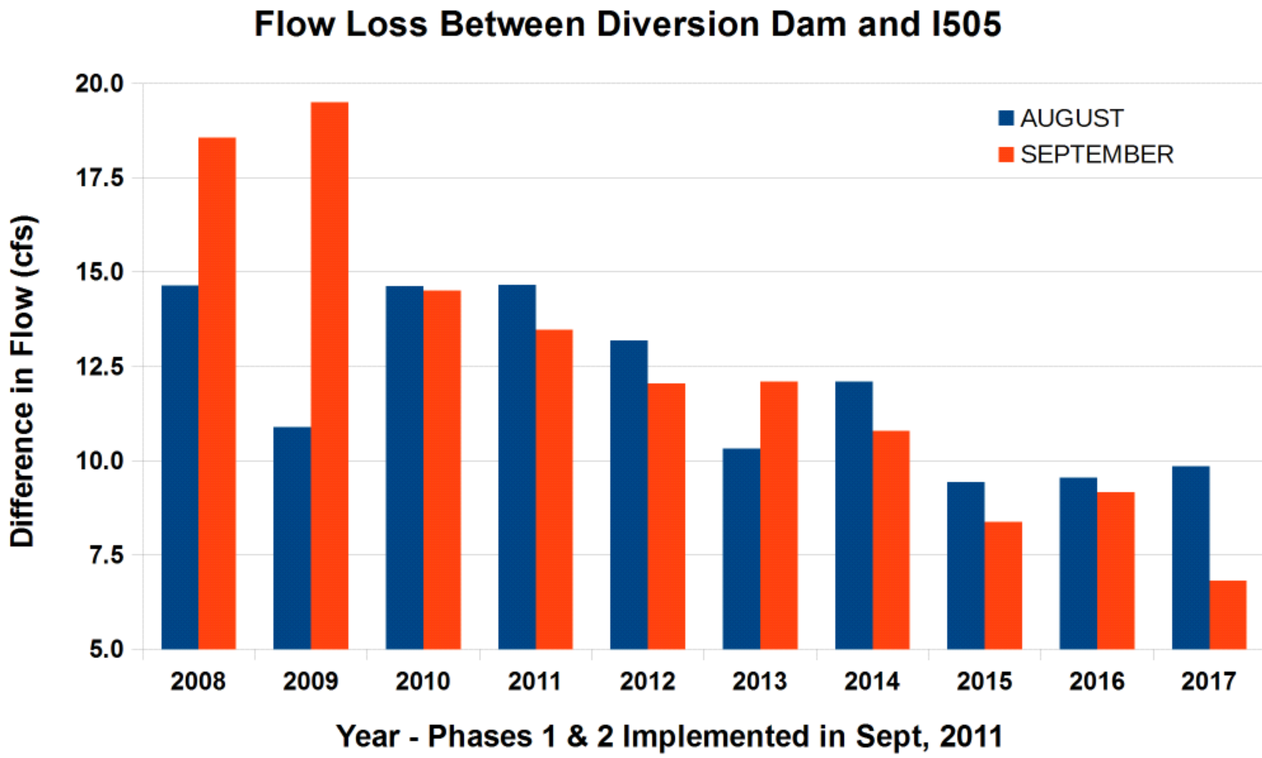
In Conclusion

Geomorphological engineering is not the solution it was claimed to be when used for restoration on creeks similar to Putah Creek. The Winters Putah Creek Park project has resulted in a almost complete failure to establish the riparian forest cut down to allow for creek channel alteration. Fish populations have plummeted in the Creek as it passes through the restored portion of the Park due to loss of favorable habitat. And the project has resulted in severe loss of groundwater recharge.

Heavy, massive earth-movers, bulldozers, and dump trucks are crude instruments to use to restore or create a complex, fine-grained, diverse stream or floodplain environment. What is needed is a lighter touch, more appreciation of the creek's complex floodplain, its wildlife, and the natural processes at work.

Written by Friends of Putah Creek for public distribution. June, 2018.

Appendix A


Flow Loss Between Diversion Dam and I505
20.0
17.5
15.0
12.5
10.0
7.5
5.0
Difference in Flow (cfs)
AUGUST
SEPTEMBER
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Year - Phases 1 & 2 Implemented in Sept, 2011

Winters Putah Creek Park – Part 2 – Analysis of Project Failures

by Friends of Putah Creek - August, 2019

EXECUTIVE SUMMARY

This document examines shortcomings in planning, engineering, and monitoring methods used by the Solano County Water Agency (SCWA) to alter a one mile+ reach of Putah Creek in the Winters Putah Creek Park project and which are proposed for application to additional reaches of the Creek as it flows over 22 miles to the Yolo Bypass.

Previous work on the Winters Putah Creek Park project has produced less than acceptable results as quantitatively documented in a previous report entitled *Winters Putah Creek Park – Part 1 – Case Study of a Failed Project* by Friends of Putah Creek. Friends of Putah Creek (FOPC) is a non-profit advocacy group devoted to protecting Putah Creek's natural heritage and ecological functions.

This report reviews project practices and outcomes and provides context through the lenses of conservation strategies and best management practices recommended by the following authoritative guides to proper restoration:

1) The recently adopted ***Yolo Resource Conservation Investment Strategy - Local Conservation Plan***,

2) The ***California Riparian Restoration Handbook*** (2nd ed, 2009) by Restoration Ecologist F. Thomas Griggs, Ph.D., and

3)The ***Low-Tech Process-Based Restoration of Riverscapes: Design Manual*** by Utah State University Restoration Consortium.

Putah Creek restoration methods that have been implemented by the Solano County Water Agency (SCWA) are compared to these best management practices as summarized below.

1. Winters Putah Creek Park Violates Many Conservation Strategies and Best Management Practices in the *Yolo Resource Conservation Investment Strategy - Local Conservation Plan* (RCIS-LCP)

The *Yolo Resource Conservation Investment Strategy - Local Conservation Plan (RCIS-LCP)* is a landmark document prepared under the guidance of the Yolo Habitat Conservancy which specifies Conservation Strategies for enhancing the habitat of lands and waterways within Yolo County. These mandated strategies should be viewed as Best Management Practices to be applied to all projects. The Winters Putah Creek Park project violated numerous principles of the RCIS-LCP as identified in sections (a) through (f) below.

a) To meet the goal of maintaining the integrity of natural communities in restoration projects, the RCIS-LCP recommends using only native soils and specifically advises against the use of imported fill and soil compaction.

These recommendations were ignored by SCWA in executing the Winters Putah Creek Park project wherein two to twelve feet of imported heavy, clayey soil was deposited on the creek floodplain and then intentionally compacted.

b) Under the goal of *improving dynamic hydrologic and geomorphic processes in watercourses and floodplains in a way that avoids or minimizes impacts on terrestrial species habitat and increases structural diversity*, the conservation strategy recommendations include:

- Creating riparian management corridors that permit lateral channel migration;
- Creating secondary channels and overflow swales that add riverine and floodplain habitat values (e.g., resting or rearing areas for fish migrating downstream), allowing channels to meander naturally through the floodplain;
- Providing greater topographic and hydrologic diversity, recognizing that depressional features such as ponds and back channels that provide important refugia for species such as western pond turtle and that higher ground in floodplains that can serve as wildlife refugia from floodwaters.

Instead, the new stream channel as engineered by SCWA is designed to be "*stable and self-sustaining*". The floodplain as designed and constructed is a planar surface sloping at a uniform 2% uniform grade across the entire floodplain, eliminating almost all topographical diversity including ponds and high ground. Further, imported and compacted fill is so indurated that potential lateral migration and future meandering is extremely restricted.

c) Under the goal of *maintaining fluvial equilibrium and protecting lacustrine/riverine systems supporting American beavers*, the conservation strategy recommendations include avoiding stream channelization, avoiding unnecessary vegetation removal, and targeting portions of streams that support American beavers for protection including protection of existing beaver dams.

Instead, the relocated stream was highly channelized, utilizing compaction, log revetments, and boulders. Over 90% of the vegetation in the floodplain was removed by bulldozers, ponds that supported beaver colonies were drained and filled, and high banks with occupied beaver dens were leveled. The once thriving beaver population is reduced to one or two animals that occupy a single very small section of creek that, in an eleventh-hour move, was fortunately preserved as a backwater.

d) Under the goal of *maintaining and/or restoring and protecting stream processes and conditions*, conservation strategy recommendations include maintaining subsurface flow, connecting groundwater hydrologically to streamflow in each watershed, and expanding and protecting riparian vegetation.

Instead, earth-moving and deposition of compacted fill imported by SCWA has disconnected the stream from groundwater. Efforts by SCWA to remediate the loss of subsurface flows by testing "French Drain" type channels have been largely unsuccessful. Most riparian vegetation was removed from the flood plain during rechannelization, deposition of fill, and other heavy equipment earth-moving activity.

e) Under the goal of *increasing the area of shaded riverine aquatic habitat for focal fish species and increasing the amount of large wood material in the stream*, recommended conservation strategies include enhancing the biomass of overhanging or fallen branches and in-stream plant material to support the aquatic food web, restoring vegetation along stream-banks, increasing input of large woody material to streams, and installing large woody material directly into streams and along stream banks as a component of restoration or enhancement projects.

Instead all overhanging vegetation was removed when the floodplain was bulldozed and the stream channel was moved, and the majority of woody biomass was eliminated. The compacted earth fill created a dense, root-restricting soil strata that will permanently retard or prevent growth of woody riparian plants.

f) Under the goal of *increasing Western Pond Turtle habitat*, conservation strategy recommendations include protecting occupied areas and adding rocks and logs to aquatic habitat to provide basking sites and cover.

Instead, except for the very short backwater that was not in the engineering plans and was added as an afterthought, slow moving sections and ponds favored by Western Pond Turtles were eliminated, existing basking sites were removed, and known nest sites were bull-dozed.

The actions by SCWA disregard established best practices and violate the fundamental and critical conservation strategies mandated by the *Yolo Resource Conservation Investment Strategy - Local Conservation Plan.*

2. Winters Putah Creek Park Does Not Meet Pre-Project Engineering Analysis and Post-Project Monitoring Recommendations in ***California Riparian Habitat Restoration Handbook, Second Edition***, July 2009 by F. Thomas Griggs, Ph.D., Senior Restoration Ecologist

The *California Riparian Habitat Restoration Handbook* is specifically recognized in the *Yolo Resource Conservation Investment Strategy - Local Conservation Plan* (RCIS-LCP) as an authoritative source that is widely accepted among restoration scientists for conservation actions to restore riparian natural community habitats.

The Winters Putah Creek Park project does not meet pre-project engineering analysis and post-project monitoring recommendations in the *California Riparian Habitat Restoration Handbook.*

It is abundantly clear from this restoration manual that one of the most, if not THE most important criterion when considering the likelihood of success of any restoration project is to have a complete and thorough understanding of pre-existing soils and underlying strata in both the stream bed and the adjacent floodplain. Information and analysis of multiple soil samples from different depths of numerous bores throughout the entire project area are key factors in determining the appropriate replanting strategy for the riparian forest.

Friends of Putah Creek (FOPC) requested any applicable soil or fill analyses information from SCWA on numerous occasions. When nothing was received FOPC issued a Public Record Act Request that included a request for information on pre-existing soil conditions. Almost a year later SCWA has yet to provide the information, suggesting that such an analysis was not completed. With information from such an analysis, SCWA should have chosen to modify plans to deposit and compact the massive volume of foreign clayey fill material in the stream-bed and floodplain.

Subsequent to the completion of the first two phases of the project, FOPC members took surface samples from the new floodplain. It was necessary to use a pick-ax to remove a one-foot square sample, which resembled an adobe brick in density and hardness. In some areas extensive remediation will be required to facilitate the return of a viable riparian forest. Such measures as removal of existing indurated soil, replacement of gravel layers, and back-filling with uncompacted, amended soil will likely be required.

It is also evident from the *California Riparian Habitat Restoration Handbook* that a rigorous and quantitative wildlife monitoring regime is critical to determining success of restoration projects as well as for adaptively managing mitigation efforts and revising future restoration plans. Wildlife monitoring to determine restoration success should include plants, fish, insects, birds, amphibians, and mammals. SCWA is required to complete wildlife monitoring under the 2002 Putah Creek Accord. Wildlife monitoring reports are required to be posted annually within 15 days of receipt by SCWA, but this requirement has been ignored for years.

Friends of Putah Creek requests for all pre-project and post-project wildlife monitoring data for the Winters Putah Creek Park project have been ignored by SCWA even when they were formally required to produce the reports through a Public Records Act Request. It is very telling that SCWA either has not performed the required monitoring or refuses to release the results as required by both the court and standard restoration practices.

3. Winters Putah Creek Park Design Philosophy Conflicts with Proven and Cost-Effective Restoration Strategies Discussed in ***Low-Tech Process-Based Restoration of Riverscapes: Design Manual*** (Utah State University Restoration Consortium, 2019)

The *Low-Tech Process-Based Restoration of Riverscapes: Design Manual* is specifically intended to assist restoration professionals to achieve successful restoration of stream and riparian ecological health in ecosystems degraded by man-made structures and impacts. It provides the underlying design philosophy and tools enabling restoration scientists and practitioners to produce remarkable results in restoring salmon habitat, as referenced in a recent Science article (Science, June 8, 2018, Vol 360 - Issue 6393), by the use of low cost beaver dam analogs and other natural structures costing approximately $10,000 per mile of restored stream. This compares with the equivalent costs of almost $6,000,000 per mile spent on the Winters Putah Creek Park project which has yet to produce evidence that any salmon spawned in the creek are returning as a result of the project. It is apparent that there are substantial differences between the low tech and low-cost methods used by experienced professional restoration ecologists versus the practices employed by SCWA on Putah Creek.

The Winters Putah Creek Park project engineering philosophy conflicts with the proven and cost-effective restoration strategies discussed in this design manual, which uses low-cost structures of natural materials and beavers themselves to add complexity and diversity to floodplains. This is inherently less expensive (by at least 2 orders of magnitude) than floodplain-damaging techniques that rely on massive earth moving machinery to create a constrained stream bed as was done at Winters Putah Creek Park.

For instance, great effort was expended in the Winters Putah Creek Park project to obtain a "stable" and "self-sustaining" Creek form but, as explained by the *Low-Tech Process-Based Restoration of Riverscapes: Design Manual*, these attempts are self-defeating. Quoting the manual, "*Stability is not a hallmark of healthy riverscapes...The desire to reduce uncertainty and precisely predict restoration outcomes has led to practices that tend to emphasize the stability of channels and in-stream structures. In the context of stream restoration, stability has often meant static. Constructed features and attributes such as plan-form, channel width, location of pools and riffles are designed in such a way that they do not change through time. The emphasis on stability requires detailed engineering designs, modeling, and heavy equipment, all of which contribute to the high cost of restoration….**However, population level response of target species*** [e.g., salmon and steelhead] ***to these restoration actions is equivocal***." (Emphasis added)

Certainly, the desired outcome of the work in Winters Putah Creek Park has been questionable. Despite a cost of about $6,000,000 to alter only one mile of Creek, there have been no quantifiable benefits to wildlife. After eight years some areas are still devoid of native vegetation despite extensive planting efforts and hundreds of replanted trees and shrubs have not survived. The loss of pools, undercut banks, and overhanging vegetation caused by the bulldozing of the original Creek channel and floodplain has compromised the kind of habitat that allows native fish populations to thrive. Fish populations have consequently plummeted in the affected areas according to SCWA's own data. There have also been noticeable drops in mammal, bird, and amphibian populations in these areas.

The target species that was supposed to benefit the most from the Winters Putah Creek Park project was fall-run salmon. Despite 2,000 tons of imported spawning gravel and carefully timed supplemental flow releases, after eight years following completion of the first two phases of the project there is still no evidence that salmon from eggs hatched in the creek have returned to spawn.

According to the above design manual, "*A central premise of process-based restoration is that restoration of natural systems (e.g., rivers streams, their floodplains and watersheds) is best achieved by 'letting the system do the work'. Process-based restoration recognizes that to restore ecologically functional riverscapes, we need to restore the physical and ecological processes responsible for creating and maintaining those conditions*."

Friends of Putah Creek fully agrees with the basic premise of this gentle restoration approach in which the return of natural systems is facilitated by invasive plant removal and native plantings rather than by employing brute diesel force to reshape the ecosystem, as has been the hallmark of SCWA's methods. As Jared McKee, an environmental engineer with the US Fish and Wildlife Service and expert in riparian systems and habitat restoration appropriately asked:

"What if restoration was about stream power doing the work, not diesel power?"

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BACKGROUND

In June, 2018, Friends of Putah Creek published a document entitled, _Winters Putah Creek Park – Part 1 - Case Study of a Failed Project_. The following discussion draws from that document.

The stated objectives of the SCWA Winters Putah Creek Park project were to enhance the overall habitat of the section of Putah Creek running through Winters by:

- Removing invasive species such as Arundo, Himalayan blackberry, and Eucalyptus and replacing them with native species
- Lowering water temperatures in Winters and downstream to attract more salmonid migration into these lower sections of the creek and improve salmon spawning success, and
- Improving overall fish habitat to increase fish populations.

The project as implemented by the Solano County Water Agency (SCWA), first used bulldozers and earth-movers to clear and strip most of the mature and mostly native riparian forest from Putah Creek's floodplain in Winters. Over 90% of the mature trees and other shrubs and ground vegetation in the floodplain were removed in this process.

The floodplain was then flattened and, in the first two phases of the project, covered with 70,000 cubic yards of a heavy, clayey imported fill brought in from a distant canal excavation site. This fill was spread with bulldozers into a 2 - 12 ft. deep layer. The entire floodplain was then graded bank-to-bank to a 2% slope and compacted to a density functionally equivalent to a canal or landfill lining. This layer of hard fill is several or more feet thick in most sections of the floodplain.

A new creek channel was then formed in the newly compacted floodplain. The man-made channel was significantly narrower (varying between 26-30 ft width) in most sections than the former one and virtually all pre-existing elements of habitat diversity in the floodplain (including ponds, back channels and swales) were eliminated in its construction.

Unfortunately this process resulted in a project that has failed to deliver on any of the main objectives above and, in fact, has produced some serious unintended adverse side effects, as follows:

1. **Failure to Reestablish a Riparian Floodplain Habitat**

Literally hundreds of seedlings and saplings have been planted in the eight years following completion of the first two phases of the project. Almost all the replants have since died for lack of water, because water cannot move laterally through the soil from the stream to the trees through the dense compacted fill. Nor can precipitation, air, or roots vertically penetrate the hardened surface of the floodplain. In most all parts of the project, the dense compact impermeable fill has completely disconnected the new creek channel from the original porous, gravelly, permeable floodplain. The compacted, hardened fill also blocked creek water from reaching residual mature trees in the floodplain which are now dead or slowly dying due to lack of water transport through the floodplain to their root zones. Apparently, no investigation of soil types, particle size differentiation, or subsurface stratigraphy was performed prior to the project, and during planning no consideration was given to soil conditions, subsurface stratigraphy, or groundwater movement.

2. **Failure to Reduce Creek Temperatures**

Reducing creek temperatures to improve trout habitat was to be a major benefit of rechannelization. It was supposed that stream temperatures would be lowered by increasing stream velocity through the newly narrowed creek channel along with more shading provided by the riparian forest that never developed. Unfortunately, as Solano County Water Agency's own stream temperature and flow data show, there has been no reduction in water temperature as a result of the Winters Putah Creek Park project. A temperature difference that SCWA tried to attribute to the project instead proved to be due to an increase in flow. SCWA can provide no quantitative modeling or engineering studies performed to test or validate the assumption of a desired temperature effect.

3. **Reductions in Fish Population**s

A main objective of the Winters Putah Creek Park project was to improve the creek as native fish habitat. There is no evidence this goal has been achieved based on recently disclosed data. Indeed, SCWA's data show fish populations in the reach of Putah Creek through Winters instead declined by about 67% in the first 4 years after completion of the first two of three phases of the project.

4. **Significant Reduction in Annual Groundwater Recharge due to Impermeable Compacted Soils**

The Winters Putah Creek Park project also had the unseen but very serious consequence of decreasing groundwater recharge. This effect has been neither recognized nor evaluated by SCWA. Due to the high porosity of the original sandy, gravelly bed and floodplain of Putah Creek, Putah Creek water historically was a very significant source of groundwater recharge as it passed through Winters. This is the groundwater relied upon by the City of Winters for municipal needs and by surrounding farmers for irrigation needs. Based on stream flow data recorded by SCWA itself, this recharge has fallen by over 4,000 ac-ft per year – about twice Winters' annual municipal water use for all residential and commercial customers and approximately equal to the amount of water needed to annually irrigate about 1,300 acres of almonds. Apparently, SCWA gave no consideration to the below-ground impacts of the projects, did no quantitative modeling, engineering, or testing of the imported fill that should have been done, and that would have predicted the adverse groundwater impact of so tightly sealing the floodplain that water cannot penetrate it.

EVAULATION OF THE CAUSES OF THE PROJECT FAILURE

In evaluating the root cause of why the project has had so many poor performance results, the following external documents by recognized experts and authoritative sources are referenced. The full documents can be downloaded by clicking on the document name or inserting the following links into a browser.

1. ***Yolo Resource Conservation Investment Strategy - Local Conservation Plan*** (https:// nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=157451&inline),
2. ***California Riparian Restoration Handbook*** (2nd ed, 2009) by Restoration Ecologist F. Thomas Griggs, Ph.D. (https://water.ca.gov/LegacyFiles/urbanstreams/docs/ca_riparian_handbook.pdf), and
3. ***Low-Tech Process-Based Restoration of Riverscapes: Design Manual*** by Utah State University Restoration Consortium (https://www.researchgate.net/publication/ 332304757_Low-Tech_Process-Based_Restoration_of_Riverscapes_Design_Manual_Ver- sion_10).

Design standards, methods, and best practices from these manuals, documents, and reports are sequentially presented below followed by a discussion and application to the engineering, implementation, and post-project monitoring of the Winters Putah Creek Park project.

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1. Winters Putah Creek Park Violates Many Conservation Strategies and Best Management Practices in the Yolo Resource Conservation Investment Strategy - Local Conservation Plan (RCIS-LCP)

The Yolo Resource Conservation Investment Strategy - Local Conservation Plan (RCIS-LCP) was recently prepared for the Yolo Habitat Conservancy. The RCIS-LCP is meant to serve as a broad road map for conservation of all Yolo County ecosystems and species not specifically addressed in the Habitat Conservation Plan / Natural Community Conservation Plan (HCP/NCCP). In many respects the *Conservation Strategies* in the RCIS-LCP may be considered best management practices for ensuring protection of Yolo County's ecosystems and species.

The *Conservation Strategies* contained in the RCIS-LCP are listed in an extensive table identified as **Table 3-3. Conservation Goals and Objectives and Applicable Conservation Actions**. The table divides *Conservation Strategies* into 1) Landscape-Level Goals and Objectives, 2) Natural Community-Level Goals and Objectives, or 3) Species-Level Goals and Objectives.

Within each of these categories, different specific Biological Goals and Objectives are identified followed by Applicable Conservation Actions recommended to ensure the stated Biological Goals and Objectives are met.

Only those important *Conservation Strategies* which are directly applicable *and* which are functionally *NOT* met by the Winters Putah Creek Park project are discussed in this report.

For each applicable *Biological Goals and Objectives* and associated *Applicable Conservation Actions* discussed below, the exact text in the RCIS-LCP is used. Bold, blue high-lighted emphasis is placed on selected text by Friends of Putah Creek to highlight important points where the projects do not follow the excerpted *Biological Goals and Objectives* and associated *Applicable Conservation Actions.*

Table 3-3. Conservation Goals and Objectives and Applicable Conservation Actions

LANDSCAPE LEVEL GOALS AND OBJECTIVES

Goal L1: Large Interconnected Landscapes. Maintain interconnected landscapes in Yolo County with the range of physical and biological attributes (e.g. slope, soils, hydrology, climate, and plant associations) that support the distribution and abundance of focal and conservation species and their habitats, provide for the movement and genetic interchange among populations of focal and conservation species, support adaptive adjustments in species distributions in response to climate change, and sustain native biodiversity	
Biological Goal and Objective	**Applicable Conservation Actions**
Objective L1-4: Natural Community Restoration. Increase the extent of natural communities through restoration, in a manner that maximizes the likelihood of their long-term functioning, taking into consideration of both historic conditions and potential future conditions with climate change.	**L14.1.** Restore species composition and ecological processes in natural communities in areas **with the appropriate soils, hydrology**, and other physical conditions that support the community.
	L1-4.2. Implement initial restoration actions according to **recommendations in a restoration handbook such as Griggs (2009)** that is widely accepted among restoration scientists.

	L1-4.5. Adaptively adjust restoration approaches on the basis of additional knowledge gained from monitoring or observing previously implemented restoration actions. Incorporate knowledge gained from restoration science generally to the extent that it addresses conditions in Yolo County.
	L1-4.7. Use native local soils.
	L1-4.8. Do not import fill.
	L1-4.9. Do not compact soil.

Discussion Added by Friends of Putah Creek

***L1-4.1 and L1-4.2** – One of the key recommendations in Griggs (2009) is that extensive soil analysis of the floodplain be performed to ensure that soils used in remediation support the natural ecosystem and ecological processes of the floodplain. Particle size and mineral content analysis should be analyzed and the results used to determine the soil stratification throughout the entire project area. This is extremely important, as pointed out in Griggs, because it is the nature of the floodplain stratification that primarily determines the lateral transport of water and nutrients in the floodplain.*

Friends of Putah Creek has repeatedly requested that SCWA release information on their analysis of soil samples from the original floodplain and the imported fill and on their stratification analysis of the floodplain. SCWA has provided no such records in response to an official Public Records Act Request. It seems that SCWA failed to perform these necessary preliminary soil and stratification analysis as otherwise recommended by Griggs in the California Riparian Habitat Restoration Handbook (also see below).

***L1-4.5**. - Phases 1 and 2 of the Winters Putah Creek Park project were completed in 2009 – 2011. Almost immediately, the project was challenged because the work on the project went well beyond the scope of the original Mitigated Negative Declaration (MND) environmental assessment of the project. That MND clearly specified that minimal vegetation was to be removed and that no foreign sols were to be brought into the project area. Unfortunately both these MND specifications were violated. Consequently problems with riparian replanting arose immediately that were identified as resulting from the imported fill placed on the floodplain and then compacted. Nevertheless construction of Phase 3 of the project commenced seven years later in October 2018 using identical methods to those known to have failed in Phases 1 and 2 including the removal of almost all vegetation in the floodplain and substantial addition and compaction of imported fill.*

Meanwhile quantitative evidence showed there were serious adverse impacts on groundwater recharge caused by lack of infiltration of water from the creek through the compacted fill into the underlying aquifer. This information was made available to SCWA between completion of Phases 1 and 2 and commencement of Phase 3. Unfortunately, SCWA ignored this new information and failed to adaptively use it in the design and implementation of Phase 3. The same imported fill was again deposited on a riparian floodplain from which all natural features had been removed by heavy equipment. In addition to again violating the provisions of the original MND, SCWA clearly did not "Adaptively adjust restoration approaches on the basis of additional knowledge gained from monitoring or observing previously implemented restoration actions". This directly conflicts with the Conservation Strategy calling for such adaptive management.

***L1-4.7, L1-4.8, and L1-4.9** – The 70,000 cubic yards of fill imported and used in the first two phases of the project and the over 15,000 cubic yards of fill imported and used in the third phase of the project were provided by SCWA from fill left over from decades-old excavation of the South Putah canal. The fill was excavated from an ancient geologic formation depleted of organic matter and containing a high percentage clay. At the project site it was spread and compacted to a depth of from 2 to 12 feet. In no way, form, or fashion can that fill be considered similar or equivalent to "locally native soils" which are primarily sandy loams interspersed in layers with sandy gravel and cobble layers and organically rich silt deposits. As discussed above, SCWA also has not provided any analyses of this imported fill material despite repeated formal requests.*

*Use of this imported and compacted fill to create a new floodplain in the project area violates three critical identified Conservation Strategies. The project 1) **did not use locally native soils** which 2) **was otherwise imported**. Further, 3) **it was compacted to an extraordinary level by the earth-moving contractor** per the contract specifications by SCWA itself! These actions violate some of the most basic tenets of restoration science and were done without explanation by SCWA engineers and management personnel. They also violate provisions and declarations in the Mitigated Negative Declaration under which the Winters Putah Creek Park project was installed pursuant to the California Environmental Quality Act (CEQA).*

Goal L2: Ecological Processes and Conditions. Maintain or restore ecological processes and conditions in Strategy Area landscapes that sustain natural communities, native species, and landscape connectivity	
Biological Goal and Objective	**Applicable Conservation Actions**
Objective L2-1: Hydrologic and Geomorphic Processes. Improve dynamic hydrologic and geomorphic processes in watercourses and floodplains in a way that avoids or minimizes impacts on terrestrial species habitat (including the HCP/NCCP) and agricultural land. Allow floods to promote fluvial processes, such that bare mineral soils are available for natural recolonization of vegetation, desirable natural community vegetation is regenerated, **and structural diversity is promoted; or implement management actions that mimic those natural disturbances**.	**L2-1.1.** Restore riverine geomorphic process on the Sacramento River, Putah Creek, Cache Creek, Tule Canal, and other watercourses in the Strategy Area. **Create riparian management corridors that can accommodate natural lateral channel migration**. Relocate levees away from watercourses to reduce the physical forces acting on them, and to allow natural lateral channel migration. • **Create or improve secondary channels and overflow swales that add riverine and floodplain habitat values** (e.g., resting or rearing areas for fish migrating downstream) and provide escape routes for fish during receding flows. • Minimize new bank protection actions, or remove non-critical bank protection features, to **allow channels to meander naturally within the floodplain.**
	L2-1.3. Modify the floodplain to improve function and support focal species. • Modify floodplains in locations where higher ground impedes flow connectivity or capacity, to increase the hydrologic connectivity and capacity of the active floodplain, im-

	prove fish migration, reduce stranding potential, and allow additional riparian vegetation to establish without significantly impeding flows. • **Modify floodplains to provide greater topographic and hydrologic diversity.** Eliminate depressional features (such as isolated gravel pits or deep borrow pits) that strand fish when water recedes, but **recognize that depressional features such as ponds can be important refugia for species such as western pond turtle and giant garter snake.** • **Create higher ground in floodplains that can serve as refugia from floodwaters for wildlife species,** including giant garter snake and California black rail.

Discussion Added by Friends of Putah Creek:

L2-1.1*. - The uniform 2% slope of the entire floodplain produced by the bulldozers and earth-movers destroyed rather than acted to "create or improve secondary channels and overflow swales that add riverine and floodplain habitat values". In fact, virtually all of the lateral and secondary features of the floodplain have been intentionally and completely eliminated by design. Thus, secondary features for "resting or rearing areas for fish migrating downstream" do not now exist in most of Winters Putah Creek Park. Further, because of the hard-pan surface and uniform slope of the floodplain, the fixed channel design does not "create riparian management corridors that can accommodate natural lateral channel migration".*

In fact, the uniform width of the constructed channel was expressly designed to be "self-sustaining" and "to show long-term tendencies to remain in stable condition without accelerated vertical or lateral erosion". The only basis SCWA could provide for this channel design specification was two letters from the design consultants to SCWA which are attached as Appendix A. Unfortunately, these specified static channel design objectives by which the project was constructed clearly conflict with the stated best management practices and goals of the Conservation Strategies, which specify that "structural diversity is promoted; or implement management actions that mimic those natural disturbances".

L2-1.3. - *Project engineers repeatedly claimed the creek and floodplain modifications in the Winter Putah Creek Park would restore the "natural form and function" of the Creek without ever objectively specifying what the "natural form and function" of the Creek should be. In fact, the static monolithic and highly compacted 2% slope of the floodplain after construction is extremely unnatural and dramatically reduces rather than "provide greater topographic and hydrologic diversity".*

All depressional features in Phases 1 and 2 of the floodplain landscape were eliminated including all ponds without "recognizing that depressional features such as ponds can be important refugia for species". Rather than "Create higher ground in floodplains that can serve as refugia from floodwaters for wildlife species", all such high ground was functionally eliminated when the floodplain was flattened and graded to a uniform slope.

Fig. 1 - Recent “Before and After” photos following bulldozing and leveling of a rich riparian floodplain habitat.

Friends of Putah Creek have repeatedly requested that the design criteria and engineering analysis used by SCWA in design of the Creek channel be provided in order to determine consistency with accepted riparian restoration practices. These have not been made available. There is otherwise no evidence that any engineering analysis or modeling of the Creek’s "form and function" was utilized by project engineers.

Rather, SCWA relied on subjective judgments instead of quantitative criteria to establish the Creek project topography. Indeed, the channel designer specifically stated that he “relied on these field observations for project design, and prefers the use of field indicators over other more technical methods of channel design and flow modeling. Modeling is a valuable tool and can be used to support design criteria, but should be verified with field data that documents the natural tendencies of the stream channel form and function.”

In this case, however, it appears that subjective “field observations” were the only criteria by which the channel “form and function” were determined. Even the subjective “field observations” cited by the engineers to guide their design criteria have not been provided or disclosed for independent review despite a Public Records Act request.

NATURAL COMMUNITY-LEVEL GOALS AND OBJECTIVES

Lacustrine

Goal LR1: Stream conservation. Conserve and enhance stream systems in Yolo County.	
Biological Goal and Objective	**Applicable Conservation Action**
Objective LR1.1. Fluvial equilibrium. Maintain and/or restore fluvial equilibrium between erosion and deposition in Strategy Area streams.	**LR1.1-1.** **Avoid stream channelization.**
	LR1.1-2. **Avoid unnecessary vegetation removal.**
Objective LR1.2. **American beavers.** **Protect lacustrine/riverine systems supporting American beavers**.	**LR1.2-1.** **Target portions of streams that support American beavers for protection.**
	LR1.2-2. Incorporate beaver management practices into management plans for lands protected by a con-

	servation easement or other instrument providing for perpetual protection of land supporting or potentially supporting this species (where consistent with existing laws and regulations related to flood easement areas). **Such management may include protection of existing beaver dams where possible**, and installation of deceiver or bypass devices where necessary, rather than dam removal. Management may also include wrapping trees identified for retention with wire cylinder tree wraps or cages.
Objective LR1.4: Stream processes and conditions. **Maintain and/or restore and protect stream processes and conditions** in Yolo County streams.	**LR1.4-1.** Encourage maintenance of appropriate minimum stream flows throughout the annual cycle to maintain aquatic life in Strategy Area streams. Flows may not be perennial in many streams, although subsurface (hyporheic) flows often continue to maintain riparian processes even when no surface flow occurs. **Conservation of stream processes is related to maintaining subsurface flow and groundwater that are hydrologically part of the stream-flow in each watershed** (Winter et al. 1998).
	LR1.4-4. **Expand and protect riparian vegetation along Strategy Area streams** where possible in accordance with flood management and operation laws and requirements.

Discussion Added by Friends of Putah Creek:

LR1.1-1 – *Plans for channel modifications of the Creek specified that the Creek channel be uniformly between 26 and 30 ft wide. That channel was lined with compacted fill. The result constitutes "stream channelization" in direct conflict with this Conservation Strategy.*

LR1.1-2 *– Over 90% of the floodplain vegetation was removed in all phases of the Winters Putah Creek Park project in direct conflict with the Conservation Strategy advice to "Avoid unnecessary removal of vegetation". The extensive removal of native vegetation was also in direct conflict with the environmental assessment and the Mitigated Negative Declaration for the project which specified that minimal native vegetation be removed during construction.*

LR1.2-1 and LR1.2-2 *- The Conservation Strategy recognizes the importance of beaver in improving diversity of the floodplain. However, instead of acting to "Target portions of streams that support American beavers for protection" and to "Protect lacustrine/ riverine systems supporting American beavers", the bulldozing and radical alteration of the floodplain and creek channel intentionally removed deep ponds and beaver dens throughout the Winters Putah Creek Park project. Clearly, SCWA plans did not "include protection of existing beaver."*

LR1.4.1 *– As discussed above, clayey imported compacted fill now covers almost the entire flattened floodplain and lines the stream channel of Putah Creek in the Winters Putah Creek Park project. This fill is nearly impermeable to water. The project fill has disconnected the stream from its floodplain and groundwater aquifer. This is reflected in the revegetation failures, death of mature cottonwoods on the floodplain, a drop in groundwater elevations in a monitoring well, and a reduction in groundwater recharge measured by upstream and downstream gauges. Groundwater recharge, once substantial through this loosing reach of Putah Creek, was re-*

duced by up to 4,000 ac-ft per year. Hyporheic flows could not be persisting along a channel lined with compacted clayey fill.

This conflicts with the objective of this Conservation Strategy to "Maintain and/or restore and protect stream processes and conditions" which further notes that "Conservation of stream processes is related to maintaining subsurface flow and groundwater that are hydrologically part of the stream-flow in each watershed". No quantitative modeling, hydraulic testing, or engineering were apparently performed so this adverse hydrologic impact could be predicted before the Imported fill was deposited in the Creek floodplain.

***LR1.4-4**. By removing almost all vegetation in the project area, SCWA clearly violated the Conservation Strategy to "Expand and protect riparian vegetation along Strategy Area streams**"**.*

Fig. 2 - Recent "Before and After" photos of a once vibrant beaver pool habitat in Winters

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SPECIES-LEVEL GOALS AND OBJECTIVES

Focal Fish Species

Goal FISH1: Protected and enhanced focal fish species habitat. Protect and enhance focal fish species spawning, rearing, and migration habitat in Yolo County.	
Biological Goal and Objective	**Applicable Conservation Action**
Objective FISH1.1: **Shaded riverine aquatic habitat.** Increase the area of shaded riverine aquatic habitat in Yolo County that supports focal fish species.	**FISH1.1-1. Maintain, restore, or enhance shade that moderates water temperatures and reduces visibility to predators.**
	FISH 1.1-3. Enhance the biomass of overhanging or fallen branches and in-stream plant material to support the aquatic food web, including terrestrial and aquatic invertebrates that provide food for fish, and to provide habitat complexity that supports a high diversity and abundance of fish species.
Objective FISH1.4: Large Woody Material in streams in Yolo County.	**FISH1.4-1. Restore vegetation along stream-banks, to increase input of large woody material to streams**

	FISH1.4-2. Install large woody material directly into streams and along stream banks as a component of restoration or enhancement projects.
Objective FISH1.6: Restore Fish Habitat in Putah Creek. Support existing efforts to restore Putah Creek habitat in Yolo County to enhance spawning, rearing, and migration of focal fish species.	**FISH1.6-1**. **Restore in-stream spawning, rearing, and migration habitat for focal fish species in Putah Creek**.
	FISH1.6-2. Restore shaded riverine aquatic habitat along Putah Creek.
	FISH1.6-3. Restore geomorphic and fluvial properties along Putah Creek.

Discussion Added by Friends of Putah Creek:

***FISH1.1-1 and Fish 1.1-3** – Long stretches of the Creek were previously almost fully shaded by the lush and mature riparian forest. Rather than "Maintain, restore, or enhance shade that moderates water temperatures and reduces visibility to predators" and "Enhance the biomass of overhanging or fallen branches and in-stream plant material to support the aquatic food web", the project stripped the floodplain of almost all vegetation. This was followed by extensive and repeated failure of plantings. Now most of the creek is exposed to direct sunlight through most of the project length and there is severely diminished overhead canopy to shed leaf litter into the creek to prime the food chain.*

***FISH1.4-1 and FISH 1.4-2** – Putah Creek through Winters once contained substantial amounts of large woody material directly in its channel, consistent with this Conservation Strategy. Rather than implement a project design to "Restore vegetation along stream-banks, to increase input of large woody material to streams", the project cleared much of the 65 year old floodplain forest that had established after the construction of Monticello Dam, then exported or buried much of the large wood, and covered the floodplain with compacted fill so that normal regrowth of large woody plants is not even possible. So both the existing inventory of large wood and the future supply were severely reduced.*

***FISH1.6-1** – SCWA has claimed the radical alteration of the entire Creek channel was necessary to improve the Creek to "Restore in-stream spawning, rearing, and migration habitat for focal fish species".*

Substantial improvement to existing riffles to improve spawning by salmon could have been more easily and inexpensively accomplished with the addition of gravel and cobble to existing reaches of suitable streambed without destruction of the floodplain and rechannelization. What the rechannelization has done instead is remove deep pool rearing habitat and eliminate overhanging trees which provided shade and leaf litter to the aquatic ecosystem. Further, undercut banks were replaced by sloping banks of compacted fill. Suitable habitat for the rearing and migration of salmon smolts and fry through the Winters Putah Creek Park was destroyed in the construction of the new detoured channel.

SCWA claims the floodplain will regenerate through natural processes that will eventually restore suitable habitat, but the failure of vegetation efforts and native species regrowth in the floodplain over 8 years post-project makes this claim highly dubious and speculative at best.

***FISH1.6-2** - "Restore shaded riverine aquatic habitat along Putah Creek". See **FISH1.4-1 and FISH 1.4-2** above*

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FISH1.6-3. *"Restore geomorphic and fluvial properties along Putah Creek." Unfortunately, SCWA's efforts at geomorphic restoration of the Creek with the intention to restore "natural form and function" have done just the opposite. The project has ultimately opposed natural fluvial geomorphology and processes with diesel geomorphology.*

Long before the Winters Putah Creek Park project began, after Putah Creek was dammed in 1955, the creek went through a period of channel and floodplain evolution. There was an abrupt change in flow and flood regime and in sediment regime. And there was a blank slate where the active channel and bare sediments stretched bank to bank across the floodplain.

In 2000 the Putah Creek Accord was signed mandating minimum flows into the Creek from the dam. Over the course of the next decade under the new flow regime, vegetation established, sediments became locked in place, and a new channel evolved in equilibrium with the new flow and sediment regime. A mature native riparian forest grew and the Creek habitat and its wildlife flourished. There were some prior anthropogenic disturbances including some floodplain clearing, some gravel extraction, and wastewater ponds on the floodplain but the stream adapted, a mature forest grew, and channel and banks were in equilibrium.

Then a new period of anthropogenic stream alteration ensued when SCWA embarked on a grant-driven process to "restore" the Creek. As part of this restoration, SCWA alleged the Creek needed to be returned to its "natural form and function". SCWA maintains that the proper channel width in Winters should be uniformly between 27 and 30 ft wide and about 1.5 feet deep and that pools should be filled because they were mostly too deep and wide. This is a claim without scientific basis but served as the foundation justification for the radical floodplain clearing and streambed alteration projects over the past decade..

Instead of relying on established engineering principles, however, the geomorphological justification of the proposed channel changes claimed it "relies on field observations for project design, and prefers the use of field indicators over other more technical methods of channel design and flow modeling. Modeling is a valuable tool and can be used to support design criteria, but should be verified with field data that documents the natural tendencies of the stream channel form and function".

Unfortunately, the geomorphological designers provide no field data or engineering or modeling to support their "observations". Instead they simply claimed that with their design "the Putah Creek channel tends to show long-term tendencies to remain in stable condition, without accelerated vertical or lateral erosion". They add, "We have looked closely at the full range of channel dimensions, patterns, and entrenchment ratios to determine what combination of factors tend to provide the most likely conditions for a self-maintaining channel morphology." (See Appendix A). None of this information has been made available to Friends of Putah Creek when seeking to confirm the design of the altered Creek even when formally requested by a Public Records Act Request. It would therefore appear that the consideration of these "full range of channel dimensions, patterns, and entrenchment ratios" do not exist.

SCWA projects in the Winters Putah Creek Park are drastically altering the stream channel, clearing vegetation, and flattening floodplain. However, SCWA claims that natural processes in the future will restore topographical variation in the creek topography where their projects have erased it, and this will provide requisite "secondary channels and overflow swales that add riverine and floodplain habitat values" that are the hallmarks of a vibrant stream ecosystem. However, the geomorphological designers are otherwise claiming their design would provide a "stable condition, without accelerated vertical or lateral erosion" which is in direct conflict with the natural processes creating topographical variation demanded by a healthy Creek ecosystem.

During fall of 2018, SCWA implemented addition al work in the Winters Putah Creek Park which again involved forest clearing and earth moving, stream alteration, construction of a new channel, and filling old channels. This was followed by an extended period of high flood flows in late winter and spring of 2019. During the floods, natural fluvial processes dramatically altered the precise engineered project including filling much of the man-made channel, reshaping the floodplains, and beginning to reestablish the old channel the project had filled. Rather than allowing these natural processes to occur, SCWA returned this summer with a bulldozer and restored their man-made design, undoing the work of the flowing waters, and opposing the natural fluvial geomorphology with diesel geomorphology. That is not restoring "<u>geomorphic and fluvial properties along Putah Creek</u>"

Western pond turtle

Goal WPT1: Maintenance or Increase of Western Pond Turtle Distribution and Abundance. Maintain or increase the distribution and abundance of western pond turtle within its range in Yolo County.	
Biological Goal and Objective	**Applicable Conservation Action**
Objective WPT1.1: Protect and enhance habitat. Increase protection and enhancement or restoration of western pond turtle habitat in riverine and lacustrine and associated upland areas.	**WPT1.1-1.** Place perpetual conservation easements over western pond turtle habitat, **prioritizing occupied areas**.
	WPT1.1-2. Add rocks and logs to aquatic habitat to provide basking sites and cover, as needed.

<u>Discussion Added by Friends of Putah Creek</u>:

WPT1.1-1 *– Western Pond turtle is a listed sensitive species. It was abundant in Putah Creek through Winters prior to rechannelization because it prefers the fresh, slow-moving water for habitat which was provided by numerous ponds and back-channels. Rather than "<u>prioritizing occupied area</u>" for conservation and "<u>to increase protection and enhancement or restoration of Western Pond Turtle habitat</u>", the project destroyed these areas through the use of heavy equipment without regard for protection of this habitat as required by the Conservation Strategies and best management practices.*

WPT1.1-2 *– Although SCWA embedded logs and rocks in the banks of the creek to "<u>provide basking sites</u>" in the Winters Putah Creek Park, they were in fast moving sections of the Creek and are not used by Western Pond Turtles.*

As a result of the loss of favorable habitat, once abundant Western Pond Turtles are now seen much less frequently in the Winters Putah Creek Park project area and then mostly in the unaltered segments and remnant pools. We have requested, without success, pre-project and post-project annual wildlife monitoring reports from SCWA to quantitatively assess the extent of population decline.

Winters Putah Creek Park Does Not Meet Many Pre-Project Engineering Analysis and Post-Project Monitoring Recommendations in California Riparian Habitat Restoration Handbook, Second Edition, July 2009 by F. Thomas Griggs, Ph.D., Senior Restoration Ecologist

The *California Riparian Habitat Restoration Handbook* is cited in the *Yolo Resource Conservation Investment Strategy - Local Conservation Plan* (RCIS-LCP) as an authoritative expert source of initial conservation actions in restoring riparian natural community habitats (see above Applicable Conservation Actions - *"L1-4.2. Implement initial restoration actions according to recommendations in a restoration handbook such as Griggs (2009) that is widely accepted among restoration scientists*").

Applicable recommendations from *California Riparian Habitat Restoration Handbook* are excerpted and reprinted below for comparison with actual practices employed in the initial design and engineering and follow-up monitoring of the Winters Putah Creek Park project.

The full manual is available to readers and covers many different aspects of restoration that are not directly applicable to the Winters Putah Creek Park project or which are not pertinent or applicable to the riparian eco-systems present in the Winters Putah Creek Park project. As a result, only those important sections of the manual that are directly applicable to the Winters Putah Creek Park project are excerpted and further discussed in this report.

For these applicable sections, the exact text in the *California Riparian Habitat Restoration Handbook* are excerpted and discussed below. Bold, blue color-highlighted emphasis is placed on selected text by Friends of Putah Creek to highlight important points we wish to make to facilitate the discussion of the project shortcomings we offer following each of the excerpted sections.

VI. Design Objectives

B. Objective 2: The Horticultural Potential

Horticultural restoration requires knowledge of local site conditions in order for a planting to successfully establish. It is common for restoration projects to include a three year maintenance regime, during which the plants are irrigated, weeds are controlled and mortality is kept under a specified level by re-planting. Beyond this period of maintenance, species will only survive if they are well matched to the site conditions. Species of plants must be matched to soil types and hydrologic conditions under which they will grow and prosper. Consequently, the first step in developing a plan and a list of species for any riparian restoration project is a detailed site evaluation that describes soils and local hydrology. Ecological preferences of select riparian plants are provided in Appendix 3.

1. Soils

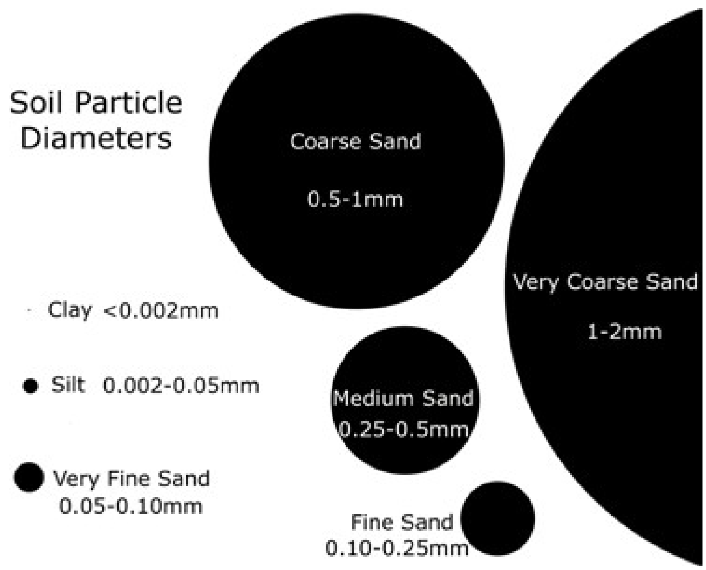
Soil conditions are the most important factors that determine the survival and growth of any species. (If any species cannot grow in the soil on a site, then the restoration planting will fail). Examination of the NRCS web soil surveys for the project site will help determine how many soil cores are needed to ground truth the soil maps. **Soil cores will also provide information about the soil texture and stratification across the site.**

Depth to the water table must also be determined at multiple locations throughout the site. The number of soil cores and measurements to water table will vary by site but soil surveys, river atlases, and aerial photos can help.

a. Texture and Stratification

Soil texture, the proportion of gravel, sand, silt, and clay (Figure 6), usually varies greatly across the entire site. Often this variation is because riparian floodplains receive coarse sediments — sand and gravel over-bank flows which deposit on top of finer sediments. Likewise, soil **texture can dramatically vary with depth, resulting in stratification of the soil profile. This layering of different textures can result in coarse sediments — sand and gravel — lying above or below much finer silts and clays. Plant root growth will be greatly affected by these discontinuities in the soil profile. The movement of irrigation water through the soil profile also will be affected by these discontinuities, which in turn will affect root growth** .

Figure 4: Soil Particle Size



To a large extent, soil texture, determines the survival and growth rate of each species (see Section XIII for a comparison of ecological tolerances among selected riparian species). For example, species such as cottonwood and sycamore grow rapidly in soils that have a high proportion of sand, while valley oak grow best in heavier soils composed mostly of silt and clay. **Soil texture is critical to plant survival and growth because the soil particle sizes determine the water holding capability.** Large particles such as sand allow water to drain quickly and cannot hold water for extended periods. Smaller particles such as silt do not allow water to drain quickly and as a result water is available to plant roots for a longer duration.

Lenses of course soil in the soil profile will affect the growth of plants; lenses of gravel may prevent species that require access to the water table from surviving.

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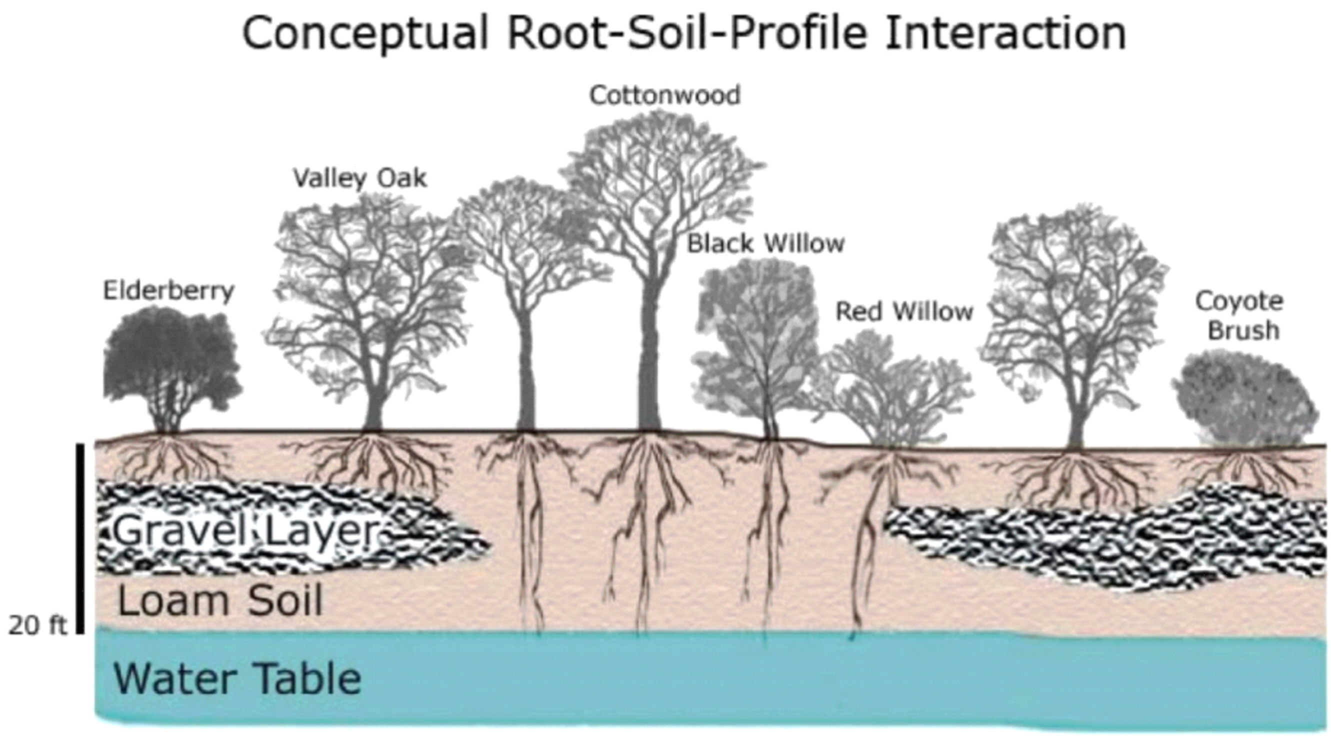

Figure 5: Root-Soil Profile Interaction

b. Depth to Water Table

Depth to water table is second in ecological importance behind soils for determining species survival, growth and the community structure of the vegetation. Depth to water table must be known for several points across a site, as it may vary by several feet. Deep soil-augur cores and soil pit samples taken on the site will al- low the depth to water table to be measured if water is reached, or estimated if soil be- comes moist at the bottom of the pit. Depth to the water table can also be measured with multiple piezometers placed into the ground that reach the ground water table. Cottonwood and willows absolutely must grow their roots into the upper portion of the water table within the three-year maintenance period, or they will die when irrigation is stopped. Other species of trees and shrubs will prosper by growing their roots into the water table, however, this is not a requirement for survival. Soil profile and depth to water table interact and can be a problem for root growth if the top of the water table is within a layer of cobbles or gravel where roots cannot grow well, making the water table functionally out-of-reach of the roots.

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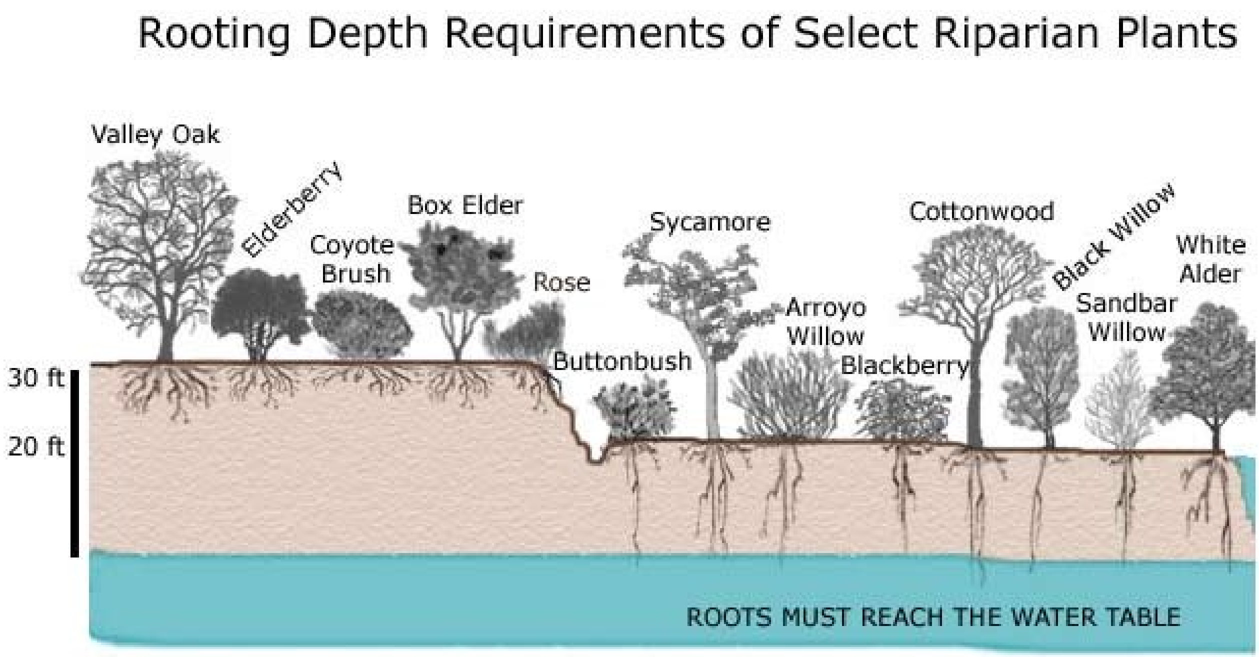
Figure 7: Rooting Depth Requirements of Select Riparian Species



Rooting depth requirements of riparian species must be known, along with the depth to the water table across the site, so that planted species will survive and thrive after irrigation is no longer applied.

Nutrients in Soils (natural vs. fertilizer)

Riparian soils are some of the richest in the state. Deep loamy soils, in combination with a water table within reach of plant roots, support rapid growth throughout the growing season for all species. Naturally occurring nutrients in the soil are abundant and readily available for plant growth. For example, stem cuttings of willow and cottonwood can grow to 6 feet tall the first season and valley oak grown from an acorn can grow to 4 feet the first year. With this kind of plant performance, additional fertilizer at the time of planting is not necessary.

<u>Discussion Added by Friends of Putah Creek</u>:

It is abundantly clear from this restoration manual that one of, if not THE most important criteria for success of any riparian restoration project is to have a complete and thorough understanding of existing soils in both the streambed and the adjacent floodplain. Information and analysis of multiple soil samples from different depths of numerous bores throughout the entire project area are key factors in determining the appropriate replanting strategy for a riparian forest.

This is all the more important if massive volumes of fill material are imported and deposited on a streambed and floodplain as they were by SCWA at the project. The fill also completely lacked the nutrients that promote rapid plant growth in natural and normal riparian soils like those either removed or covered by fill at the Winters Putah Creek project.

We have requested the soil information used by SCWA on numerous occasions. None was provided, indicating to us that they probably never took these most basic steps to ensure the success of their project.

Subsequent to installation of the first two phases of the project, we took our own post-project soil samples from the new floodplain. It required a pick-ax to dig out a one foot deep chunk of fill so hard it resembled an adobe brick or concrete. We do not believe a viable riparian forest will ever grow in this floodplain without extensive remediation or complete removal of this compacted and hardened fill.

VII. Monitoring Riparian Restoration Projects

A. Implementation Monitoring

The purpose, significance, and success of a riparian restoration project can be, and at times are required to be, monitored throughout the entire process. This means monitoring can take place before implementation, during restoration, and after implementation. The California Rapid Assessment Method (CRAM) is a statewide, standardized method to monitor wetlands (which include riparian areas) in a cost-effective and scientifically defensible manner. The methods and handbook are available online (www.cramwetlands.org). Given the ecological complexity of any restoration site, many unknowns will affect the performance of the plants. Consequently, implementation requires an adaptive management approach to the timing and level of intensity of management actions during implementation.

B. Measuring "Restoration Success"

Restoration success of the project will be determined by how well the goals for the project were met. Not only will success therefore be different for each restoration project, success can also be measured at several different levels.

1. The Contract Level

Contracts require some kind of quantitative measure of performance to evaluate success. Most call for a cumulative survival of all plants and trees after the maintenance period of at least 70 percent. Percent cover of the entire site by native species is a reasonable performance goal when grasses or other herbaceous species are planted.

2. Horticultural Success

In addition to survival, height and cover, or diameter at breast height of individuals of all species can be measured annually to track growth. Permanently marked sample plots are the ideal design, since they can also be used for post-project monitoring. Recent advances in the restoration of riparian understory species allows for restoration success to be defined as the percentage of the entire site that is covered by native species.

3. Wildlife Use

Monitoring of use of the restoration planting by wildlife species is the ultimate measure of success of any riparian restoration project. The methods of monitoring depend on the original goals of the project and wildlife for which the restoration was designed. Monitoring methods will also depend on the resources available for monitoring, including time. Long- term monitoring is the best way to understand how wildlife respond to the project site. It is best to select wildlife that are considered umbrella species, which are species that represent many other species, and to select a range of umbrella species that represent multiple habitat requirements. Land bird monitoring is an excellent way to measure restoration success, because birds are relatively easy to locate and observe and they cover a wide range of habitat types . A diversity of birds on the site means the restoration successfully provided a diversity of habitat to them. Presence and absence monitoring is a useful indicator of the wildlife present on the site. More detailed surveys that can provide demographic data such as nesting success, mortality rates and monitoring over many years will indicate whether the site is functioning as quality habitat for breeding or as a site that wildlife use temporarily.

Discussion Added by Friends of Putah Creek:

It is clear that a rigorous and quantitative wildlife monitoring regime is critical to measuring success of restoration projects in addition to adaptively managing efforts for mitigation and revising future restoration plans. Wildlife monitoring to determine restoration success should include plants, fish, insects, birds and mammals. Putah Creek wildlife monitoring is also required by SCWA under the 2002 Accord, which specifies minimum Creek flows among other things. These wildlife monitoring reports are required to be posted annually within 15 days of receipt by SCWA yet this reporting requirement has been routinely ignored for years by SCWA.

Friends of Putah Creek has repeatedly requested all pre-project and post-project wildlife monitoring for the Winters Putah Creek Park project without success. It is very telling that SCWA either has not performed the required monitoring or refuses to release the results as required by both the court and standard restoration practices.

Winters Putah Creek Park Design Philosophy Conflicts with Proven and Cost-Effective Restoration Strategies Discussed in ***Low-Tech Process- Based Restoration of Riverscapes: Design Manual***., 2019, Utah State University Restoration Consortium

The recently published *Low-Tech Process-Based Restoration of Riverscapes: Design Manual* provides the underlying design philosophy and tools for restoration scientists to restore riparian and salmon habitat. These methods produce significant increases in salmon spawning and fry development by using low cost beaver dam analogs and other natural material structures costing approximately $10,000 per mile of restored stream. In comparison costs of the Winters Putah Creek Park project were over $6,000,000 per mile.

Yet the Winters project has yet to produce any evidence of creek-born salmon returning eight years after completion of the first two phases of the project. What is apparent are substantial differences in the experience and mindset of the restoration ecologists and scientists describing their successful low-cost restoration strategies and that of the SCWA engineers and project managers who have produced very costly and destructive failures.

The full Design Manual is available to readers and covers many different aspects of riparian restoration. However, only those important sections of the manual that are directly applicable to the Winters Putah Creek Park project are excerpted and further discussed in this report.

For these applicable sections, bold, blue highlighting is placed on selected text by Friends of Putah Creek to emphasize important points to facilitate discussion of the Winters Putah Creek Park project shortcomings following the excerpted sections.

EXECUTIVE SUMMARY

Stream and riverine landscapes or riverscapes are made up of a series of interconnected floodplain, groundwater, channel habitats, and their associated biotic communities that are maintained by physical and biological processes that vary across spatial and temporal scales. An over-arching goal of riverscape restoration and conservation is to improve the health of as many miles as possible, while ensuring those systems achieve and maintain their potential in self-sustaining ways. This design manual is intended to help the restoration community more efficiently maximize efforts to initiate self-sustaining recovery of degraded riverscapes at meaningful scales.

Structural-starvation of wood and beaver dams in riverscapes is one of the most common impairments affecting riverscape health. At a basic level, a riverscape starved of structure drains too quickly and efficiently, lacks connectivity with its floodplain and has simpler more homogeneous habitat. By contrast, a riverscape system with an appropriate amount of structure provides obstructions to flow. What follows in the wake of structurally-forced hydraulic diversity are more complicated geomorphic processes that result in far more diverse habitat, resilience, and a rich suite of associated ecosystem services.

The purpose of this design manual is to provide restoration practitioners with guidelines for implementing a subset of low-tech tools - namely post-assisted log structures (PALS) and beaver dam analogues (BDAs) - for initiating process-based restoration in structurally-starved riverscapes. While the concept of process-based restoration in riverscapes has been advocated for at least two decades, details and specific examples on how to implement it remain sparse.

Here, **we describe 'low-tech process-based restoration' as a practice of using simple, low unit-cost, structural additions (e.g., wood and beaver dams) to riverscapes to mimic functions and initiate specific processes. Hallmarks of this approach include:**

- An explicit focus on the processes that a low-tech restoration intervention is meant to pro- mote
- A conscious effort to use cost-effective, low-tech treatments (e.g., hand-built, natural materials, non-engineered, short-term design life-spans)
- '**Letting the system do the work', which defers critical decision making to riverscapes and nature's ecosystem engineers**

Importantly, the manual conveys underlying principles guiding use of low-tech tools in process-based restoration in systems impaired by insufficient structural complexity. Although intended to be simple, low-tech restoration still requires some basic understanding of water- shed context, riverscape behavior and channel evolution, and careful planning.

The manual provides interested practitioners with sufficient conceptual and applied information on planning, design, permitting, construction and adaptive management to get started, as well as references to additional information and resources. Detailed design and construction guidance is provided on two effective low-tech tools: 1) beaver dam analogues (BDAs) for mimicking beaver dam activity, and 2) post-assisted log structures (PALS) for mimicking wood accumulation in riverscapes.

Throughout the manual, readers are reminded that the structures themselves are not the solution, but rather a means to initiate specific, desirable processes. Ultimately, embracing the design principles will help practitioners better understand the ‘why’ behind structural interventions and allow for more efficient and effective riverscape restoration.

IMPLICATIONS FOR PRACTICE

- Riverscapes are composed of connected floodplain and channel habitats that together make up the valley bottom.
- The scope of degradation of riverscapes is massive. Tens of thousands of miles of riverscapes are in poor or fair condition.
- Structural-starvation is both a direct cause of degradation, as well as a consequence of land use changes and direct modification of stream and riparian areas.
- **Engineering-based restoration tends to emphasize channel form and stability, rather than promoting the processes that create and maintain healthy riverscapes, which leads to increased costs and a limited ability to restore more miles of riverscapes.**
- **Process-based restoration focuses on restoring physical processes that lead to healthy riverscapes. Low-cost, simple, hand-built structures have been used for over a century. Restoration principles are needed to guide the use of low-tech structures in order to address the scope of degradation, which will require that practitioners “let the system do the work.”**
- The overarching goal of low-tech restoration is to improve the health of as many miles of riverscapes as possible and to promote and maintain the full range of self-sustaining riverscape processes.

“What if restoration was about stream power doing the work, not diesel power?”
— Jared McKee (USFWS)

RESTORATION REVIEW

Engineering-based Restoration

While there are a wide variety of approaches and techniques used in stream restoration we contend that engineering-based approaches have been, and continue to be, the most widely used. **Rather than address specific techniques used in engineering-based restoration (e.g., channel reconfiguration, engineered log jams), here we highlight themes that we believe limit the ability of such an approach to effectively scale up to address the scope of degraded riverscapes.**

These include i) precisionism and the need for certainty, ii) an emphasis on stability, and iii) high cost and limited spatial extent.

Our intent in this section is not to suggest that engineering-based approaches to restoration should be replaced by the low-tech approach outlined in this manual. Engineering-based approaches to restoration are and will continue to be useful in many riverscapes, especially on larger rivers and in areas where uncertainty cannot be tolerated, as in areas with significant infrastructure. Rather, due to their location and size, many riverscapes could be more effectively restored using low-tech methods.

Many restoration funders and land managers are expected to evaluate the success of restoration projects by specific criteria, which creates a need for restoration practitioners to design projects that have a high certainty of meeting project objectives. As a result of these pressures, and in order to avoid uncertainty in outcomes, restoration often focuses on stability.

Stability

Stability is not a hallmark of healthy riverscapes. While healthy riverscapes can be generally characterized by a collection of attributes (e.g., Stage 0), the specific location of structural elements and habitat features changes through time while reach-scale metrics remain relatively constant. The desire to reduce uncertainty and precisely predict restoration outcomes has led to practices that tend to emphasize the stability of channels and in-stream structures. In the context of stream restoration, stability has often meant static. Constructed features and attributes such as plan-form, channel width, location of pools and riffles are designed in such a way that they do not change through time.

An example of the emphasis on channel stability is the extensive use of rip-rap on meandering channels to prevent lateral migration. Importantly, lateral migration is the process responsible for the creation of meandering channels, limiting this process necessarily means the stream will not be able to function naturally. Another example of the emphasis on stability can be shown with the use of in-stream structures. Adding wood to degraded streams is generally considered to improve habitat conditions and is a common restoration practice. Wood is typically added to streams by constructing large woody debris structures that simulate log jams (e.g., engineered log jams (ELJs)); or by designing log structures to be static by cabling, burying, or using boulders to secure wood in place. The emphasis on stability requires detailed engineering designs, modeling, and heavy equipment, all of which contribute to the high cost of restoration. Studies have generally found that such structures do increase local geomorphic diversity. **However, population level response of target species (e.g., salmon or steelhead) to these restoration actions is equivocal.**

High Cost – Limited Footprint

Emphasizing stability and certainty leads to highly-engineered restoration projects that necessarily increase the cost of restoration. The results of the high cost, per unit length of stream, inevitably results in fewer stream miles being restored. This is important for at least two distinct reasons. First, we are unlikely to be able to address the scope of degraded riverscapes using a high-cost approach to restoration. Second, many ecological goals of restoration must be addressed at large spatial scales. For example, improving in-stream and floodplain habitats to affect a population level response in salmon necessarily requires restoring large spatial extents. In short, reach-scale projects are unlikely to achieve many ecological goals.

Process-Based Restoration

In many degraded streams and rivers, the processes that sustain healthy riverscapes have been altered by both watershed-scale changes (e.g., conversion of forest to agriculture) and reach-scale alterations (e.g., channelization, removal of wood and beaver). Generally, restoration has focused more on restoring riverscape form without addressing the underlying processes responsible for that form. In response, the scientific community proposed a process-based restoration philosophy.

Process-based restoration is defined as protecting, enhancing, and/or restoring “normative rates and magnitudes of physical, chemical, and biological processes that sustain river and floodplain ecosystems”. A central premise of process-based restoration is that restoration of natural systems (e.g. rivers streams, their floodplains and watersheds) is best achieved by ‘let-

ting the system do the work'. Process-based restoration recognizes that to restore ecologically functional riverscapes, we need to restore the physical and ecological processes responsible for creating and maintaining those conditions.

Low-Tech Process-Based Restoration

We define low-tech process-based restoration of riverscapes as, simple, cost-effective, hand-built solutions that help repair degraded streams. In the context of process- based restoration, low-tech approaches are designed to "kickstart" processes that allow the stream to repair itself" . Historic and current examples of low-tech restoration, as both a label and an approach, are abundant. These low-tech restoration approaches, such as simple rock and wood structures, management with beaver, and time-controlled grazing management rely primarily on human labor, natural materials, and changes in management to restore hydrologic, ecologic, and geomorphic processes.

Discussion Added by Friends of Putah Creek:

Low-technology "process-based" creek and stream restoration using beavers, beaver dam analogs, or other low-cost, in-stream structures using natural materials to add complexity and diversity to floodplains is inherently less expensive (by at least 2 orders of magnitude) than comparative restoration techniques using massive earth-moving machinery to form a "precision - engineered" streambed as was practiced at Winters Putah Creek Park. In addition to the financial advantages, there are also substantial ecological advantages. For instance, great effort has been expended in Winters Putah Creek Park to obtain a "stable" and "self- sustaining" Creek form.

*Yet according to the authors of the Low-Tech Process-Based Restoration of Riverscapes: Design Manual, these attempts are self-defeating because "Stability is not a hallmark of healthy riverscapes...The desire to reduce uncertainty and precisely predict restoration outcomes has led to practices that tend to emphasize the stability of channels and in-stream structures. In the context of stream restoration, stability has often meant static. Constructed features and attributes such as plan-form, channel width, location of pools and riffles are designed in such a way that they do not change through time. ….The emphasis on stability requires detailed engineering designs, modeling, and heavy equipment, all of which contribute to the high cost of restoration….**However, population level response of target species (e.g., salmon or steelhead) to these restoration actions is equivocal.**"(Emphasis added)*

Certainly that has been the response in Winters Putah Creek Park. Despite a cost of $6,000,000 to alter only one mile of Creek, there have been no quantifiable increases in benefits to wildlife. Its compacted imported fill has prevented reforestation and caused hundreds of planted trees and shrubs to die over many years. And we know the loss of pools, undercut banks, and overhanging vegetation caused by the bulldozing of the original Creek channel and floodplain has resulted in the loss of almost all in-creek habitat required by native fish populations, which have consequently plummeted in the affected areas according to SCWA's own data. There have also been noticeable drops in mammalian and bird populations in the area SCWA targeted for alteration.

Indeed, the focal species that was supposed to most benefit from this Winters Putah Creek Park project was fall-run salmon. Yet 8 years following completion of the project's first 2 phases there is no evidence a single salmon has been hatched and reared in the Creek and then returned there to spawn.

According to the authors of this design manual, "A central premise of process-based restoration is that restoration of natural systems (e.g., rivers streams, their floodplains and water- sheds) is best achieved by 'letting the system do the work'. Process-based restoration recognizes that to restore ecologically functional riverscapes, we need to restore the physical and ecological processes responsible for creating and maintaining those conditions."

Friends of Putah Creek fully agrees with the basic premises of this low technology restoration solution promoted in this design manual. Restoration of the Creek requires a much lighter touch than the heavy-machine, diesel-powered, over-engineered mindset of SCWA which has proved particularly destructive in the Winters Putah Creek Park.

We prefer the approach favored by one experienced US Fish and Wildlife Service ecologist:

"What if restoration was about stream power doing the work, not diesel power?" *— Jared McKee (USFWS)*

Appendix A – See Following Pages

STREAMWISE

Stream Assessment and Restoration

Achieving restoration goals with natural stream form, processes, and function.

600 S. Mt. Shasta Blvd.
Mt. Shasta, CA 96067
(530) 941–6334
streamwise@sbcglobal.net
www.streamwise.com

July 27, 2011

Rich Marovich
Streamkeeper
Lower Putah Creek Coordinating Committee

Dear Rich,

In response to the resource agency question regarding "*appropriate channel width*" I offer the following thoughts for consideration:

During the past twelve years of work on Putah Creek and its tributaries, we have spent innumerable hours in the field studying the creek and the current conditions. We have looked closely at the full range of channel dimensions, patterns, and entrenchment ratios to determine what combination of factors tend to provide the most likely conditions for a self-maintaining channel morphology.

Given the changes to sediment delivery and flow regime imposed by the upstream impoundments, calculation of such conditions is greatly facilitated by use of careful field observations of the stable channel form. Indeed, these observations are the foundation of design specifications for many of the successful projects we have worked on over the past twelve years.

The key to accurate approximation of the stable condition is to document areas where the stream channel forms its own dimensions through depositional features. Many of these sites are formed by recent channel avulsion, or through building point bar deposition below Dry Creek confluence, where gravel bedload sediment is in ample supply.

We have found a very consistent tendency for the channel to settle into a dimension of approximately 27 to 28 feet in width, with riffle control mean depth of approximately 1.5 feet. When coupled with adjacent inset floodplain features that allow for the dissipation of flood energy, the Putah Creek channel tends to show long-term tendencies to remain in stable condition, without accelerated vertical or lateral erosion. This condition is optimal for the establishment of native riparian vegetation, such as sedge, alder, willow, and cottonwood.

StreamWise relies on these field observations for project design, and prefers the use of field indicators over other more technical methods of channel design and flow modeling. Modeling is a valuable tool and can be used to support design criteria, but should be verified with field data that documents the natural tendencies of the stream channel form and function.

I hope this summary helps resolve any concerns over our design for the Winters Putah Creek Park and allows the project to move forward in a timely manner.

Thanks for the opportunity to comment on this important issue,

Rick Poore
StreamWise

UNIVERSITY OF CALIFORNIA, DAVIS

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SANTA BARBARA • SANTA CRUZ

Department of Environmental Design

University of California
One Shields Ave.
Fax: (530) 752-1392
Davis, CA 95616

July 25, 2011

Rich Marovich
Solano County Water Agency

Dear Rich,

As a professional geomorphologist, I have been studying Putah Creek for the past 10 years. One of the issues on Putah Creek is that - due to previous manipulations to the creek - the channel width has been "over-widened." In coordination with others, I have done field studies on the creek that suggest that the geomorphically appropriate width (the width that would self-form according to the existing hydrology of the creek) is significantly less than what is observed in many places today. These field studies suggest that the geomorphically (hydrologically) appropriate width is approximately 30 feet.

If I can provide other information, please let me know.

Sincerely,

Eric Larsen

Eric Larsen, Ph.D.
Research Scientist
Phone: (530) 752-8336
ewlarsen@ucdavis.edu