CFFU Conservation Committee
California Fly Fishers Unlimited • 2443 Fair Oaks Blvd. # 209 • Sacramento, CA 95825

Putah Creek

Evaluations of Specific Sections and Recommendations Regarding Restoration Efforts.

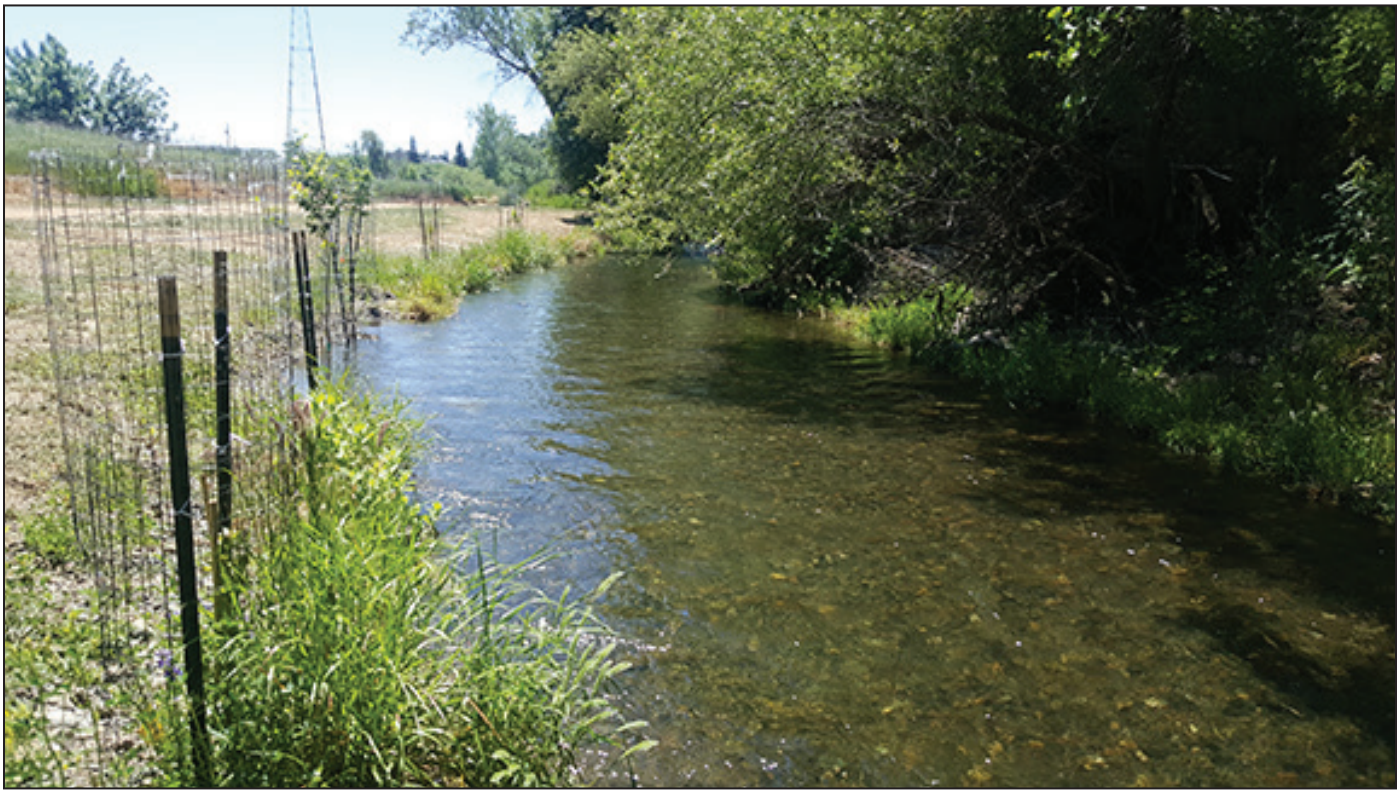
December 29, 2023

Submitted To:

Solano County Water Agency

Submitted By:

The CFFU Technical Advisory Group



Morales scarification and salmon spawning area. Shows constructed floodplain on left.

Submitted By: The CFFU Technical Advisory Group
(Per contract with Solano County Water Agency)

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Technical Advisory Group Members

California Fly Fishers Unlimited (CFFU) is a non-profit community organization established in 1962 to promote fly fishing, aquatic education, and environmental stewardship.

CFFU Committee Members' Biographies available on Page 20-21

Dave Lentz

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Paul Wisheropp

Ken W. Davis

Laurie Banks

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CFFU Committee Members are much more than accomplished scientists and educators!

As longtime fly fishers, the CFFU Conservation Committee members are knowledgeable regarding the complexities and subtleties of productive trout and salmon streams. Successful fly fishers are keen observers of nature and spend countless hours, days, seasons, and years learning the hydrology and ecology of the waters they ply. The Conservation Committee members have waded and floated small streams and majestic rivers in all the western states catching and releasing all five species of Pacific salmon, in addition to steelhead and multiple trout species. We have taken pause from casting in knee-deep water to observe salmon swimming at our feet. Our work schedules and vacation plans have evolved to correspond to the life cycles of the salmon and steelhead we pursue. We are committed to preserving and protecting our local waterways so that future generations have the opportunity to celebrate healthy creeks and streams teaming with life.

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IMAGE LINKS

All images by Ken W. Davis unless noted.

1. INTRODUCTION

In late 2022, Roland Sanford, General Manager (now retired) for Solano County Water Agency asked the Conservation Committee (Committee) of the California Fly Fishers Unlimited (CFFU) to address issues associated with the Putah Creek watershed. The Committee was asked to address three issues, evaluate the sites and provide recommendations for future actions

1. Evaluate the need for "enhancement" of the Winters Putah Creek Park (a.k.a Winters Putah Creek Parkway and Winters Putah Creek Nature Park).

2. Evaluate the potential and need for a fish bypass around the Putah Creek Diversion Dam (PDD).

3. Evaluate potential actions in the Interdam Reach (IDR) to enhance salmon and non-anadromous wild trout fisheries.

The Committee determined that it would be necessary to address a fourth issue: the Los Rios Board Dam and the related salmon run issues.

The Committee visited these sites multiple times to examine the effects of previous actions, recommend potential future actions, and what obstacles could inhibit or prevent success of these efforts.

2. THE WINTERS PUTAH CREEK PARK RESTORATION EFFORTS

The lead agency for the Winters Putah Creek Park is the City of Winters. The park restoration was designed for various reasons, including removing invasive plants, developing habitat for spawning salmon and expanding public access. The project was divided into three sections. Phases One and Two were initiated and completed in 2011. Phase Three was delayed by citizen complaints and a lawsuit from the Friends of Putah Creek that claimed Solano County Water Agency (SCWA) failed to secure necessary permits (Hanson, T, 2018). Funding for the projects came from a variety of sources including the California Natural Resource Agency "River Parkway Program" with Parks and Water Bonds via Prop. 50 and 84, and the North American Wetland Conservation Act (NAWCA).

Putah Creek - Phase One prior to project 10/4/2011. Image shows the North bank and the difficulty for public access.

2.1 PHASE ONE

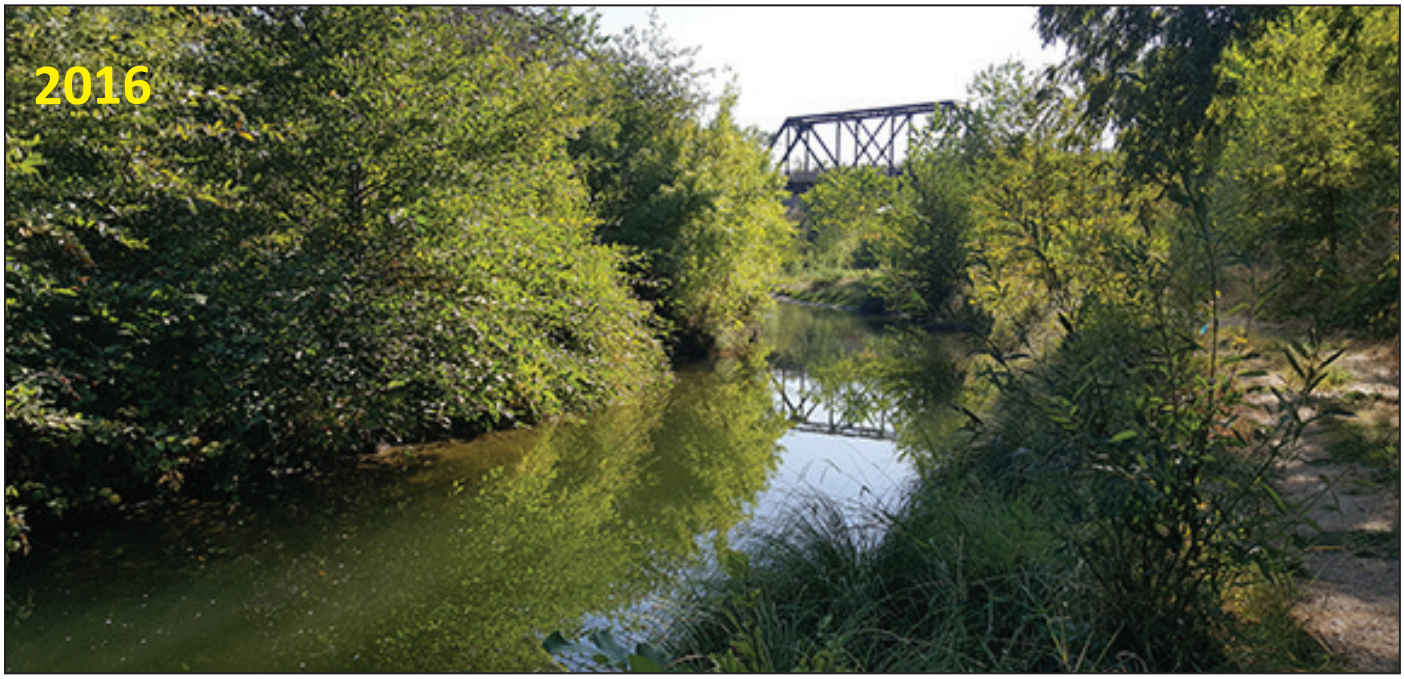
When Phase One was initiated in November 2011, the creek was impounded by a coffer dam and creek water was diverted into two 24-inch, 5400 feet-long high-density polyethylene pipes to facilitate drying of the construction area (CVRWQCB, 2014). As the water receded and fish were rescued, the pipes were moved to the side to allow construction of improvements to the creek bed. A significant amount of debris and equipment including a tar tanker truck were removed beneath the Winters Car Bridge. Some undersized spawning gravel for salmon was added in several areas. After the creek bed was formed into a "V" shape, water was reintroduced into the creek and the pipes removed. The banks and the riparian zone were planted with vegetation specific to the region grown by the Streamkeeper at the California Forestry greenhouses in Davis, California.

Phase One - Tar truck before removal on 9/29/2011.

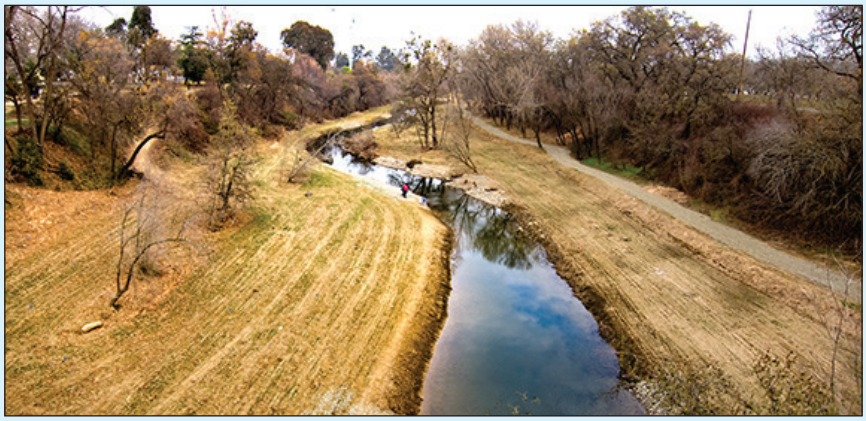
2.2 THE COMMITTEE EVALUATION - Phase One

Our on-site observations showed that the "V" shaped creek bed is too deep and too wide to provide a flow regime (water depth and velocity) adequate to support spawning areas. We observed a general lack of benthic structure including appropriately sized cobble for spawning salmon and a lack of refugia for juvenile salmon and native fish including resident trout. The reach does not have the necessary array of riffles, runs and pools which are essential habitat requirements for the life cycle of most fish found in Putah Creek. There is also concern about the density of the planted riparian forest and the canopy cover over the creek. The creek bed must have some access to direct sunlight for algae and aquatic invertebrates to thrive.

Phase One - Fish Rescue on 10/4/2011



Phase One - Same site as above on 9/27/2016



Sequential images of Phase One downstream of the Winters Bike Bridge.

9/1/2011
Prior to the beginning of the Winters Putah Creek Project.

12/28/2011
Water introduced. Flood plain established

5/15/2018
Riparian vegetation established

10/26/2021

Putah Creek - Phase Two with pipes prior to reintroducing the water. The pipes were removed. Image on 10/19/2011.

It appears that some areas of Phase One are overly dense and might require a riparian management plan with specific percent cover goals (Broadmeadow and Nisbet, 2004).

According to a study by Salamunovich, (2019, 2020) these efforts were unsuccessful with regards to usage by spawning salmon and did not result in the intended increase in resident fishes. The attached charts (Page 18 and 19) show the fish distribution in Lower Putah Creek in October 2018 and October 2020 (Salamunovich, 2019, 2021).

Golf ball sized pebbles added to the creek in several areas. The small cobble is undersized for effective salmon spawning.

2.3 PHASE TWO

Phase Two was initiated in 2011 at the same time as Phase One. Phase Two was at the downstream end of the project with Phase Three in between the other locations. This section is also a “V” or “U” shaped structure very similar to Phase One. The actions taken were like those in Phase One. Some under and over-sized spawning gravel for salmon was added in several areas. After the creek bed was formed (V-shape) the water was reintroduced into the creek and pipes removed. The banks and the riparian zone were planted with vegetation specific to the region and grown by the Streamkeeper at the California Forestry greenhouses in Davis, California.

2.4 THE COMMITTEE EVALUATION - Phase Two

Our evaluation for this phase was similar to the concerns noted in Phase One. Like Phase One, Phase Two did not have the necessary array of riffles, runs and pools and there was a significant lack of appropriate-sized spawning gravel. However, there was an addition of uniform golf ball sized cobble in several areas which did not remedy the problem of having diverse sizes of cobble. This section also did not have sufficient benthic structure for juvenile salmon and native fishes. Some of the planting restoration efforts in this section were over-compacted during the construction project, and the riparian plants did not survive. Subsequently, the planting sites were drilled for proper depth, size, and compaction and then replanted.

2.5 PHASE THREE:

Phase Three was completed in 2018. Phase Three (the middle 1/3) of the project was started in 2014 but was stopped when it was claimed by the

Phase Three - Shows the extent of riparian planting efforts. 5/28/2019.

Friends of Putah Creek that SCWA did not hold the appropriate permits from the Army Corp of Engineers and Central Valley Flood Control Board.

2.6 THE COMMITTEE EVALUATION - Phase Three

Similar concerns noted in Phases One and Two were also evident here. Phase Three is too wide (original concept was thirty feet wide) to provide adequate flow regimes necessary to prevent siltation in the spawning gravel and interstitial flows which provide aeration for eggs and alevin.

The initial actions taken did increase access for the public on the north side. However, the unintended consequences of the increased access resulted in disruption of spawning salmon by the public allowing dogs to run through the creek. This site was also over compacted during the construction. This site as well as the others have been impacted by homeless camps which allow human waste to enter the creek, impact the flow regime with crossings and interrupt the salmon when they are in the waterway (Davis. K, 2023).

2.7 WINTERS PUTAH CREEK PARK - RECOMMENDATIONS:

We suggest that the City of Winters and SCWA and the Lower Putah Creek Coordinating Committee (LPCCC) work with appropriate federal, county, and cities to develop a plan to rework the Winters Putah Creek Park Phases One, Two and Three to improve habitat as was originally intended. The City and SCWA should work with experts such as a Technical Advisory Committee (described in later sections) on all considerations.

3. CONSIDERATION FOR A FISH BYPASS AROUND THE PUTAH DIVERSION DAM

The Putah Diversion Dam (PDD) was constructed in 1957 to divert water into Putah South Canal about 6 miles downstream of Monticello Dam. This dam is a gated concrete weir structure with an earth-fill embankment wing. It created the small Lake Solano which has a capacity of 750 acre-feet. The canal is entirely concrete lined except for a mile of pipe called the Putah South Pipeline. Most of the canal is operated by Solano Irrigation District including its headworks at the PDD. Water passes the PDD to Putah Creek through radial gates in the dam and through a Venturi meter in the dam. A concrete pad is immediately below the gates and receives the overflow. The project provides irrigation water to about 95,000 acres of farmland and municipal and industrial water to the cities of Benicia, Vallejo, Fairfield, Vacaville and Suisun City.

As the Committee understands it, the idea to construct fish passage above the PDD was suggested to

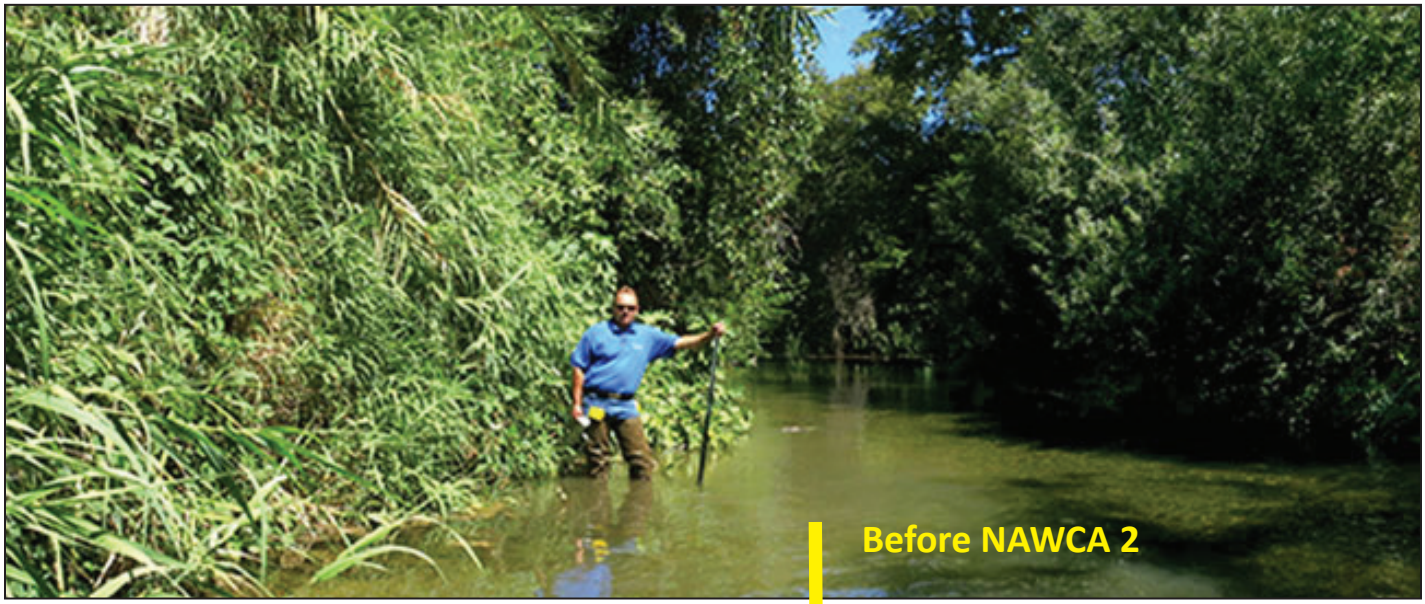
Putah Diversion Dam and Lake Solano on 3/24/2017. Image from aerial video during high-water event shows the Diversion Dam and Lower Putah Creek. Arrows show the soft plug (white arrow), Lower Putah Creek (yellow arrow) and the entrance into the Putah South Canal (blue arrow).

help establish a native salmon population in historic habitats above the dam. The historic salmon population was apparently extirpated in 1957.

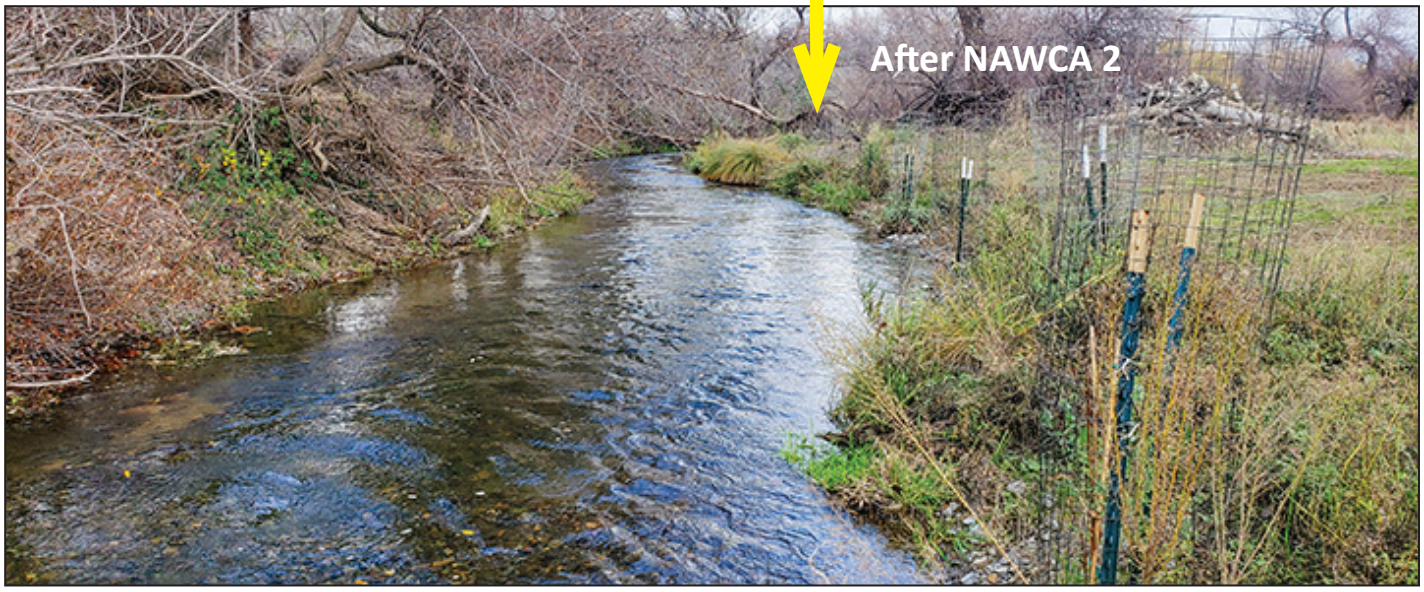
Goetz, et al. (2022) studied the origin of the Rainbow Trout in the IDR along with other locations in the drainage. DNA samples were used to determine their similarity to other California Rainbow Trout populations including Central Valley Steelhead (*Oncorhynchus mykiss*) and hatchery rainbow strains. Results of these genetic analyses indicated that the Rainbow Trout in the IDR and fish sampled downstream of the PDD in the anadromous reach of Putah Creek have native Central Valley origin with mixed ancestry similar to wild Central Valley Steelhead with likely contributions from multiple hatchery Rainbow Trout strains. Fish from the upper drainage above Lake Berryessa share ancestry with Russian River and other coastal populations suggesting fish above Monticello Dam are remnant populations of coastal Rainbow Trout isolated after 1957. Similar to Rainbow Trout in the IDR and lower Putah Creek, the Chinook Salmon returning to lower Putah Creek are of mixed ancestry and origins, nearly all from hatcheries (Willmes et al. 2021).

3.1 THE COMMITTEE EVALUATION - Fish Bypass (PDD)

Setting aside our belief that restoring native salmon (*Oncorhynchus tshawytscha*) above the PDD by constructing fish passage alone will not achieve that goal, we think there are other significant impedi-



9/3/2013 before NAWCA



12/10/2014 after NAWCA and mechanical scarification

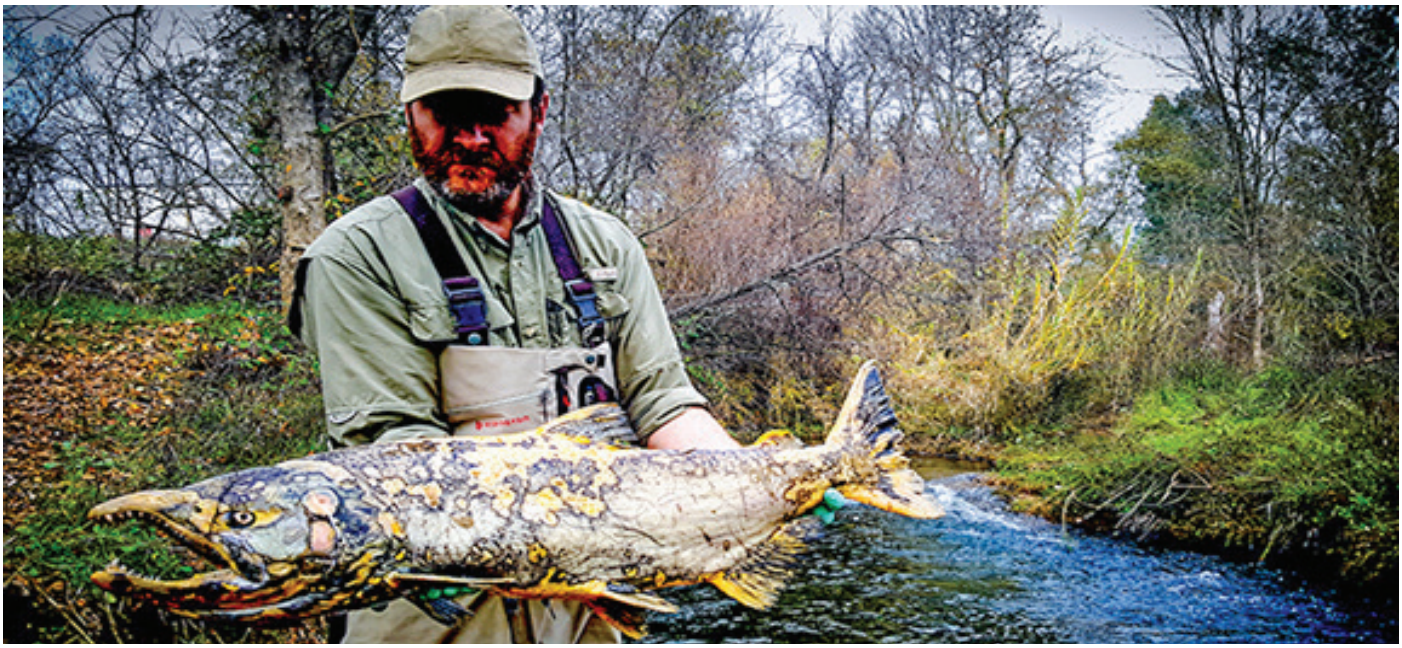
ments to restoring a salmon fishery above and below the dam that will effect out migrating juvenile salmon at both the diversion site and throughout the remaining system. Fish passage infrastructure can be complicated and expensive such as fish ladders and screens. Other approaches may involve collection and transport systems that can be operated for both upstream spawners and for downstream juvenile migrants. These systems would require staffing and labor commitments and may not balance out in terms of getting the desired results. As discussed by Willmes et al. (2021) if it is a desired goal to have a Putah-origin salmon run above PDD then controlling spawner access and marking of fish using such a "trap and truck" effort could be used to pursue that goal. However, such an approach does not address the impacts caused by salmon introduction above the PDD.

At the PDD there would be needed measures for keeping juveniles out of the diversion into the Putah South Canal and a better option than releases into Putah Creek through a Venturi outlet which when encountered by out migration smolts would kill them. Furthermore, wild Rainbow Trout in the IDR spawn at the same time as Fall Run Chinook Salmon (Salamunovich 2009) and would create competition for resources and predation. If steelhead did make it to the IDR, they may alter the genetics after spawning with resident Rainbow Trout. Because of the trophy Rainbow Trout fishery in the IDR there is likely conflict among the angling community who prefer a robust fishery over attempts to restore salmon

In California, straying, especially of hatchery origin salmon has significantly increased with the trucking of hatchery salmon fry farther and farther downstream. In an effort to increase juvenile salmon survival in the wake of drought conditions, low water flows, higher river water temperatures, increased water diversions, and non-native predatory fish; millions of hatchery salmon are annually released in the Delta, San Francisco Bay, and Half Moon Bay. This practice increases straying rates (presumably because of a lack of natal stream imprinting), and appeared to be an important driver of fish straying into Putah Creek (Willmes, et al. 2020).

3.2 RECOMMENDATION FOR FISH BYPASS

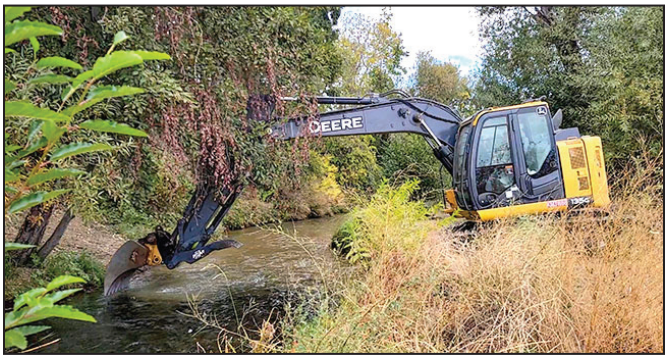
We feel it is important to note that the increased numbers of spawning salmon observed in Putah Creek is not in itself evidence of salmon returning to Putah Creek. Evidence of Putah Creek-origin salmon returning in the spawning run is lacking, and the run is comprised nearly all by hatchery-origin strays (Willmes et al. 2021). Increasing habitat and spawning above PDD will not improve the situation in the lower creek. A lack of Putah-origin salmon could be attributed in large part to the lower creek's fish passage, barriers, connectivity, water management and predation issues that hinder migration of spawners into and juveniles out of Putah Creek.



12/14/2016 U.C. Davis survey crew member with salmon carcass in Lower Putah Creek. To date, no natal return salmon have been identified in Putah Creek.

The committee feels strongly that restoration efforts on Lower Putah Creek must be coupled with steps to improve flow and connectivity to the Sacramento River during the downstream migration of juvenile salmon during spring. The committee also believes that it would be highly questionable to invest millions of dollars for fish passage at the PDD when fish passage issues in the lower system remain and are limiting restoration of the salmon run in Putah Creek.

In lieu of a fish bypass around the Putah Diversion Dam (PDD), we suggest enhancement of about 1 mile or more of salmon spawning areas that can



Mechanical scarification in the Morales section.

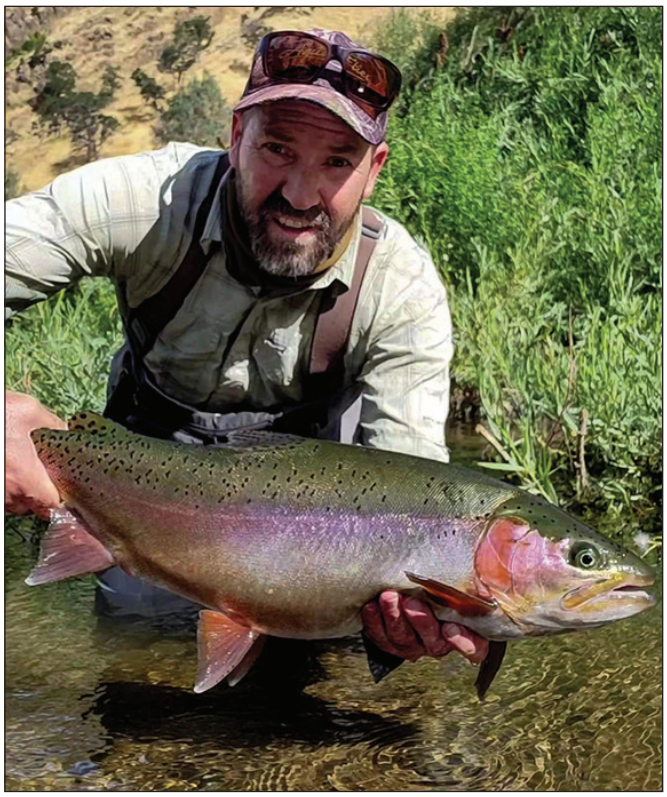
be achieved by scarification similar to the NAWCA 2 project which runs from Pickerels to Morales. The reach between Morales and the Mertz property could be treated by lowering the south bank to develop a floodplain and scarifying the creek bed by knowledgeable excavator operators. The NAWCA 2 Project produced an area that was used by spawning salmon every year since 2014. In that area, the water flow is sufficient to help keep the spawning gravel open and clean, depending on the sediment load (Davis, 2021).

NOTE: The CFFU Conservation Committee donated a copy of the RIVERMorph software to SCWA to help facilitate projects such as the one suggested above.

4. PUTAH CREEK – INTERDAM (IDR)

The IDR benefits from sustained cold water releases from Lake Berryessa. Releases are typically reduced in late October as irrigation demand is diminished, remaining lower through winter usually until April or May, except during storm events. Peak stream flows occur in summer months coinciding with higher irrigation demand. Presently the IDR supports a population of wild Rainbow Trout and two other native fishes, three-spine stickleback and prickly sculpin (Hogan et al. 2013).

With the cessation of hatchery trout stocking in 2008 the California Department of Fish and Wildlife's Heritage and Wild Trout Program (HWTP) evaluated Putah Creek trout management efforts and initiated monitoring surveys that included trout movement studies and angler use assessments. At that time, trout management with catchable-size Rainbow Trout stocking had an open year-round angling season that was divided into a period allowing a 5-trout bag limit with no



Putah Creek Guide Rob Russell with a trophy size rainbow caught in the Interdam Reach

gear restrictions (Last Saturday in April through November 15) and a period of catch-and-release, zero-bag limit with gear restricted to artificial lures and flies with barbless hooks for the remainder of the year. Trout managers reasoned that with the trout stocking cessation the five-trout bag limit may not be sustainable and may result in over-harvest of wild trout and a diminishing trout fishery. After early monitoring surveys, HWTP proposed a regulation change that would cease the harvest of trout. This regulation change was adopted by the California Fish and Game Commission in early

2010. The HWTP continues monitoring the IDR fishery to evaluate possible effects of angling regulation changes, habitat changes and enhancements, and angling use.

4.1 THE COMMITTEE EVALUATION - IDR

We recognize that the wild trout fishery in the IDR has high value and popularity. There have been significant contributions by stakeholders, trout managers, and the community to improve and enhance IDR habitats and the fishery. There are few trout fisheries in Central California capable of producing significant numbers of trophy-size trout as found in Putah Creek We support the HWTP following the guidance provided by the Fish and Game Commission's Policy on Wild Trout Waters and legislative direction (California Fish and Game Code §1725 et seq.) to develop wild trout management for Putah Creek. In addition, we applaud the primary goal of the Department of Fish and Wildlife's Strategic Plan for Trout Management (CDFW 2022) which recognizes that naturally self-sustaining wild trout populations are the preferred and most efficient management strategy, and these fisheries are best supported by high-quality ecosystems. Because of these trout management strategies and directions, the HWTP recommended Wild Trout designation for Putah Creek IDR and Lake Solano resulting in the Fish and Game Commission adopting the designations in 2014.

4.2 IDR - RECOMMENDATIONS

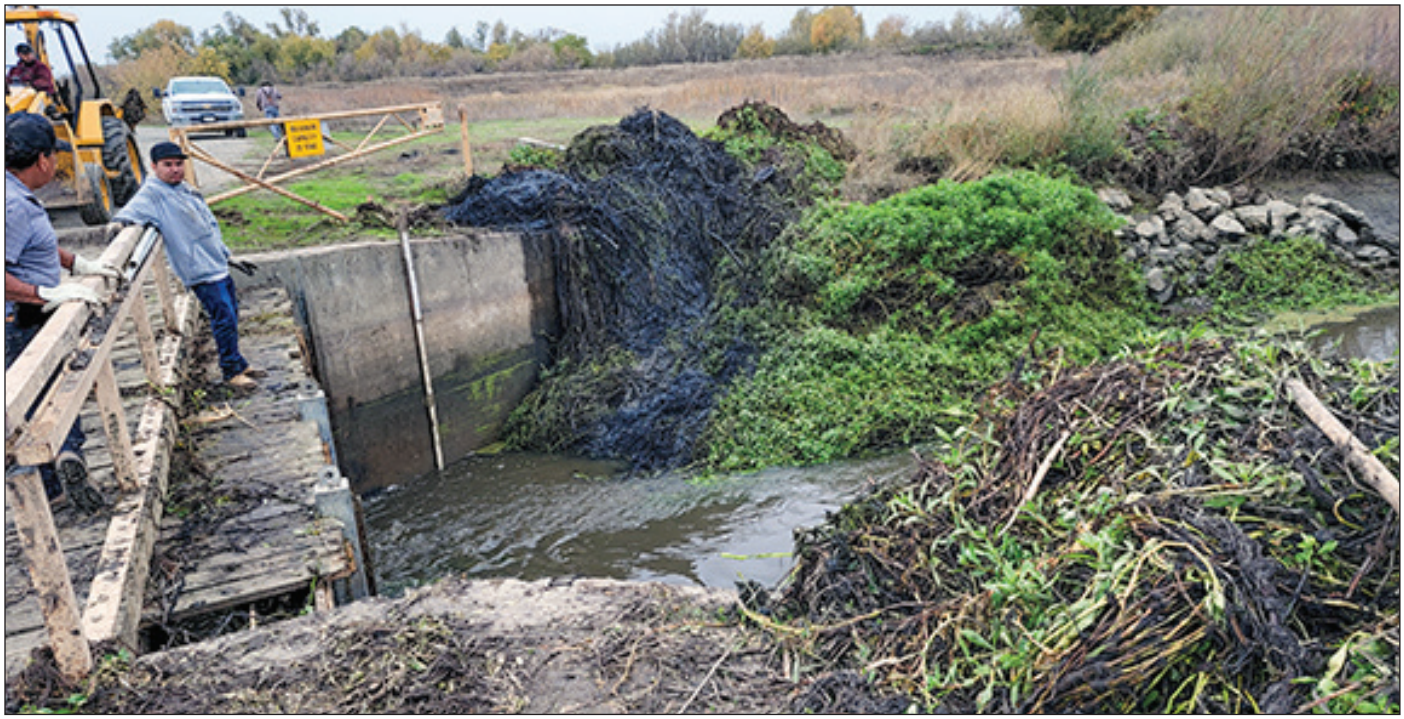
We are aware that spawning habitats in the IDR for Rainbow Trout were studied previously (Salamunovich 2009) and potential spawning available for Chinook Salmon was also assessed in 2022 (Salamunovich 2022). The February 2022 survey identified 44 separate cobble/gravel patches in 4.2 mi IDR flowing section, with many of these identified as Rainbow Trout redd sites in the 2009 study. Salamunovich cautioned that there are many factors affecting the selection of redd sites for adult salmon and that not all potential redd sites are suitable for spawning and egg rearing. These factors and selective salmon indicate the spawning habitat is more limited than the numerical estimates of sites.

We propose that the best strategy here is to protect and enhance the existing wild trout fishery in the IDR and not add salmon into the system of the IDR. Focus on improvements in habitat enhancement and fish passage in lower Putah Creek to provide improved conditions for salmon and Rainbow Trout in the reach below the PDD.

5. PUTAH CREEK SALMON RUN: ADDITIONAL ISSUES OF IMPORTANCE

The Lower Putah Creek salmon run is subject to the operation of the Los Rios Board Dam (LRBD) and the crossing at Road 106a. This run is based on stray salmon that do not have natal origin in Putah Creek. To our knowledge, monitoring has not identified Putah-origin salmon from those sampled in the Putah Creek run. The salmon run timing into the creek is currently determined by when the boards at Los Rios are opened to allow passage. Currently, there are no perennial flows to the Sacramento River. Water flow is subject to the LRBD

Los Rios Board Dam showing Lower Putah Creek downstream from the dam. This area is considered a water conveyance section, not wildlife habitat (Stevenson 2022). This section is NOT regulated under the authority of the Putah Creek Accord.



Los Rios Board Dam after the Los Rios crew removed the vegetation from the creek.

water diversions via CDFW Wildlife Area and the Los Rios Farms.

5.1 THE COMMITTEE EVALUATION

The decision-making process for the removal of the boards is unknown to us. Who is involved and what are the criteria for the timing and board removal is not clear. The basis for removing the boards then reinstalling the boards for two weeks, then removing the boards again is hard to evaluate because we are unaware of any science-based data to justify and support these actions. It has been documented that salmon are stranded by dewatering and some are stacking up below the LRBD waiting for the boards to be reinstalled which allows CDFW and Los Rios Farms to remove water. It is apparent that water management at the LRBD site creates conflicts with fish passage. With better management we believe this can be avoided.

Image shows immediately upstream of the Los Rios Board Dam after vegetation removal.

5.2 RECOMMENDATIONS

We understand that water management between Road 106 A and the LRBD is complicated. Dewatered segments are common and harmful to migrating fish. We propose constructing a permanent bypass to avoid the LRBD and allow the Putah Creek run to contribute to the overall recovery of salmon in California. The best timing and methods to allow passage needs to be determined by knowledgeable fishery biologists, engineers in concert with administrators and those legally using the water. Continued monitoring is necessary to evaluate success of the actions, allowing for analysis and adaptive management as conditions continually change. Until the lower Putah Creek channel is restored with a direct connection to the Sacramento River including perennial flows it is not likely that salmon spawning within the creek will contribute to salmon recovery in California.

LPC: Shows dewatered section upstream from the Los Rios Board Dam on 11/08/2023 during the salmon run.

6. THE BIGGER PICTURE

Our recommendations are a result of thorough analysis, collaboration with experts, and alignment with existing conservation efforts, including but not limited to, the Putah Creek Accord, Solano County Habitat Conservation Plan and existing CDFW Heritage and Wild Trout Program directives. After evaluating existing restoration efforts, the Committee was impressed with many of the projects and general intent, however it believes these efforts would strongly benefit from specific goals, technical input/oversight, and more collaboration with well-defined leadership. Some specific guidelines would serve as a valuable framework for the SCWA to lead successful and impactful management and restoration initiatives.

6.1 THE COMMITTEE EVALUATION

We often encountered conflicting information explaining decisions made for restoration efforts. It became clear that no one person knew exactly who had oversight, decision making power, or analytical data to support actions. Some decisions seemed arbitrary. We are aware of the many stakeholders involved and appreciate the difficulty in remedying needed information sharing. While the information we sought may exist it would benefit those involved if it was clearly spelled out and disseminated to all parties.

The Committee supports using **SMART** analysis methods to develop such a document. That would involve conducting a comprehensive situation analysis of salmon habitat and passage in Lower Putah Creek and to formulate **S**pecific, **M**easurable, **A**chievable, **R**elevant, and **T**ime-bound (**SMART**) objectives which will serve as the foundation of the project's success.

Using this approach we recommend actions which are designed to elevate the likelihood of success and address any challenges that might arise.

6.2 RECOMMENDATIONS

We recommend establishment of a Technical Advisory Committee (TAC) consisting of experts in ecology, hydrology, fisheries management, and local stakeholders. The TAC will play a pivotal role in guiding projects with robust data and information from qualified experts. The TAC should engage local communities, regulatory agencies, and organizations in the planning process to ensure a comprehensive buy-in to restoration and management.

The goals of the TAC would be to develop a monitoring and evaluation plan to track progress toward objectives including defining key performance indicators and data collection methods. This approach, allows for adjustments (adaptive management) based on ongoing monitoring and evaluation. The TAC would also develop a detailed budget that includes the cost of habitat restoration, monitoring, and TAC operations. This enhances the ability to seek funding from government grants, private donors, and partnerships which often require milestones and accountability.

To ensure widespread success the TAC must develop outreach programs to inform the public about the project's importance and progress as well as engaging in educational initiatives to raise awareness about salmon conservation. Regularly reporting on project progress to stakeholders, regulatory agencies, and the public is essential as well as ensuring compliance with local, state, and federal regulations related to environmental and fisheries management.

The SCWA and other agencies involved should

schedule periodic reviews with the TAC to assess project performance, accountability and adapt strategies as needed.

6.3 OVERSIGHT AND ACCOUNTABILITY

The responsible agencies need to define specific short and long-term goals that align with the project's objectives by conferring with the TAC to derive goals and prioritize implementation after evaluating **SMART** objectives.

We believe that following these recommendations will lead to successful salmon restoration projects in Lower Putah Creek. Additionally, we strongly recommend that conservation and management of non-anadromous wild trout in the IDR should be the focus there for SCWA. As stated before, we see value in using many of the same approaches for salmon habitat restoration to be used for wild trout in the IDR with a high expectation of enhancing this blue ribbon fishery.

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8. APPENDIX A: Normandeau Associates. 2018 Lower Putah Creek Fish Survey. January 10, 2019

Table 4. Capture data for the October/November 2018 fish monitoring surveys on lower Putah Creek.

Fish	PDD	DRY	WPK	I505	RR	STEVE	PED	1KM	APO	OLD	MACE	Total
Native Fishes												
Pacific lamprey (PLR)	1 (142 TL)											1
Sacramento pikeminnow (PKM)	2 (51-52 FL)	6 (42-112 FL)	1 (95 FL)	20 (38-93 FL)	220 (49-310 FL)	214 (46-290 FL)	168 (61-355 FL)	83 (48-282 SL)	3 (175-195 SL)			717
Hitch (HTC)							3 (68-121 FL)	1 (67 SL)		3 (76-83 FL)	9 (74-140 FL)	16
Sacramento sucker (SKR)	6 (39-163 FL)	44 (40-145 FL)	5 (85-223 FL)	14 (42-91 FL)	97 (64-252 FL)	56 (82-342 FL)	62 (81-328 FL)	24 (90-246 SL)	10 (255-400 SL)		1 (151 FL)	319
Rainbow trout (RBT)	61 (127-425 FL)	9 (107-135 FL)	7 (113-284 FL)	4 (96-139 FL)	2 (110-128 FL)							83
Chinook salmon (CHK)	6 (110-140 FL)	1 (116 FL)		4 (90-108 FL)	1 (103 FL)							12
Threespine stickleback (TSB)	33 (15-65 TL)											33
Prickly sculpin (PKS)	70 (37-112 TL)	49 (46-96 TL)	19 (53-87 TL)	26 (50-93 TL)	3 (52-102 TL)	3 (73-81 TL)	5 (57-102 TL)	6 (45-68 SL)	1 (54 SL)	1 (67 TL)	1 (79 TL)	184
Riffle sculpin (RFS)	4 (86-96 TL)											4
Tule perch (TP)		7 (61-93 FL)		2 (49-60 FL)	139 (74-122 FL)	113 (74-120 FL)	11 (87-138 FL)	13 (78-110 SL)				285
Exotic Fishes												
Black bullhead (BLBH)											3 (82-143 TL)	3
White catfish (WCF)											1 (191 FL)	1
Mississippi silverside (MSS)										75 (18-105 FL)	21 (35-90 FL)	96
Western mosquitofish (MSQ)				1 (36 TL)				3 (28-36 SL)	76 (21-44 SL)	2 (28-30 TL)	1 (39 TL)	83
Bluegill (BGS)	8 (55-119 FL)				5 (77-131 FL)			2 (76-96 SL)	54 (56-137 SL)	148 (27-145 FL)	91 (75-132 FL)	308
Redear sunfish (RES)							1 (169 FL)	4 (80-98 SL)	35 (26-235 SL)	11 (79-170 FL)	40 (78-190 FL)	91
Green sunfish (GSF)							1 (117 FL)	9 (46-98 SL)	3 (30-101 SL)	7 (39-115 FL)	7 (56-127 FL)	27
Smallmouth bass (SMB)							6 (79-112 FL)	12 (58-97 SL)	13 (41-141 SL)	1 (172 FL)		32
Spotted bass (SPB)					1 (95 FL)		1 (114 FL)			2 (92-100 FL)	8 (73-114 FL)	12
Largemouth bass (LMB)					6 (62-158 FL)	7 (74-180 FL)	23 (72-331 FL)	59 (45-182 SL)	85 (36-450 SL)	42 (45-346 FL)	159 (63-190 FL)	381
Bigscale logperch (BLP)							1 (112 TL)	1 (98 SL)	4 (62-102 SL)	1 (120 TL)	15 (100-114 TL)	22
Total # Individuals	191	116	32	71	474	393	282	217	284	293	357	2,710
# native fish	183	116	32	70	462	386	249	127	14	4	11	1,654
# exotic fish	8	0	0	1	12	7	33	90	270	289	346	1,056
Total # species	9	6	4	7	9	5	11	12	10	11	13	21
# native species	8	6	4	6	6	4	5	5	3	2	3	10
# exotic species	1	0	0	1	3	1	6	7	7	9	10	11
Shannon's Diversity (ln)	1.542	1.294	1.040	1.530	1.225	1.076	1.254	1.751	1.723	1.358	1.615	2.284
Eveness (H'/Hmax)	0.702	0.722	0.750	0.786	0.558	0.669	0.523	0.705	0.748	0.566	0.630	0.750

9. APPENDIX B: TRPA Fish Biologists. October 2020 Lower Putah Creek Fish Survey. June 10, 2021

Table 4. Capture data for the October 2020 TRPA fish monitoring surveys on lower Putah Creek.

Fish	PDD	WPK	I505	STEVE	PED	OLD	MACE	Total
Native Fishes								
Sacramento pikeminnow (PKM)		1 (89 FL)	8 (80-118 FL)	61 (45-162 FL)	105 (63-291 FL)			175
Hitch (HTC)					15 (68-120 FL)			15
Sacramento sucker (SKR)	6 (56-168 FL)	8 (49-99 FL)	15 (48-161 FL)	1 (188 FL)	13 (130-278 FL)			43
Rainbow trout (RBT)	61 (118-434 FL)	10 (99-158 FL)	12 (103-152 FL)	2 (131-156 FL)				85
Threespine stickleback (SBK)	14 (43-58 TL)							14
Prickly sculpin (PKS)	70 (38-140 TL)	59 (40-92 TL)	137 (36-97 TL)	1 (85 TL)	8 (71-97 TL)	6 (65-102 TL)	1 (55 TL)	282
Riffle sculpin (RFS)	1 (76 TL)	3 (66-73 TL)	3 (74-95 TL)					7
Tule perch (TP)		4 (63-121 FL)	9 (53-92 FL)	37 (81-128 FL)	11 (96-119 FL)			61
Exotic Fishes								
Black bullhead (BLBH)							1 (137 TL)	1
White catfish (WCF)						1 (178 FL)		1
Golden shiner (GSH)							1 (141 FL)	1
Mississippi silverside (MSS)						1 (54 FL)	122 (25-86 FL)	123
Western mosquitofish (MSQ)					4 (25-66 TL)		4 (18-38 TL)	8
Bluegill (BGS)	2 (71-77 FL)				4 (107-146 FL)	109 (43-136 FL)	244 (82-168 FL)	359
Redear sunfish (RES)						1 (125 FL)	32 (105-179 FL)	33
Green sunfish (GSF)						13 (53-115 FL)	10 (41-147 FL)	23
Smallmouth bass (SMB)					2 (90-94 FL)			2
Largemouth bass (LMB)				2 (61-205 FL)	30 (85-182 FL)	54 (65-193 FL)	89 (68-280 FL)	175
Bigscale logperch (BLP)						1 (122 TL)	2 (109-110 TL)	3
Total # Individuals	154	85	184	104	192	186	506	1,411
# native fish	152	85	184	102	152	6	1	682
# exotic fish	2	0	0	2	40	180	505	729
Total # species	6	6	6	6	9	8	10	19
# native species	5	6	6	5	5	1	1	8
# exotic species	1	0	0	1	4	7	9	11
Shannon's Diversity (ln)	1.159	1.042	0.953	0.922	1.507	1.081	1.350	2.798
Eveness (H'/Hmax)	0.647	0.581	0.532	0.515	0.462	0.520	0.586	0.859

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10. COMMITTEE MEMBER BIOGRAPHIES

DAVE LENTZ - Conservation Committee Chairman

Dave Lentz retired from California Department Fish and Wildlife, Senior Environmental Scientist) Dave spent 33 years working on trout management and conservation of California native trout. He previously worked on environmental science issues for the State Water Resources Control Board, Utah Water Research Laboratory at Utah State University, with a private environmental consulting firm in Logan Utah and as a seasonal employee of the U.S. Fish and Wildlife Service in Yellowstone National Park

Education: B.S. Zoology, Montana State University, M.S. Fisheries and Wildlife Science, Utah State University

ROGER BLOOM

Roger Bloom retired from California Department Fish and Wildlife in 2022. He served in many capacities since his start in 1994 including, but not limited to, Fisheries Chief, Inland Fisheries Program Manager, Statewide Native fishes coordinator, Heritage & Wild Trout Program Leader, and Regional Wild Trout Biologist. Roger has also worked on many projects throughout California including chemical treatments, habitat restorations, aquatic sampling, genetic sampling, research, fishing regulations, public outreach, and many others.

KEITH PFEIFER:

California Department of Pesticide Regulation/ California Environmental Protection Agency (CAL EPA) (1985-2005)

Responsibilities: Senior Toxicologist and supervisor of the group of scientists that reviewed toxicology studies and developed risk assessment documents used for the regulation of pesticides used in California under agriculture, industrial and residential settings.

Education: Doctorate in Pharmacy (Pharm D.) (1966) University of California-San Francisco School of Pharmacy Master of Science in Marine Biology (1972) California State University-San Francisco Ph.D. in Fisheries and Environmental Sciences/Toxicology (1979) Oregon State University-Corvallis OR

MIKE GIUSTI

Michael Giusti (Retired from California Department of Fish and Wildlife, Senior Environmental Scientist Supervisor) spent 37+ years working on fisheries research, management and habitat enhancement mostly in southern California. Other duties included providing review and comments on environmental documents and becoming a department expert on the Stream and Lake Alteration Agreement process. Also, supervision of fisheries staff in Inyo, Mono, San Bernadino and Riverside Counties and wildlife staff in Riverside and San Bernardino Counties.

Education: B.S. Wildlife Management, Humboldt State University.

PAUL WISHEROPP

Paul Wisheropp is a retired water resources engineer with extensive consulting experience in river mechanics, channel restoration, hydrology, and floodplain analysis. He has worked on numerous environmental analyses of water projects in the central valley and throughout the state.

MARY ELLEN MUELLER

Mary Ellen Mueller Worked for the U.S. Fish and Wildlife Service for 23 years followed by 6 ½ years at U.S.G.S. Her positions in USFWS included fisheries research biologist at the Great Lakes Environmental Research Lab in Ann Arbor MI evaluating histological effects of PCBs on black bullhead in the Great Lakes She then went to Washington D.C. USFWS Fisheries Division as the Head of the National Fish Health Centers. Her last year in D.C. she was detailed to the Senate Interior Appropriations Committee. She then came to Sacramento, CA Regional Office serving as a fisheries supervisor with oversite of Fish Health Centers and some Fishery offices in California and Nevada. In her last 6+ years she moved to the Western Ecological Research Center of the USGS located on the campus of Sacramento State University. She served as a Research Manager supervising as many as 65 employees at various locations in California.

Education

B.S. Fish and Wildlife Management, Montana State University

M.S. Fish and Wildlife Management Montana State University

Ph.D. Zoology and Physiology University of Wyoming

KEN W. DAVIS

Aquatic biologist: Thirty years+ designing aquatic invasive species projects and surveying for invasive species, vernal pool crustaceans, and general plankton tows. Worked on numerous wildlife survey projects including, Mountain Lions, Desert Tortoise, and other endangered species. Worked 23 years as a consultant for to the Solano County Water Agency. Developed the Lake Berryessa Eurasian Mussel Prevention, Detection and Education Plan. Monitored Chinook salmon in Putah Creek for 15+ years. Developed a video monitoring program for the Peterson Ranch Burrowing Owl Project.

Wildlife Photojournalist: Fifteen years represented by a International Photo Agency. Images published by more than 5000 periodicals, encyclopedias, and text books. Image clients included National Geographic, Wildlife Conservation Magazine, Zoobooks, American Angler and the Fly Fisher. Other clients include: The California Rice Commission, Yolo County, Solano County, Sacramento County, USFWS, NOAA, Water Audit, State of California and Western States Native Trout Initiative.

LAURIE BANKS, M.Ed

Thirty six years teaching Continuation High School. Founder of the CFFU Conservation Committee.

JOHN DURAND

Science Teacher, 1980-2000. Consumes River Preserve Education Coordinator, 2000-2023, leading floodplain and wetland restoration projects for K-12 youth.