San Joaquin Valley Project
Native Seed Harvest

Photos and text by Stacy Small, Ph.D.

Kneeling on the barn floor at the San Joaquin National Wildlife Refuge, Salvador Barragon grasps a stack of drying Spanish clover (*Lotus purshianus*), and gives it a hard shake. He reaches under the stack to sweep out a pile of loose plant matter and rubs his palm over it a few times. He then leans over and, with a sharp puff of breath, blows away bits of dried flowers, stems, and leaves. What remains is a pile of pebbly black seed. Native clover seeds like these will be sown to provide forage and cover for the endangered riparian brush rabbit (*Sylvilagus bachmani riparius*) on restoration sites where River Partners has recently planted trees and shrubs.

It is harvest time for River Partners’ San Joaquin Valley restoration team, and this year we will be planting 220 acres of native herbaceous understory on our riparian restoration sites for habitat and weed control, in addition to the 1,500 acres of understory we have already sown.
Message from the Board Chair

An Unlikely Challenge For Restoration

Growing up in a tenement on the east side of Manhattan in New York City, I had never heard of, and certainly never saw, a vole, a mouse-like rodent somewhat similar in appearance to a pocket gopher. Voles have shorter tails and ears than the city mice that skittered through my family’s apartment and have long, coarse fur that is blackish brown to grayish brown.

There are six species of voles in California and the one responsible for the majority of damage in our restoration areas is the California vole (Microtus californicus), found primarily in the Central Valley and along the coastal range. Their ravenous appetites are exceeded only by their ability to reproduce: some populations regularly go through cycles from low to high numbers with occasional irruptions that can send numbers soaring (up to several thousand per acre). Indeed, in captivity voles are known to produce as many as seventeen litters a year, more than any other mammal on earth.

Voles damage and sometimes kill the trees we plant by girdling the bark, that is, by chewing a band off the whole way around with their chisel-like teeth. This action exposes and destroys the cambian layer under the bark that is responsible for transporting water and soil nutrients to the tree. The voles in our riparian areas seem particularly partial to younger cottonwood and willow trees.

Voles are controlled somewhat by making the habitat less suitable to them, such as planting perennial native grasses to replace the more tempting exotic annual species. They are also reduced in number by the floodwaters that often drown them.

While the abundance of voles constitutes a real nuisance to our restoration efforts, they play a more positive role in the larger ecosystem of the Central Valley. Voles make up a good portion of the diet of red foxes, coyotes, mink, owls, and other predators. They are a staple of the diet of Swainson’s hawk, which is listed as a threatened species by the California Department of Fish and Game. Also, by composing such a significant portion of predator diets, voles and other small mammals may serve to buffer ground nesting birds from nest and brood predation.

Board Chair Irv Schiffman

The California vole. Photo by Jack Kelly Clark, University of California, courtesy of the UC Davis IPM program. For more information, visit www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7439.html
River Partners Project Updates

Fall is the time for collecting plant material

To ensure the success of future plantings, over the next few months River Partners must collect 150,000 acorns, 37-gallons of rose hips, and 100-pounds of mugwort seed. We are also collecting seed from 10 plant species for experimental riparian meadow plots. The experimental riparian meadow plots will be planted at the Drumheller Slough, La Barranca and O’Connor Lakes projects.

Over the summer, our science staff and interns processed blackberry, elderberry and pipevine seed, as well as collected Sycamore cuttings from the Sacramento River Watershed.

Controlling Invasive Weeds at O’Connor Lakes

Since our experiment with using goats to consume invasive weeds succeeded at Turtle Bay, we moved the herd to O’Connor Lakes in Sutter County. The goats were limited to a 70-acre section of this project and they cleared about 80-90% of the star thistle, arundo and tumble weeds.

Bidwell Ranch Mitigation Bank Project

River Partners and the City of Chico hosted a Citizen Work Group Meeting for the Bidwell Ranch Conservation and Mitigation Bank Project on September 25th, 2007 at the City Municipal Building. River Partners is preparing the documents necessary to establish the Bank. Once completed, the City will decide on whether to move forward with the mitigation bank.

The meeting provided members of the Citizen Work Group an update of the project and an opportunity to provide input on documents and research methods. Staff members Dan Efseaff and Colleen Martin provided an overview of the project and process. Greg Treber (Tehama Environmental Solutions) outlined and fielded questions about the recently updated Wetland Delineation, while Greg White (California State University, Chico) discussed the upcoming cultural resource investigation. Coral Cavanaugh (Coralium Consultants) facilitated the meeting.

A draft site inventory will be available for review in Fall 2007. Further information on the Bidwell Ranch Conservation and Mitigation Bank Project can be accessed online at www.riverpartners.org/where-we-work/bidwell/bidwell.html.

If you would like to receive the first wave of announcements about our canoe floats, or other news alerts, please register your email address at our website: www.RiverPartners.org.

River Partners kayakers going up the Bear River, Oct 6, 2007. Photo by Matthew Morgan
in the region. This means collecting more than 600 pounds of tiny seed locally from native plants like mugwort (Artemesia douglasiana), gumplant (Grindelia camporum), and Spanish clover. This approach to seed collection and processing ensures that we preserve the local genotype adapted to the specific environmental conditions wherever we are working.

The seed collection techniques that restoration manager Stephen Sheppard and restoration field foreman Barragon have developed over the years resemble very traditional agricultural harvest methods, put into practice for cutting-edge ecological restoration efforts. The natural forces of water, wind, and gravity are all employed to collect seed. Seed heads of herbaceous plants are gathered by hand with clippers and spread across large tarps to dry for several weeks in a barn. The dried plants are then shaken and beaten...
over plastic bins, and the seed is sifted over a screen by a team of two people. On a day with just the right, slight breeze, the seed falls straight to the ground over a tarp and the lighter chaff blows off to the side. Seeds are extracted from elderberries, currants, and native California blackberry (*Rubus ursinus*) through a hand-cranked grinder, and then rinsed with water through a series of sieves and buckets to separate out the heaviest viable seed from the berry pulp and skin. Acorns are collected from tarp spread beneath oaks over a period of weeks. “When we started processing seeds, it was all totally new to us. We tried a lot of different implements -- kitchen blenders, fruit juicers, a grain harvester, window screens…Salvador figured out that a corn meal grinder worked best for separating berry seeds from the pulp. We finally built our own screens of different sizes for sifting gumplant and the smaller mugwort seeds. We’ve just been figuring it out as we go,” says Sheppard.

This year, River Partners’ San Joaquin Valley staff harvested several gallons of golden currant (*Ribes aureum*) berries and more than 3,000 valley oak (*Quercus lobata*) and interior live oak (*Quercus wislizenii*) acorns for next year’s tree and shrub plantings. We will incorporate golden currants in a planting for the first time next year on a new restoration site along the Stanislaus River, on the Buffington Tract of San Joaquin National Wildlife Refuge. This shrub species will be part of a willow riparian shrub planting design targeted for wildlife that depend upon shrubby habitat, including the riparian brush rabbit, valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), and breeding birds such as Least Bell’s Vireo (*Vireo bellii pusillus*), Yellow Warbler (*Dendroica petechia*), Black-headed Grosbeak (*Pheucticus melanocephalus*), and Wrentit (*Chamea fasciata*).

Growing from native seed collected and processed locally is just one way that River Partners preserves and promotes the biodiversity of California’s Central Valley.

“River Partners’ native seed collection techniques resemble very traditional agricultural harvest methods, put into practice for cutting-edge ecological restoration efforts.”

Gumplant seed is sifted over a screen, and a slight breeze separates the seed from the lighter chaff, which blows to the side.
Do plants slow down flood waters? For any professional concerned about flood control, this is a BIG question, as the goal is to have a flood control system designed to facilitate the passage of flood water, not necessarily to slow it down. Slow-moving flood water could stack up within a channel and spill over levees. Typical engineering models assume all vegetation, as well as rocks, boulders and logs, decrease flood water velocity. This slowing factor is called “roughness.” Recently, though, the research team at UC Davis’ monster flume have seen that sandbar willows help convey flood waters. In other words, the willows, rather than add a “slowness” factor, actually provide a “quickness” factor for river water moving at flood speeds.

These preliminary data from the sandbar willow experiments suggest that flood control professionals need to rethink how plants and flood waters interact. Not all plants have equal “roughness,” and in fact, some native plants have the potential to increase flood water conveyance. In other words, native plants, which benefit wildlife, also could benefit flood control.

The Flume

On the west side of UC Davis’ campus resides the J. Amorocho Hydraulics Laboratory, also known as the “Monster Flume.” The Monster Flume is a 95’ long by 8’ wide tank with a pump that can push water through the structure at a rate of 70 cubic feet per second. The machine essentially simulates river flows, from normal conditions up to extreme flood events.

Funded by the Department of Water Resources (DWR), UC Davis Prof. Lev Kavvas and his research team are running experiments with different plant species in the tank, measuring flow at different depths and recording plant bending responses. Their project, “Roughness Character of Plant Species in California Rivers,” tests native plant species supplied by River Partners. The first trials involve sandbar willow. Future trials will study mulefat, California rose, and California blackberry.

Dr. Kavvas’ team sets up the experiment by “planting” one type of native species on the flumes’ floor. They then run various trials at different water velocities. While recording localized velocities at different spatial points within the flume tank, they also observe and measure the plants’ (in this case, the willows’) responses. The trials reveal that when the flume puts out water at flood velocities, the willows lay down. Further, once the willows lay down, the actual velocity of the water above the plants is greater than flood water running over bare soil.

Simply put, the flexible willows create a smoother layer over which flood water may pass. Since the willows are laying down, they also protect the soil surface from erosion – an additional benefit.

Native Plants for Wildlife and Flood Conveyance

River Partners is excited to be a collaborator in this research project. We are involved as consultants on the experimental design and also as a provider of the various native plant species.

This collaboration is the historical product of a series of questions River Partners had about vegetation in the flood way. In the aftermath of flood events within our project sites, River Partners’ field staff and ecologists consistently observed some species bent over where flood waters seemed to have run fastest.

Believing that the roughness characteristics of plants in river and streams may be more complex than traditionally assumed, River Partners proposed to DWR the idea of running flood experiments within one of our project sites. DWR, opened to the concept, then proposed involving the J. Amorocho Hydraulics Laboratory and using the monster flume. From there, Dr. Lev Kavvas developed the research into investigating individual species, rather than an aggregate, under flood conditions.

From Dr. Lev Kavvas: “Hydraulic roughness values are not known for many native floodplain plants. Therefore floodplain managers and engineers are reluctant to use native vegetation in floodplain management, unsure of the resulting effect on flood hydraulics and flood protection structures (i.e. levees).”

This research quantifies the effect of plants in the floodway, thereby providing a rational means to include them in engineering designs and models. Discovering how specific species respond to flood waters means plants can be used more effectively in restoration designs to enhance public safety while also protecting the environment. This creates a potential win-win situation for flood control and riparian and wetland habitat conservation.
Special for the Holiday Season: GIFT MEMBERSHIP

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Introduce your family and friends to River Partners. Make them partners in protecting our rivers, fish, wildlife, and recreational areas.

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River Partners Development Department
580 Vallombrosa Ave., Chico, CA 95926
(530) 894-5401, ext. 22, jpkorandt@riverpartners.org
www.riverpartners.org. Thank you for your support!

Join Us for these Upcoming Events!

December 4-6: Riparian Habitat Joint Venture Conference
Integrating Riparian Habitat Conservation & Flood Management in California. The Radisson Hotel, in Sacramento, California

River Partners’ science staff will present several papers and posters to their professional peers, highlighting our successes in designing and implementing restoration projects.

Chico Mason Family Center. For more info: www.snowgoosefestival.org

Among the festival’s numerous tours, River Partners staff will lead at least two which show case our work around Glenn and Butte Counties.

Save the Date: April 11, 2008
River Partners’ Annual Dinner
Celebrating our 10-Year Anniversary!

Throughout the 2008 season, we'll be celebrating our 10 year anniversary with a series of nature tours, canoe floats and other special events. The Annual Dinner will be the kick off – stay tuned to our website for more details. www.RiverPartners.org

Photo by River Partners Staff.