California’s once-thriving fish populations have dramatically declined, and many of our salmon, steelhead, and other iconic species will be extinct this century if current trends continue. Innovative conservation strategies are urgently required to reverse this rapid slide towards extinction.

One of the most promising new strategies is using Central Valley river floodplains as rearing habitat for juvenile native fish. This “fish on floodplains” concept is based on the straightforward ecology of aquatic food webs. When river water reaches floodplains during high flows, it spreads out and is exposed to increased sunlight that serves as fuel for a highly productive food web. Algae convert sunlight through photosynthesis and are eaten by zooplankton, which rapidly grow and reproduce. A staggering amount of zooplankton are produced on floodplains in only a few weeks after inundation, resulting in a nutrient-rich “soup” that is readily consumed by fish.

Young native fish, often only an inch or two in length, evolved to use these floodplains as rearing habitat when migrating downstream to the ocean. Besides food, floodplains offered these vulnerable fish safe refuge from predators and high flow velocities, thus supporting the large native fish populations once present in the Central Valley and downstream in the Delta.

In modern times, almost all Central Valley floodplains have been disconnected from rivers and flooding, all but eliminating access by native fish. Dams, levees, and other water control structures have constrained young fish to less productive river channels in which they struggle to find adequate nutrition and avoid predators on their journey to the ocean. Conservation agencies and practitioners agree that making floodplains accessible to young native fish is critical, but it remains uncertain how best to do so.

Under the ideal scenario, floodplains are reconnected to rivers so fish can enter them, fatten up on abundant food, and re-enter the river to continue their journey. River Partners’ previous efforts have focused on creating these frequently activated floodplains within large-scale restoration projects across the state. However, this approach does assume that flows will be high enough to reach floodplains and that the timing of high flows will match the timing of young fish migration downstream. As we have always recognized, this is a challenging scenario given all the modifications to Central Valley rivers. For example, spring flows are often captured behind dams and held.
Message from the Board Chair

By Irv Schiffman

Flooding in the Time of Drought

It may seem strange to read about flooding in California while the state is going through its fourth year of a record drought and the government is curtailing watering practices. The downpours of last December, however, should remind us that floods can occur any time after heavy rains no matter how little rain otherwise falls. According to the California FloodSAFE Program, the last four years of drought have averaged sixty million dollars a year in flood damage. For example, the December 2014 rains led to widespread flooding in the state, resulting in the evacuation of nearly 1,000 homes and the closing of several major highways. Elsewhere in the U.S., floods in drought-stricken Texas and Oklahoma recently brought death and disaster to the citizens of those two states.

Flooding can take many forms: the result of a river or stream surpassing the flood stage, usually from heavy rainfall or melting snow; flash floods caused by heavy rainfall often overwhelming small creeks and streams; and areal flooding, usually the result of a prolonged rainfall. In all of these events, the danger is made worse by the floodwaters rushing over dry, drought-hardened ground.

According to experts, the danger of flooding in California will increase whether there is a drought or not. There is a consensus among scientists that climate change is magnifying the risks of future droughts and floods and that California’s wet season will become shorter and sharper. Storms are likely to be more intense and winter precipitation will more likely fall as rain rather than snow.

Already we have seen that wildfires spurred by the drought and higher than normal heat have threatened many areas of California with floods and mudslides following heavy rains. The state Department of Forestry and Fire Protection, citing a major increase in wildfires this past winter, warns that the drought has made wildfires a year-round threat.

In March, California Governor Brown announced that $660 million of a billion dollar drought relief program would be spent on flood control measures: “With climate change and global warming, there will be more extreme weather events… All of a sudden, when you’re all focused on drought, you can get massive storms that flood through these [river and stream] channels and overflow and cause havoc.”

Enhancing flood protection is, of course, a major goal of River Partners. Our efforts to restore floodplains to their natural functions include working with governmental agencies to reconnect river channels to floodplains by moving back or breaching levees, thus mitigating storm surge. Meanwhile, restoration work on the floodplain eases the consequences of limited rain by providing refuge for drought-stressed wildlife and holding flood waters long enough to allow seepage into the underground aquifer.
for later release – yet these flows match the timing of young fish migration and could otherwise usher fish on and off floodplains. A second challenge arises during periods of drought, when flows are simply too low to reach floodplains altogether.

Conservationists are now exploring more managed solutions for fish, similar to what has been required for other terrestrial and aquatic species. For example, “simulated floodplains” can be created to which young fish could be transported, held for a short period of time sufficient for rapid growth, and then released into the river or transported further downstream. This water-efficient approach is especially relevant during droughts, since a large number of fish can be reared in shallow water on a relatively small area. Given River Partners’ access to riparian sites across the Central Valley, and our willingness to be creative in trying new approaches for species recovery, we are very interested in these kinds of options for native fish.

In 2015, River Partners successfully implemented two pilot fish-rearing projects based on these concepts. The first project was implemented as part of the “Nigiri Project”, a large-scale collaborative study at Knaggs Ranch in the Yolo Bypass involving both farmers and researchers from California Trout, UC Davis, and the California Dept. of Water Resources. The goal of the study is to test the general hypothesis that farm fields can both produce crops in the growing season and also serve as habitat for native fish and wildlife during winter months. In addition to the main project site, several satellite sites were established this year to broaden the study. Dos Rios Ranch, River Partners’ 2,100-acre flagship multi-benefit restoration site in the San Joaquin Valley, was chosen as one of them.

At Dos Rios Ranch, River Partners flooded a 3-acre grain field on the San Joaquin River floodplain in February. Our biologists and field staff installed six rearing pens into which were placed 20 hatchery-raised fall-run juvenile Chinook salmon that were reared for four weeks (Fig. 1). During this time, staff monitored fish growth, zooplankton development, and both water temperature and dissolved oxygen (Fig. 2). Fisheries biologists from the consulting firm FISHBIO lent their expertise and assisted with fish monitoring. After four weeks, all of the fish were measured a final time and sent to DWR for gut content analysis. The final numbers were highly encouraging and similar to results from the larger Knaggs Ranch project over the past few years: salmon experienced a 1.6-fold increase in length (49 mm to 76 mm) and a 4.8-fold increase in weight (1.3 g to 6.1 g). Survival was also extremely high (98%), which was largely the result of suitable water conditions maintained during the project.

At the same time, a second pilot project took advantage of a natural floodplain swale at the Willow Bend restoration site, north of Colusa on the Sacramento River. After one month of floodplain rearing, several hundred juvenile Chinook salmon experienced a 1.6-fold increase in length (37 mm to 62 mm) and a 5.8-fold increase in weight (0.5 g to 2.3 g). Similar monitoring of zooplankton, fish, and water chemistry was performed on this project (Fig. 3), and overall survival was again extremely high (93%).

Together, these two pilot projects successfully demonstrated the potential for flooded riparian habitat nested within River Partners large-scale restoration projects to serve as rearing habitat for juvenile native fish. We are now exploring options for expanding this approach to help create a network of floodplain sites throughout the Central Valley to improve native fish population resiliency and to support species recovery.

We thank the Volgenau Foundation and the Resources Legacy Fund for their generous support of these pilot projects and appreciate their interest in conserving native California species.
Thriving Plants and Helping Hands at Dos Rios Ranch

by: Heyo Tjarks, Restoration Ecologist and Jeff Holt, Restoration Biologist

It is an exciting time regarding ongoing restoration efforts at the 2,100-acre Dos Rios Ranch, located at the confluence of the San Joaquin and Tuolumne rivers in the San Joaquin Valley just west of Modesto. This unique site is being restored in phases by River Partners with funding from numerous state and federal partners and collaborative support from many conservation organizations. Dos Rios Ranch is one of our flagship projects due to the potential for increasing floodplain reconnection, flood safety, and habitat for threatened and endangered birds, mammals, fish, and insects.

The first 198 acres of the project were planted in 2013 with a diverse mix of woody trees and shrubs that are growing extremely well. Fast-growing species like cottonwoods are already 20 feet tall, and wildlife species have already begun using these fields as habitat. One of goals of the project is to create habitat for many different species of birds, and we are eagerly awaiting the results of bird surveys to be performed in the fields by Point Blue Conservation Science staff this summer. Earlier this year, after two years of maintenance and weed control, we planted native understory species in these same fields that have successfully established even in this period of severe drought. We have learned over the years that a dense, native understory community is critical for controlling weeds and providing additional habitat. Meanwhile, an additional 401 acres planted with native woody species in 2014 are thriving thanks to the hard work of our field staff and members of the California Conservation Corps.

One of the many benefits people of all ages receive from habitat restoration projects is the chance to volunteer for, and learn from, environmentally-friendly projects in their local communities. Over the past 14 months, the Tuolumne River Trust (TRT) has been utilizing Dos Rios Ranch as both an outdoor classroom and as a community volunteer site. TRT has teamed up with local elementary schools, offering field days for hands-on learning where students have the opportunity to identify native plants and wildlife and understand the diverse roles of California’s rivers. TRT has also hosted several outreach events for local community members to plant native trees and shrubs as part of the riparian restoration efforts. River Partners is also working with TRT, East Stanislaus RCD, and the Center for Land-Based Learning to implement a Student and Landowner Education and Watershed Stewardship (SLEWS) program at Dos Rios Ranch in late 2015. SLEWS programs engage California high school students in habitat restoration projects that enhance classroom learning, develop leadership skills, and result in real positive impact for the environment.

Restoration Planning Begins in the Lower Tijuana River Valley

by Dave Roberts, Restoration Ecologist

River Partners continues to expand on restoration efforts in Southern California. We recently received funding from the U.S. Fish and Wildlife Service to develop a Riparian Habitat Pre-restoration Plan for the lower Tijuana River, the Tijuana Slough National Wildlife Refuge, and the Naval Base Coronado. The lower Tijuana River Valley and the associated Tijuana Estuary are the end point of a 1,750 km² watershed, and is a complex ecological system that straddles the international border between the United States and Mexico. The unique Tijuana Estuary is the largest intact coastal estuary in Southern California. The Valley is home to core populations of the State Endangered Least Bell’s Vireo (Vireo bellii pusillus), as well as the Federally Threatened California Gnatcatcher (Polioptila californica). This grant provides funding to evaluate opportunities to restore riparian forest and sage scrub habitats within the lower Tijuana River Valley. Sediment, trash, and other pollutants carried in stormwater runoff currently threaten the Valley’s valuable ecological, recreational and economic resources. This project will benefit the region by providing a framework for the implementation of various multi-benefit restoration projects that will create wildlife habitat in addition to recreational and educational opportunities for local communities.

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Native understory species planted in 2015, including mugwort (bottom left) and creeping wildrye (bottom right), have established well in fields planted with woody species in 2014. Meanwhile, native woody species planted in 2014 are thriving on the adjacent 401 acres (top).
Breaking Ground at Abbott Lake

by: Michael Rogner,
Associate Restoration Biologist

With funding from the Wildlife Conservation Board, River Partners is restoring 150 acres of the 439-acre Abbott Lake Unit of the Feather River Wildlife Area, owned by the California Department of Fish and Wildlife. The Abbott Lake project has been delayed for years due to permitting challenges and other factors. Thanks to patience and persistence, we are excited to finally have broken ground on the project.

The Abbott Lake project is located 7 miles south of Yuba City and approximately 0.3 miles upstream of River Partners’ Star Bend Setback Levee Improvement Project. In conjunction with our restoration at the nearby O’Connor Lakes Unit, the Abbott Lake project will result in hundreds of acres of habitat on the Feather River while also improving river access and public recreation.

The restoration design for the 150 acres focuses on providing habitat for California Quail (Callipepla californica), Swainson’s Hawk (Buteo swainsoni), and Valley Elderberry Longhorn Beetle (Desmocerus californicus diamorphus), among other wildlife species. Most of this acreage has been planted with a diverse mix of native trees and shrubs that have established well even in this period of drought. A dense herbaceous understory of native grasses and forbs will also be planted to improve habitat quality and aggressively compete with invasive species.

Prior to implementation, this portion of the project was carefully analyzed to minimize adverse effects on floodwater conveyance and to improve flood safety for the surrounding area. Hydraulic analysis of the project was conducted by the firm MBK Engineers, which resulted in adjustments to plant locations, species, and densities to optimize conditions during floods. For example, large 100’ wide native grass corridors will be installed between blocks of woody trees and shrubs. The number of large woody species like cottonwoods and sycamores was also reduced, and the number of smaller, more flexible-stemmed species was increased. Both actions will make it easier for floodwater to move through the project site during periods of higher flows.

The remaining 35 acres will be planted with native grassland species. Integrated research by our former intern, Grant Thorton (M.S. student at Chico State University), seeks to identify cost-effective seed mixes and rates for these grassland sites. In addition to the area being actively restored, the surrounding habitat at Abbott Lake will be enhanced by removing invasive species. Overall, the restoration efforts at Abbott Lake will provide significant habitat for wildlife and increased recreational opportunities for the surrounding community.

Flexible-stemmed native blackberry plants wait patiently in their pots (left), ready to planted by River Partners’ hard-working field staff (right).
River Partners has always championed water conservation in California through our use of low-water native plants, efficient irrigation designs, and a climate-smart approach to restoration planning. We continue to seek new ways to conserve water, but not all opportunities occur within our large-scale restoration projects. Recently, thanks to a rebate from our water provider, our staff upgraded the sprinklers that irrigate our native landscaping around our Chico office. The old system was replaced for free with an EPA-certified WaterSense Smart Watering Controller from Hunter Industries (right). The new system is 40% more efficient than before, and uses a sensor to assess local weather conditions in order to optimize water schedules and reduce waste. It is just a reminder that, in this time of drought, water conservation starts with your home or office. Check with your water provider to see if you are eligible for a similar rebate - small changes can produce real results!

Annual SERCAL Conference and SJRRP Science Meeting

Conferences and meetings are excellent opportunities for sharing River Partners’ projects, successes, and lessons learned as well as engaging the broader conservation community. We were in sunny San Diego in mid-May for the 22nd annual conference of the California Society for Ecological Restoration (www.sercal.org). Our Otay River Delta project was the first stop on a day-long tour of restoration sites at the San Diego National Wildlife Refuge. Our scientists also presented on three different large-scale restoration projects at the conference itself, highlighting River Partners’ work in the Central Valley and in Southern California.

On June 11-12 in Los Banos, we and our project partners will be presenting on restoration and weed control projects from the San Joaquin Valley at the first annual Science Meeting for the San Joaquin River Restoration Program (www.restoresjr.net). The SJRRP is a comprehensive, long-term effort to restore the San Joaquin River and a self-sustaining Chinook salmon fishery. The purpose of the Science Meeting, which is open to the public, is to connect scientists and management staff to inform ongoing restoration planning and implementation. We look forward to sharing our experience from over 13 years of successful restoration and weed control projects in the region.
Adopt a Tree!

Join us in our mission to create wildlife habitat for the benefit of people and the environment. Your contribution will support our work to restore and protect the rivers of California, and you will also receive invitations to special tours and events.

☐ Yes! I’ll give the gift of nature and adopt a tree to support River Partners.

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