

Restoration in the Flood Plain: A How To

River Partners' O'Connor Lakes Project on the Feather River

By Tom Griggs, Senior Restoration Ecologist

Why is O'Connor Lakes an ideal restoration site? Successful riparian restoration must take place in a location that experiences the physical river processes of flooding, bank erosion, sedimentation, and channel movement. Without the annual influence of these river processes our restoration planting will eventually evolve into a patch of invasive weeds that do not serve wildlife needs. Creating viable

habitat for wildlife is the goal of restoration. In California's Great Central Valley, with dams and levees on the floodplain's rivers, river processes now occur only between levees or in the floodway. Thus, if we desire quality wildlife habitat in the future, riparian restoration projects must take place within the Central Valley's flood-control system.

River Partners' O'Connor Lakes project meets this criterion. The project is located about six miles south of Marysville-Yuba City along the Feather River on a unit of the California



High water on the Feather River in January 2006 flows through a portion of River Partners' recently restored site just as planned. The water is moving through an area that had been cleared for flood conveyance, protecting the planting of elderberries on other portions of the site, which will provide habitat for the endangered Valley Elderberry Longhorn Beetle (see article on page six).

Department of Fish and Game's Feather River Wildlife Area. The Feather River has a long history of levee breaks and floods, most recently in 1955, 1986, and 1997. Consequently, flood-control managers are very concerned about any activity in the floodway that could influence the behavior of the floodwaters.

When engineers designed the Feather River levee system, it had a "design flow"—i.e. maximum flow—that could be conveyed safely through the system. At the design flow the elevation of the floodwater is one to three

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In This Issue

This issue of the River Partners *Journal* focuses on the theme of flooding in the Central Valley. Flooding is part of life in the Sacramento and San Joaquin River ecosystems. So, too, are the levees and dams that have enabled us to live in these areas.

River Partners is dedicated to designing and implementing restoration projects along our rivers that provide wildlife habitat and help to mitigate the impacts of flooding. This issue of the *Journal* explains how.

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Message from the Board Chair

The disastrous flooding of New Orleans has increased awareness of how susceptible we in the Central Valley are to the vagaries of nature with regard to the many rivers that both drain the Valley and sustain our economy and quality of life.

When settlers first started coming in any number into the Central Valley in the early 1800s they discovered that the valley floor, particularly the Sacramento Valley, was essentially a massive flood plain, which during the rainy season turned into an inland sea that did not fully drain until summer.

They also found soil of exceptional quality, riparian forests, an abundance of fish and wildlife, and magnificent varieties of flora.

For them to live and prosper in the Valley it was necessary to control the annual floods – so they built levees, and weirs and by-passes and then they channeled the rivers and then they built the dams.

And with the paving of the new state for urban development, it became more crucial than ever to tame the rivers.

Indeed, with the exception of the Cosumnes, over the last fifty years every major river in the Central Valley has been dammed in the Sierra foothills, thus changing the physical face of the valley and altering its ecosystem. And we're not finished –to some an Auburn Dam continues to be a real possibility.

But still the floods come.

I've been in California since 1967. I missed the record flood of 1964, but I was in Chico for the great CA flood of 1986 – which affected 41 counties

After New Orleans, the city of Sacramento is considered by many to be the locality most in danger of a catastrophic flood.

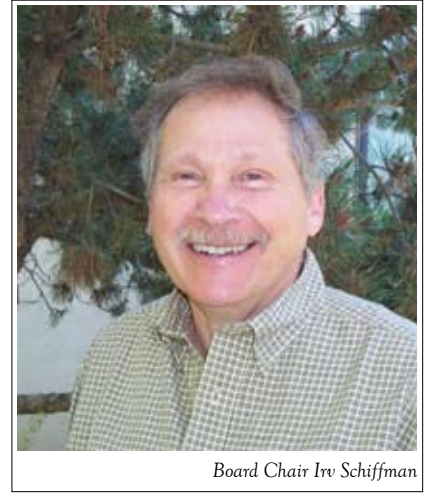
and killed 13 people – and during the record flood of 1997 which re-created the inland sea, floodwaters covering some 250 square miles of the Central Valley, destroying or damaging some 16,000 homes, killing eight people, and causing

about 1.8 billion dollars in damages. Indeed, after New Orleans, the city of Sacramento is considered by many to be the locality most in danger of a catastrophic flood.

Here in the Central Valley we have come to expect the expected – the floods will come and that past practices will mitigate but not control their fury. It is a troubling prospect that River Partners seeks to change through its restoration efforts that work to re-create the natural system and role of flood plains.

This edition of the River Partners JOURNAL is devoted to the concept that, along with the other valuable benefits obtained through the science of riparian restoration, this approach can reduce harm from flooding and at the same time

Continued on next page.



Board Chair Irv Schiffman

River Partners Welcomes New Staff

River Partners is excited to welcome **Julie Pokrandt** as our new Development Director. Julie comes to Chico from San Diego where she was the Executive Director of Project Wildlife. She brings a high level of successful fundraising, leadership and development to River Partners, as well as a strong commitment to environmental conservation.

"I'm excited to be a part of River Partners, an organization with a great mission and the capacity to realize its vision," Julie adds.

"Having lived in Southern California for more than 12 years, I've seen how habitat loss negatively impacts not only local wildlife populations but also the quality of life of local residents. It truly delights me to be a part of an effective, collaborative team that has succeeded in restoring habitat along our rivers. This is crucial work for the Central Valley's communities, economies, and biodiversity."

Julie is also thrilled to have made the move to rural northern California. "I knew I made the right decision to move to Chico the moment I stepped out of the car in my new neighborhood: I saw a Red-shouldered hawk nesting in my neighbor's backyard. As I explore the area, I am also slowly relearning the concepts of 'community' and "neighborliness."

Julie will be relying on River Partners' donors, partner organizations and agencies, and others in our community to help us raise much needed matching funds towards our current restoration and community education and outreach projects in the Sacramento and San Joaquin River valleys.

River Partners also welcomes several new staffers since our last *Journal*: **Christiana Conser**, Biological Technician; **Tara Morgan**, Biological Technician; **Cayle Little**, Restoration Field Manager; **Sara Taylor**, Biological Technician (San Joaquin); and our two interns from California State University, Chico: **Jessica Gibbs** and **Joe Green**. We are also thrilled to announce that **Jessica Bourne**, Financial Specialist, and her husband Craig had a new baby, Jonas.



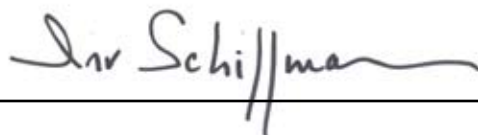
Development Director Julie Pokrandt

Message from the Chair

Continued from previous page.

enhance the positive environmental effects that natural floods provide.

River Partners' Senior Restoration Ecologist Tom Griggs shows how, through modeling, a riparian restoration effort along the Feather River is designed to create a "flood neutral" project, incorporating the beneficial aspects of flood waters while avoiding their destructive effects (page one). River Partners' Restoration Ecologist Dan Efsseff describes an interdisciplinary team effort along the Sacramento River, which is designed to meet the multiple goals of habitat restoration, flood management, and facilities protection (page four).

A handwritten signature in black ink that reads "Dan Efsseff".

Opening Young Eyes: Outdoor Education

By **Christiana Conser** and **Jessica Gibbs**

At the Del Rio Wildland Preserve Learning Center in Glenn County, students from Chico Country Day School (CCDS) are seeing the season's changes firsthand and learning how habitat restoration of native riparian forests on the river provides essential habitat for more than 225 species of wildlife. The 96-acre site, located on a flood-prone former almond orchard, was restored in 2004 with native riparian trees, shrubs and grasses to provide wildlife habitat for threatened and endangered species such as blue grosbeaks, Swainson's hawks, valley elderberry longhorn beetles, giant garter snakes, and others.

Historically the Sacramento River was bordered by 500,000 acres of riparian forests but currently less than 5% remains. CCDS student Anthony observed, "It's good to restore (riparian forests) so animals can go back to the homes they had before."

The new science education program was created by River Partners and CCDS in 2005 with funding provided by the Nature Restoration Trust - a partnership between PG&E and the National Fish and Wildlife Foundation. The program uses



Second graders measure the height of a coyote brush.

an interactive approach. Students learn ecological and earth science principles by conducting independent scientific investigations to develop their observation skills. Biologists at River Partners adapted existing curriculum to teach students about riparian ecosystems and habitat restoration on the Sacramento River. Each activity is adapted for the appropriate grade level and meets a Science Content Standard for California Public Schools. According to CCDS environmental science teacher Suzie

Bower, "Students get a real sense of what the world is all about when they see their studies outdoors."

The program consists of fall and spring field trips for grades 1 through 6. Each activity includes a biology lesson, pre-field trip classroom activities, library and internet resources, and follow-up activities to make deeper explorations back in the classroom. Suzie Bower adds, "They also just had fun and anytime a kid has fun at learning, it sticks!"

Floodplain Solutions on the Riparian Sanctuary: A Confluence of Agriculture, Ecology, and Science

By Dan Efseaff,
Restoration Ecologist

One of River Partners' core values is to develop restoration projects that provide critical, high quality wildlife habitat and meet the needs of the local community. River Partners recently put this core value to the test to find workable river management solutions as part of the Riparian Sanctuary project.

Open dialogue with concerned community members, the use of state of the

The Birth of a Joint Project

The project area centers around the Riparian Sanctuary along the Sacramento River (please see sidebar). For this area, River Partners had to balance two potentially conflicting issues: (1) how to improve habitat and meet conservation goals within the refuge and (2) how to protect an existing pumping plant and fish screen facility on the opposite bank.

It's easy to imagine the conflicts that would arise from vastly different perspectives to define the problem and generate solutions. Traditional engineering approaches to protect the Princeton, Cordora, Glenn and Provident Irrigation Districts (PCGID-PID) pumping plant facility would require a rock bank and a rigid river channel, while a meandering river on Refuge-owned land contributes to a rejuvenated forest and complex channel that is absolutely essential for the long-term survival of native plants and animals. Therefore, the traditional engineering approach would have produced the traditional outcome-conflict, delay, and short-term fixes that harm the health of the river.



Community meeting in Glenn County communicated the project and obtained input from neighbors.

The different users on opposite sides of the river initially had vastly different perspectives.

art modeling tools, and a strong scientific advisory team, have produced solutions to meet multiple goals. The project has generated support from a diverse coalition of agricultural and environmental interests, and suggests the progress possible when sound partnerships and science come together.

The Riparian Sanctuary

In 1991, the Riparian Sanctuary became part of the Llano Seco Unit of the Sacramento River National Wildlife Refuge (SRNWR), managed by the U.S. Fish & Wildlife Service (USFWS).

The 950-acre unit is 15 miles southwest of Chico in the southwest corner of Butte County, on the east bank of the Sacramento River between River Mile 176.5 and 178.

The USFWS acquired the Llano Seco Unit "to protect, enhance, and restore critical habitat and natural communities of native, resident, and migratory wildlife species" (FWS, 1992). Approximately 450 acres of the site is in existing (or recently recruited) riparian habitat

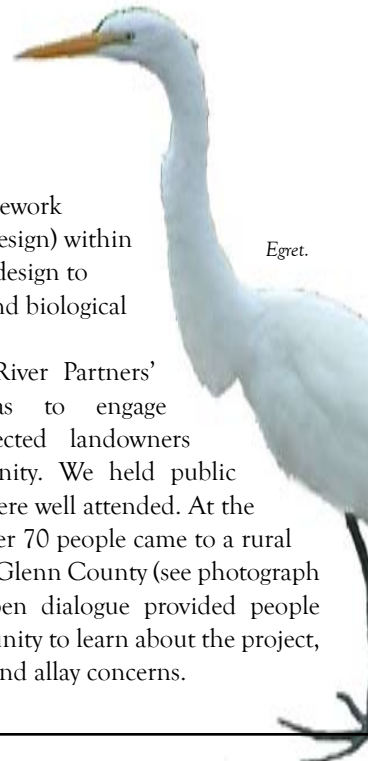
providing excellent habitat for a wide variety of riparian wildlife.

However, non-native plants (such as yellow star thistle (*Centaurea solstitialis*), bull thistle (*Cirsium vulgare*), black mustard (*Brassica nigra*), and Johnson grass (*Sorghum halepense*)) dominate the remaining 500 acres of the unit. Even worse, the site is vulnerable to invasion by giant reed (*Arundo donax*), tree of heaven (*Ailanthus altissima*), and pepperweed (*Lepidium latifolium*). These current conditions contribute little to conservation.

Working closely with the USFWS and the PCGID-PID, River Partners began with an optimistic notion – that a joint effort would result in consensus based solutions that meet habitat restoration, flood management, and facility protection goals. Funded through a CALFED grant, we embarked on a series of feasibility studies to:

- Identify ecologically sound measures that protect the PCGID-PID pumping plant and fish screen
- Examine management options to aid species recovery and meet USFWS goals on the Riparian Sanctuary
- Develop a scientific framework (experimental design) within the restoration design to monitor river and biological processes.

In 2004, River Partners' first step was to engage potentially affected landowners in the community. We held public meetings that were well attended. At the first meeting over 70 people came to a rural meeting hall in Glenn County (see photograph above). The open dialogue provided people with an opportunity to learn about the project, provide input, and allay concerns.



Egret.

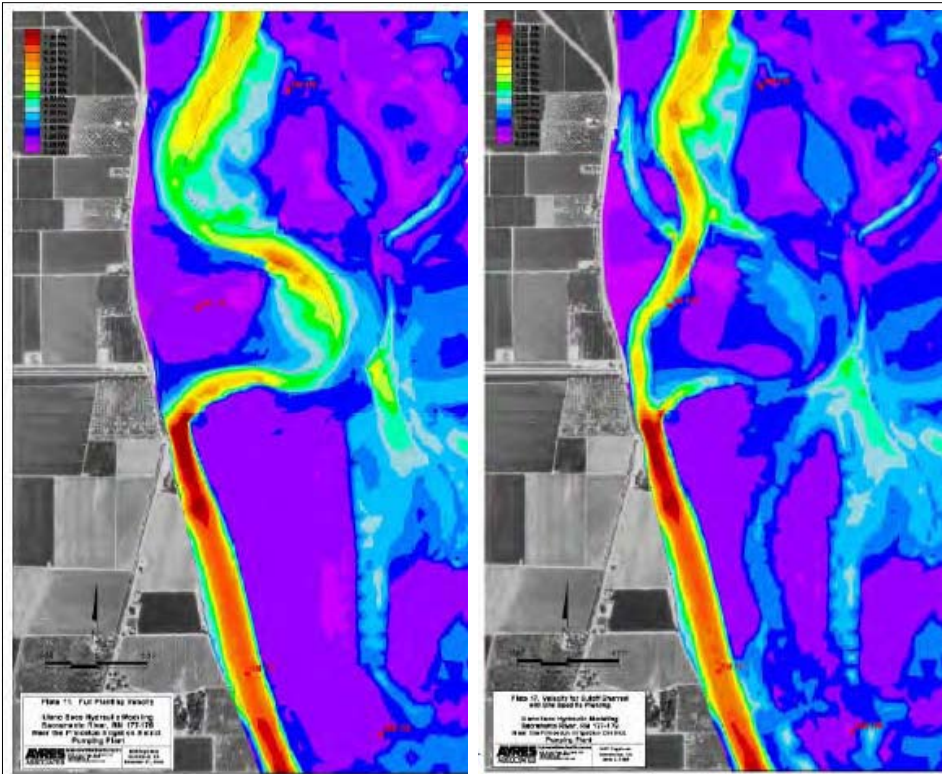
The PCGID-PID Fish Screen and Pumping Plant



The PCGID-PID pumps on the Sacramento River on the Riparian Sanctuary, Llano Seco Unit, Sacramento River National Wildlife Refuge.

In the mid-1990's the PCGID-PID consolidated three existing unscreened pumping plants on the Sacramento River into a single pumping plant with a state-of-the-art fish screen. The facility is located directly across the river from the Riparian Sanctuary. A driving force of the \$11 million project was the protection of endangered fish species such as juvenile Chinook salmon and steelhead. With a 605 cubic foot per second capacity, the pumping plant is the fourth largest on the Sacramento River (left). The PCGID-PID serves nearly 30,000 acres of orchard, row crops, rice, and wetlands.

The Feasibility Study identified bank retreat as a serious threat to the operation of the pumping plant. For example, if the east bank erodes, the angle of flow and velocity of the water passing the screens will change, potentially trapping fish against the screens rather than sweeping them past. Without meeting the flow standards, the plant would shut down, causing severe economic impacts. Traditional remedies would provide few ecological benefits.



Integration of Facility Protection and Restoration Science: Modeling examined current channel configurations with restoration (left) and hypothetical channel configurations with site-specific restoration design for flood corridors (right).

Promising Solutions

The complex issues surrounding the site warranted the involvement of a multi-disciplinary team. For the next step, River Partners pulled together the principal partners, consultants, and technical and scientific advisors, to explore potential

solutions and to develop the criteria to judge them.

Fortunately, a number of sophisticated tools were available to analyze options. For example, hydrologic and meander modeling allowed us to “move” the river (see modeling images) and allow river meander on the upper bend and while controlling meander on the lower bend. If combined with restoration, this

promising solution protects the pumping plant and provide new riparian and oxbow habitat.

Once restored, the Riparian Sanctuary would fit into one of the largest blocks of contiguous riparian habitat on the Sacramento River – a corridor of more than 2,000 acres stretching more than 10 miles (river mile 174 to 184). This proposed restoration, in conjunction with other efforts on Llano Seco (see sidebar), will contribute to a unique mosaic of riverine, wetland, grassland, forest, and woodland habitat found nowhere else in California. River meander and protection of the pumping plant facility are also a part of the solution.

From Conflict to Collaboration

Sound science, strong partnerships, and attention to multiple goals have produced feasible solutions that have successfully garnered support from agricultural and conservation interests. River Partners, PCGID-PID, and the USFWS are now collaborating on the next step to further investigate these solutions. The joint project provides a glimpse of how hard work and collaboration can produce good floodplain management decisions

For More Information

As part of an open process all of the technical reports and meeting summaries are available on River Partners' webpage (riverpartners.org). Anyone is welcome to access them by clicking on the Riparian Sanctuary Overview button and following the document links.

Restoration in the Flood Plain

Continued from page one.

feet below the top of the levee. Any changes to the floodplain between the levees have the potential of raising the elevation of the design flow or of locally increasing the velocity of the flow against a levee causing it to erode. Vegetation can cause both of these to occur.

River Partners hired MBK Engineers, specialists in flood management engineering, to evaluate the pattern of the floodflows on the O'Connor Lakes project and to give us guidance for the plant design, or how to arrange the trees, shrubs, and grasses such that the design flow is not altered. Using a complicated two-dimensional computer model, MBK determined where in the restoration area the high velocity floodwater would flow, and where the slow-moving backwater areas would be during a hypothetical design flow flood. Using the same model MBK tested various configurations of trees, shrubs, and grasses until we developed a planting design that made no changes to the design flow, in other words, a "flood-neutral" design.

Developed with the aid of the computer model, here is the plant design we followed. Field one is planted with the full complement of trees and shrubs because it lies in a backwater area of very slow moving water. Field two is planted with only creeping rye grass because this is an area of high velocity flows. Field four is planted with rose and blackberry and no trees and no large shrubs so that floodwater can pass easily (trees in this field could deflect water into the levee).

The O'Connor Lakes project exemplifies how River Partners is working with flood control engineers to develop riparian restoration projects that benefit wildlife and people, especially in our flood-prone Central Valley.

Landmark Restoration Agreement Provides a Model for Future Action

By Michael J. Bean, Environmental Defense, and John Carlon, River Partners

While the Governor's plans for beefed up flood control efforts garnered big headlines recently, too little attention was paid to an important agreement among often-sparring conservation and flood control agencies in the state. That agreement, finalized in November 2005, and shepherded by River Partners for more than two years, breaks a longstanding impasse over ecological restoration efforts along the state's rivers. The Reclamation Board, the Department of Water Resources, the Department of Fish and Game, and the U.S. Fish and Wildlife Service all deserve credit for harmonizing their public safety and environmental responsibilities.

But to understand why this agreement is so important, you must take a short walk through history. California's rivers were once lined with extensive riparian forests, spread out over wide floodplains. Over the years, agricultural, commercial and residential development has occurred in these floodplains, some of it with little heed of the attendant flood risks or the environmental consequences. The development rendered riparian forests - on which many of California's endangered species depend - one of the state's most imperiled ecosystems.

The land between the levees is often the only place where significant stands of native riparian vegetation remain and is generally the best place to restore such habitats. Yet proposals to restore habitats likely to be used by endangered species have brought into sharp focus the challenge of accomplishing both public safety and environmental protection goals. Routine floodway maintenance can sometimes harm endangered species or their habitats. Mitigation of those impacts by positive measures elsewhere is usually required. And mitigation costs can be significant.

In a head-to-head battle between cost savings vs. nature, money usually wins. The Reclamation Board's permits for restoration activities usually prohibited the planting of elderberry bushes, which provide habitat for a boldly colored but exceedingly rare creature - the Valley elderberry longhorn beetle. If they're not planted, they can't be destroyed, which means they don't have to be mitigated. That kind of cost-saving, however,

sacrifices one of the best opportunities to recover the beetle and get it off the protected list, which everybody - including the Reclamation Board - wants.

The new agreement addresses this very conflict. On the O'Connor Lakes Unit of the Feather River Wildlife Area, River Partners and the Department of Fish and Game will restore habitat on 228 acres, including the planting of 1,300 elderberry bushes (see article on page one). That will increase the number of elderberries on the site more than tenfold. The multi-agency agreement allows the planting of the elderberries now, without any obligation to mitigate for their loss if future maintenance or flood fighting activities damage or destroy the planted bushes. By avoiding future mitigation costs and improving floodway maintenance while simultaneously creating habitat for an endangered species, the agreement serves both public safety and conservation goals.

River Partners was pleased to see almost immediate, on-the-ground results of this agreement. Once we were allowed to begin restoring the O'Connor Lakes project on the Feather River (in Valley Elderberry Longhorn Beetle habitat), we discovered that previous flood control efforts in the area were ineffective and expensive, and that a simpler method of revegetation that would both improve flood control and provide species habitat, could be utilized. Our efforts were rewarded when the January 2006 high water flowed exactly as we wanted through the newly restored project site (see photo on page one).

This approach resembles a now decade-old idea that allows private landowners to restore or improve habitat for rare wildlife without encumbering their land with unwanted new restrictions. Called "safe harbor agreements," they build upon the theory that relieving fear of future restrictions can foster significant habitat improvements, with River Partners' help. The Reclamation Board, the Departments of Fish and Game and Water Resources, and the Fish and Wildlife Service have produced a sensible solution that will save taxpayers money, improve flood protection and benefit endangered species.



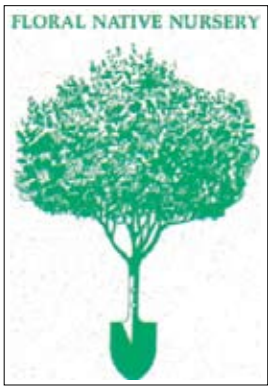
Valley Elderberry Longhorn Beetle

Local Nurseries Support River Partners

River Partners is delighted that Floral Native Nursery and Sierra Horticulture, two of our major suppliers of the native plants used in our restoration projects, have also each made a cash donation of \$2,500 towards our work to educate the community about the importance of riparian ecosystems.

Sierra Horticulture farms 23 acres of kiwi fruit mostly in the river bottoms, and a nursery in which they grow the plants for River Partners. Owner Rick Argetsinger recalls that he first became involved in River Partners after seeing a project at Woodson Bridge with John Carlon, and gaining an understanding of "what we need to do to make sure that restoration is being done correctly."

Floral Native Nursery has provided California Native Plants in Butte County for more than eight years, propagating local, native trees, shrubs, flowers and grasses from seeds and cuttings, ensuring that the plants used, for example, in River Partners' projects, are adapted and suited to the locations in which we work.



According to owner Germain Boivin, "We have grown plants for River Partners' revegetation programs since they started. We are happy to support an organization that does such important work in the community."

Thank You to Our Supporters!

River Partners would like to acknowledge the following for their generous support in 2005-2006

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Yes! I'd like to become a River Partner.

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I understand that my contribution is tax-deductible and that my information will never be shared with any entity.

Your membership contribution will help us in restoring and protecting the rivers of the Great Central Valley of California. You will receive our quarterly *Journal* and a River Partners membership window decal.

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Enjoy a Walk Around Ord Bend

Saturday, April 29, 2006
8:30 am to 10:30 am

Come explore one of River Partners' first restoration sites with our ecologists. See habitat thriving with neo-tropical birds and native trees, such as valley oak, willow and box elder. Amidst 10 types of native grasses, blooming in April, learn about the secrets of the site's ancient soils.

This gentle walking tour offers something for everyone as we guide you through this restoration project within the Sacramento River National Wildlife Refuge in Glenn County.

To make a reservation, call River Partners at (530) 894-5401 x 22, or stop by our office at 580 Vallombrosa Ave., Chico, CA 95926. Space is limited, so sign up today! We request a tour donation of \$5.



Great blue heron.

Project Updates

Drumheller Slough - The goal of this project is to remove the existing prune orchard and develop and implement a restoration plan. Located at the Drumheller Slough Unit of the Sacramento River National Wildlife Refuge three miles south of Butte City in Afton, the site contains 2,000 linear feet of Sacramento River stream bank and is important for conservation of the valley elderberry longhorn beetle and winter run Chinook salmon. Currently River Partners is completing the final stages of a plant design and has completed a detailed survey of the site, which will help facilitate layout of the irrigation system.

San Joaquin - River Partners has two new projects in the San Joaquin River National Wildlife Refuge to restore abandoned levee land with native plants in collaboration with the City of Manteca and the City of Tracy.

Turtle Bay - Earlier this year, River Partners completed this high visibility community project, at the McConnell Arboretum, part of the Turtle Bay Exploration Park. Along the north bank of the Sacramento River within Redding city limits, the goal of the project was to restore riparian associations of native trees, shrubs, and grasses that will support wildlife species characteristic of streamside forests in the Central Valley. The restored area is now open to the public and is part of an extensive outdoor recreation and educational area adjacent to the Turtle Bay Museum and Sundial Bridge.



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