

VETTING LID

In late June I had the opportunity to visit the Puget Sound area of Washington state as part of the US EPA's review of the Puget Sound Partnership (one of the other 27 other National Estuary Programs). The trip provided a wonderful way to exchange ideas and learn from another program on the West Coast facing many of the same issues we have here in the San Francisco Estuary. Particularly exciting is the Puget Sound Partnership's work on better measuring and defining the water quality benefits of Low Impact Development (LID) stormwater projects. I toured the Washington State University Puyallup Research and Extension Center, which is using a \$1 million state grant to retrofit the WSU Puyallup campus to significantly reduce stormwater runoff. The project employs "green" development practices including permeable paving surfaces and stormwater bioretention facilities.

The retrofit includes a significant research and monitoring component to measure the effectiveness of various LID practices. A variety of permeable surfaces have been used to retrofit paved parking lots and various retention facilities installed. Thirty-nine bioretention cells have been built: 16 are full-scale rain gardens (measuring approximately 18 feet by 18 feet) to test different mixes of plants; 20 bioretention areas (60 inch-diameter-by-52-inch-deep tanks or mesocosms) will test the performance of different soil compositions; 3 additional bioretention areas (18 feet by 32 feet) were also built, with the same overall soil and aggregate bedding depths as the rain gardens.

Researchers can now very finely measure which approaches are most effective in directing stormwater back to the aquifer and which measures do the best job at filtering out a suite of specific pollutants. The retrofit also will be used

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ESTUARY NEWS

Bay-Delta News and Views from the San Francisco Estuary Partnership | Volume 19, No.4 | August 2010

PUTTING PARKING LOTS TO WORK

Can a parking lot mitigate for its dirty guests? Built with funding from a small increase in vehicle license fees in San Mateo County (see "Slow It, Spread It, Sink It," ESTUARY NEWS, August 2009), four new rain gardens and bioswales at the Daly City Public Library parking lot are proving that plants and soil can filter out some of the worst pollutants before they make their way into the storm drain system, Colma Creek (inhabited by endangered clapper rails), and San Francisco Bay.

According to the San Francisco Estuary Institute's Nicole David, who monitored runoff from the parking lot before and after the rain gardens and swales were installed, initial results show a 40% reduction in PCBs and mercury to an over 80% reduction in PAHs (from motor oil, diesel, and asphalt), and heavy metals like zinc, copper, lead, and nickel. Explaining the difference in those reductions, David says, "Mercury is more of a global problem, while PAHs, copper from brake pads, zinc, lead, and nickel are more from local sources." David says the pre-rain garden concentrations of these pollutants were 5 to 80 times higher than the long-term average concentrations of the same pollutants in central San Francisco Bay, suggesting that "our transportation infrastructure is a major contributor to water quality impacts in the Bay." Eighty-eight percent of last winter's storms were successfully treated through the rain gardens and swales, she says, with only 12% exceeding their capacity and overflowing into the storm drain system. "This shows great potential for new and re-development projects to include this type of treatment right at the source. It not only improves aesthetic values but also helps downstream—and in the Bay."

The Estuary Institute will monitor the site again (through an Estuary Partnership grant) in a couple of years after the plants have matured. "We don't know if there will be saturation [of pollutants] or if



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the contaminants in the soil will degrade over time, but in their first year, the system is still struggling for survival. The plants will develop root systems and bacteria, and other microorganisms will develop, resulting in a healthier system." And that healthier system, says the State Water Board's Eric Berntsen, will help filter pollutants even more effectively. "It's really important to get the soil biota working for you over time." The city of Portland, Oregon's Tom Liptan, who has led that city's many green stormwater efforts, adds: "When the stormwater hits the vegetation [carrying pollutants], you get removal of total suspended solids. So it's filtered and drops out, then the sediment and the plant roots start to work."

While some may think rain gardens are better for rainy climates, Portland's Kevin Robert Perry (with Nevue Ngan Associates, who produced the

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POSTPONE THE THRONE?

While the rain was much needed, this past winter's storms had their downside: hazardous road conditions, mudslides, downed trees, and, not least, sewage spills. Local sewage treatment plants can be overwhelmed by high-volume flows. "There's not enough capacity to treat all that stormwater," says Lila Tang of the San Francisco Bay Regional Water Quality Control Board. "Fifteen times a year it goes out to the Bay partially treated." That prompted Tang to make a recommendation. "Each time you use the can," she writes, "you generate two gallons of sewage that becomes 10 to 40 gallons in the one to two hours it takes to find its way through the pipes to the plant. . . . So each time you hold it when it rains, you're helping to reduce pollutants that end up in the Bay. Food for thought the next time you're on the throne." The same idea applies to washing dishes or doing laundry, says Tang.

SLUDGE REPORT

The City of Santa Rosa got the results from a study of legal and illegal drugs in its municipal sewage (raw sewage, pre-treatment). The analysis by Oregon State University researchers was the first of its kind in the U.S. Santa Rosa Director of Utilities Miles Ferris reported the detection of methamphetamine, cocaine, oxycodone, methadone, PCP, LSD, and MDMA (aka Ecstasy), among other prescription opioids and illicit substances. Higher-than-expected levels of some drugs led to a second round of sampling. "The good news," Ferris said, "is that it appears the city's wastewater treatment process is highly effective in removing large numbers of these contaminants."

ICONIC ATLAS ON LINE

Since 1979, the California Water Atlas has become an almost legendary book. This lavishly illustrated documentation of the state's waterways and water use is hard to find. Now, thanks to David Rumsey of Cartography Associates, it's available

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Habitat

GRASS GRAZERS

The relationship between geese and eelgrass (*Zostera marina*) is complex. Recent studies suggest that eelgrass beds grazed by brant geese (*Branta bernicla*) are more productive. Canada geese (*B. canadensis*), on the other hand, may pose a threat to the beds. In at least one local site, herbivory by Canadas appears to have promoted a change in the plant's life history.

Little is known about the historical situation in San Francisco Bay.

Writing in 1926, zoologist Joseph Grinnell described brant as formerly abundant here but last observed in significant numbers in 1900; earlier records are lacking. Only a few stragglers occur today. Canada geese used to be uncommon winter visitors; the species didn't begin nesting in the Bay Area until 1959. The presence of eelgrass in the Bay wasn't documented until the 1920s. No one has mapped its original extent, although apparently suitable habitat is unoccupied. "We have almost no historical records of eelgrass distribution," says San Francisco State University's Katharyn Boyer. Sediment from Gold Rush mining activity may have choked existing eelgrass beds, dispersing brant to other wintering grounds.

Humboldt Bay, which hosts 80,000 brant annually, provides clues to what brant/eelgrass dynamics in San Francisco Bay may have been like. The geese clip off eelgrass leaves but don't go after new shoots or rhizomes. According to research at Humboldt State University, cropping by brant exposes eelgrass shoots to more light, and the geese fertilize the beds with their feces. Graduate student Susannah Ferson, who used test plots to simulate the effects of brant herbivory, documented increases in leaf growth rate, shoot density and biomass, and leaf nitrogen content.

While brant geese are seagrass specialists, Canada geese are more opportunistic feeders. Stephanie Kiriakopolos, a graduate student at San Francisco State's Romberg Tiburon Center for Environmental Studies, says Canadas eat eelgrass rhizomes as well as leaves. Their impact is stronger in shallow beds like the one off Alameda's Crown Beach, where it's easier for the birds to get at the rhizomes. The geese frequent the eelgrass bed from July through November, their numbers building and feeding hours lengthening as the season progresses.



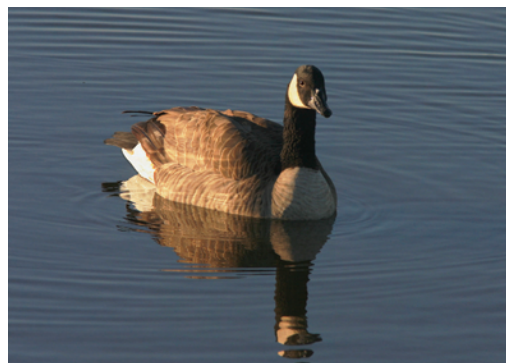
Eelgrass is typically a perennial that reproduces by cloning itself, with new vegetative shoots growing from the rhizome. The eelgrass at Crown Beach is different: it has an annual life history, flowering, setting seed, and dying back every winter. It's the only known annual population in San Francisco Bay. Although annuality in eelgrass had been explained in terms of stressors like heat, cold, or extreme storm events, and shallow beds are warmer than deeper beds, Kiriakopolos suspected the geese had something to do with it.

To test that hypothesis, she set up heavy-duty plastic mesh cages around eelgrass plots at two different depths. "The geese couldn't get into the cages or reach over them," she explains. "I found that in the plots that kept the geese out, the plants persisted throughout the year." This, she says, is the first study to experimentally establish waterfowl herbivory as a stressor that induces an annual life history strategy in a seagrass.

"This population of eelgrass is really successful as an annual," Kiriakopolos says. "The vulnerability is that it has to come back from seed every year, and could potentially go extinct." Dependence on sexual reproduction alone is a risky strategy, especially in a changing environment. Factors like rising temperatures, human disturbance, or changes in the birds' use of the beds might push the Crown Beach eelgrass over the edge. The Bay's year-round population of Canada geese may also complicate the process of eelgrass restoration, at least in shallow waters.

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Brant goose (above) and Canada goose by Tom Grey.



If you talk to a biologist, you may hear gruesome stories of the perils that can befall green sturgeon—chopped in half by boat propellers, squeezed into the mud as large ships pass inches overhead, sucked up by dredges, or squished by gates on dams that temporarily block their route to spawning grounds on the upper Sacramento River. Like the submarines that went silent and deep in old war movies, these big, slow fish hunker down when challenged—an unfortunate trait if they happen to be under the lowering gates of the Red Bluff Diversion Dam. More perilous still may be one of their favorite fast foods, as they snuffle along the muddy bottom of San Francisco Bay suctioning out delicacies. The Asian overbite clam they've been consuming isn't making them

“...this ancient fish...may be facing challenges no amount of dinosaur-like armor can protect it from.”

fat. In fact it's so indigestible that scientists examining sturgeon droppings have found live intact clams, not much of a plus on the nutrition side. Clearly, this ancient fish—a survivor of the cataclysmic asteroid blasts that felled T-rex—may be facing challenges no amount of dinosaur-like armor can protect it from.

The feds listed the West's southern population of green sturgeon as threatened in April 2006—adding yet one more critter to the list of those not faring well in the Sacramento River system. “It's a single spawning population in a small stretch of river,” says NOAA Fisheries' David Woodbury, who is writing biological opinions and recovery plans for the sturgeon. “It's not found anywhere else in the world.” The feds also designated 8.6 million acres of rivers and coastal waterways as habitat critical to the survival of the species, including the Sacramento River and San Francisco Bay. In the Bay, the quality of this critical habitat—which sturgeon use both on spawning migrations and during other life stages—may be affected by contaminants, invasive species, and activities like dredging and sand mining.

As biologists like Woodbury try to figure out how to help these 6-7-foot long fish—

named for the green tinge around their scutes and the green stripe on their underbelly—Bay dredgers and sand-miners are wondering how this new listing and critical habitat designation may affect their work. For the past eight years, regional interests and federal fish managers have agreed (through a cooperative program called LTMS) on special “work windows.” These windows cover weeks of time when herring aren't spawning or salmon aren't migrating through the Bay, and when those clearing navigation channels or altering the Bay bottom can carry on with minimal impacts on these species. Unfortunately, green sturgeon not only pass through the Bay during spawning migrations, they also range widely around it year round. “There is no window for green sturgeon; it's ubiquitous, in a sense it makes windows moot,” says Ellen Johnck of the Bay Planning Coalition, which represents maritime interests. “We're hanging in the wind until the LTMS biological opinion comes out.”

But regulators involved in inter-agency discussions about how to manage Bay bottom and shoreline activities to better protect the sturgeon don't foresee dramatic restrictions. “I haven't seen any showstoppers in terms of maintenance dredging so far,” says BCDC's Brenda Goeden.

The new listing may have put the “kybosh” on one project, however, according to Goeden. A proposal for an aquatic transfer facility for dredged sediment being used to restore wetlands at the former Hamilton airfield, and adjacent Bel Marin Keyes property, stalled due to concerns about sturgeon take. The proposed facility—basically a hole in San Pablo Bay where scows laden with dredged material can pull up, dump their load, and leave—would overlap, in part, with an area referred to as the “Sturgeon Triangle” by local fishers. On the plus side, the facility would also remove the need for an expensive piece of equipment called an “offloader,” speeding the offloading process, and saving time and money in the region's effort to beneficially reuse dredged material on wetlands and uplands. But according to Woodbury, a recent suction-dredging project in the Columbia River collected 2,000 sturgeon along with 700,000 cubic yards of sediment, and marooned them in an upland disposal site.

Woodbury does see hope in a cattle-guard-like screen that suction dredgers (hoppers) have successfully used in the Gulf to keep

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www.mmcta.org

Although life may look easy for California sea otters, these laid-back marine mammals must contend with a host of pathogens that enter the marine environment from land-based sources. Previous studies had shown the otters to be susceptible to protozoans such as *Toxoplasma gondii* and *Sarcocystis neurona*. Now a report by Cal Fish & Game's Melissa Miller and colleagues documents otter exposure to fecally-associated bacteria like *Campylobacter*, *Salmonella*, and *Clostridium*.

Miller and her team performed necropsies and collected fecal samples throughout the otter's California range, from Santa Cruz to Santa Barbara. “We went out to otter haulouts between high tides, in some cases actually swam out, and did ‘poop captures’,” she says. Patterns of bacterial infection varied widely. Shallow embayments like Elkhorn Slough and Morro Bay seem to be hot spots; Big Sur otters, on the other hand, are at lower risk. Overall, those sampled near urban areas or regions with high freshwater runoff were more likely to test positive. *Clostridium perfringens* showed up at higher rates in wet season samples.

She points out that the study didn't try to identify specific sources for fecal bacteria: “We can't say anything informative about sewage. We didn't have any carcasses come in from areas highly impacted by sewage, and there was no coverage for live otters either. The divers aren't going to go there.”

One surprise was the absence of the toxic *Escherichia coli* strain 0157:H7, associated with spinach contamination upstream of sea otter habitat. “We've now tested hundreds of otters, marine shellfish, and multiple water samples,” says Miller. “We have yet to find *E. coli* 0157:H7 in any of those samples.”

Even so, the findings are troubling enough. Sea otters are major consumers of marine invertebrates: “Many of the foods they eat are filter-feeders that are really good at picking up chemical and biological pollutants and concentrating them in their tissues. We share a lot of the same kinds of foods as otters.”

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AGENCIES RESPOND TO CORPS

Two of California's leading resource agencies have weighed in on the US Army Corps of Engineers' new stance on levee vegetation. (See "Riparian Vegetation at Risk," ESTUARY NEWS, April 2010.) In an April 15 letter, Department of Water Resources director Mark Cowin and Fish and Game director John McCamman called the Corps' proposed guidelines for obtaining variances from a stringent vegetation-maintenance policy "so stringent and ambiguous that variances are unlikely to be issued except perhaps under specialized, local circumstances." They described the policy as "a major departure in both process and substance, and... a cause for grave concerns by our departments."

Cowin and McCamman foresaw "grave environmental impacts" if most woody vegetation on levees is removed in compliance with the Corps' standards, requiring an Environmental Impact Statement under the National Environmental Policy Act and consultation under the Endangered Species Act. Clear-cutting the levees would affect a whole suite of sensitive species, including the valley elderberry longhorn beetle, Chinook salmon, steelhead, Swainson's hawk, and riparian brush rabbit (see page 6). The Corps had provided only a brief and perfunctory Finding of No Significant Impact.

The agency heads also stated that they were unaware of "evidence that well-managed vegetation poses significant risk" to levees, or of "any levee failures in the Central Valley that were caused by woody vegetation." In fact, they contended, removing existing vegetation that provides erosion protection could increase the risk of levee failures." Implementing the Corps' policies now, they argued, would preempt the results of ongoing collaborative research on levee safety.

According to an accompanying report, Water Resources analysts have estimated the cost of full compliance for the 1,600 linear miles of affected levees as \$7.5 billion. Even if variances covering a limited portion of the levees were approved, the price tag would still be \$6.5 billion. This would put cash-strapped flood control districts between a rock and a hard place, since failure to comply would result in the loss of federal flood insurance. **JE**

SLOW FISH (CONTINUED FROM PAGE 3)

out sea turtles. He also hopes to investigate the construction of ladders developed in the 1950s and 1960s on the Columbia River that enabled these lethargic fish to pass around dams. Currently, most ladders are designed for strong-swimming salmon that have superior leaping abilities. Stepping up enforcement of ballast water management—to prevent invasions of more indigestible, non-native sturgeon food—and perhaps even reseeding native invertebrates in the benthos, are also on Woodbury's laundry list, along with continued curbs on contaminants and turbidity limits.

Studies tagging green sturgeon and following them through the Sacramento River, around the Bay, and up the ocean coast—partly funded by ports—may help scientists pinpoint their favorite hangouts, and possibly narrow the geographic boundaries of their "critical habitat." Results are still in the works, but one of the problems has been the batteries running out on the tags—sturgeon live for decades, travel far, and unlike salmon, don't die after spawning. Tracking them requires time and patience matched only by the nature of the species itself.

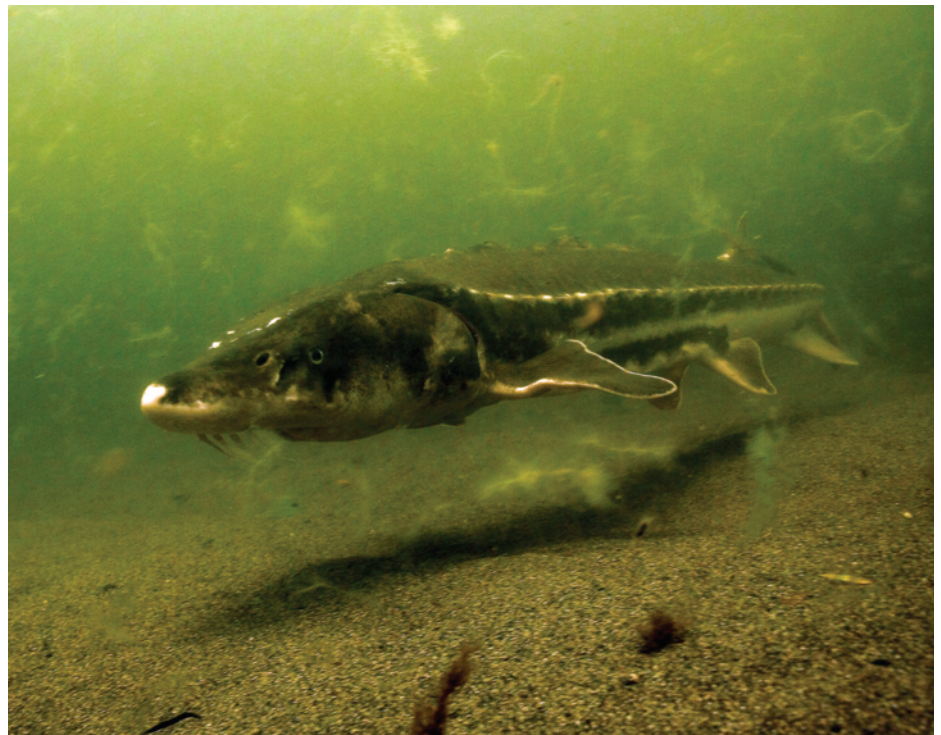
"If there can be a single generalization about sturgeons, it is that they tend to be poky

at life: their hearts beat slowly; they respire slowly, reproduce infrequently, and are slow to die," says Chesapeake Bay's David Secor of the University of Maryland.

This very slowness, adds Woodbury, may be their undoing as humans so thoroughly and quickly alter the environment. "It's the blink of an eye in sturgeon time," says Woodbury, "They may not be able to adapt that fast."

Slow or not, their fate may soon weigh in on a number of Bay restoration and planning initiatives. As sturgeon habitat encompasses soft muddy bottoms and sediments, their recovery could be aided by planning for subtidal restoration in the Bay, regional sediment management, and ecosystem-minded adaptation to rising sea levels. Whatever the outcome, the synergies between these management issues may inspire new levels of environmental management or raise the usual arguments about harm to the local economy. Perhaps the evolutionary long view inherent in dealing with sturgeon may offer some perspective for recovery planners—or simply raise more questions. "If a fish lives a hundred years, longer than most of us, how do we know if it's recovered?" says Woodbury.

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A green sturgeon in the Klamath River. Photo by Thomas Dunklin.

350 BY LAND; 1 BY SEA?

Three ports may soon be a lot busier—and surrounding freeways less clogged with diesel-spewing trucks—as a result of a \$30 million federal stimulus boost and \$750,000 from the Bay Area Air Quality Management District for installing less polluting intermodal transportation. The Ports of Oakland, Stockton, and Sacramento are dividing the stimulus pot to purchase equipment and to plan for between three to eight shipments of containers—on barges pulled by tugs—to navigate between them every week. Says the Port of Stockton’s Jeff Wingfield, “At full buildout we would hope to have 150 barges per year. That would take approximately 50,000 trucks per year off the highway between the Bay Area and the Central Valley.” Friends of the Earth’s John Kaltenstein says each container barge replaces 350 trucks on the road.

Kaltenstein convened a forum in May to discuss the issues surrounding short sea shipping, which is much more common in East Coast and European waters. Currently, only minimal container shipping takes place between the three ports in the Estuary, says Wingfield. “We are primarily bulk and break bulk—bag products—we export a lot of rice, mostly to Japan, in bags, and we also export sulfur for soil amendment that goes right off of a conveyor into the ship hold, as well as cement, steel, fertilizer, and lumber.”

“Two things make this idea viable from our perspective,” says the Bay Area Air Quality Management District’s Damian Breen. “Fuller containers mean more efficient shipping, so there are lots of air quality benefits. Boxes shipped by sea can be heavier because they are not subject to the 52,000-pound weight restriction imposed on trucks for over-the-road transportation; ships can transport boxes weighing 60,000 pounds.” By replacing heavy

duty trucks on the road, says Breen, the diesel particulate matter that gets deposited on communities adjacent to highways will be greatly reduced. Another reason to investigate the idea now, says Breen, is that the technology for marine barges and tugs has greatly improved, and tugs are leaner and “greener.” Wingfield says 26,041 tons of NOx could be removed and 7.6 million gallons of fuel saved per year by switching to short sea shipping.

With its portion of the stimulus funding, the Port of Stockton will purchase a crane for offloading containers, and a lay-down yard that is served by rail as well, says Wingfield. The three ports will jointly purchase a barge.

The proposal is not going unnoticed by environmental groups, and so far, everyone seems to agree that a full environmental review would need to be performed before a new short sea shipping program could get off the ground—and into the water.

“I think the idea has promise, but you need to identify some of the impacts and work around them, plus green up American shipping,” says Kaltenstein. “American crews have to make sure they’re not throwing a bunch of clunkers and belching tugs out there moving cargo. We have to get our teeth into this: what’s going to be green? The details have to be worked out.” Kaltenstein warns that the volume of cargo being shipped into the United States is increasing. “We will continue to get freight from Asia. We’re going to have to deal with it—if we can recognize that fact and not have an overall increase in emissions, we’ll have to cut them sharply somehow. The question is, how green do we have to be to get some benefit?”

BCDC’s Will Travis says he thinks short sea shipping is a “great idea if it doesn’t require dredging.” (Wingfield says it will not, at least on the Port of Stockton’s part.) But Pacific Environment’s Jackie Dragon is worried about possible impacts on the Bay’s water quality. “An increase in vessel traffic in the Bay is always cause for concern. With increased traffic in the water, you have more potential for oil spills and threats to sensitive habitat and ecosystems. The motivation to decrease emissions in California is well placed, but a thorough investigation of the subsequent environmental impacts is needed before we move ahead.”

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CATCH AND RELEASE

The latest prisoner on Alcatraz Island is easier to capture, doesn’t escape, and gets released slowly over time without bail. Last year, the Golden Gate National Parks Conservancy and the Garden Conservancy, two overlapping agencies that manage aspects of Alcatraz Island, decided to install a rainwater catchment system to irrigate some of the island’s historic gardens. Oakland-based WaterSprout Landscape Design and Construction, which has installed catchment and graywater systems for residential, institutional, and commercial applications all over the Bay Area, won the bid and designed the project.

WaterSprout’s John Russell designed a system that uses four polyethylene water tanks and two refurbished concrete graywater tanks to store water channeled from the roof of the main cellblock building. “We calculated how much we could collect from the roof area of the old prison building. It goes first into a large leaf filter, then into a sand filter, and then

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Photo of container-on-barge courtesy of Master of Towing Vessels Association.



CATCH AND RELEASE

(CONTINUED FROM SIDE PAGE 5)



Photos courtesy of WaterSprout.

into the storage tanks," he says. Installed last October, the system experienced its first rainfall this past winter. "We believe that the system will provide 80 to 90% of water requirements for the West Lawn garden," says Russell. Originally a stables and riding arena, the West Lawn was replanted with lawn, perennials, and shrubs after the horses left, but fell into disrepair after the prison closed. Most of the island's gardens are perennial plantings and shrubs, and new restorations feature drought-tolerant plants. Water from the tanks will be applied manually—"They have an army of volunteers who water everything by hand with hoses," explains Russell. "The tanks are uphill from where they'll water, so it's gravity-feed."

Water was barged over from San Francisco throughout the island's use as a prison—and still is, for visitor use and gardens in other parts of the island. Russell says he discovered dilapidated underground cisterns, leading him to wonder if rainwater harvesting had been employed in the prison's early days.

See www.watersprout.org LD

Restoration**RABBIT REBOUNDS**

A restoration success story at the San Joaquin River National Wildlife Refuge highlights the value of vegetated levees as wildlife habitat. Working with the Endangered Species Recovery Program at Cal State Stanislaus and the US Fish and Wildlife Service, River Partners designed and planted high-ground flood refugia for the endangered riparian brush rabbit. Surveys earlier this year found thriving rabbit populations in the refugia.

The levees were originally built by the Army Corps of Engineers. In 1998, the Corps and the US Fish and Wildlife Service signed a memorandum of understanding stating that the levees were no longer needed for flood protection. "The refuge got permission to maintain the levees as they saw fit, not to Corps standards," says River Partners' Julie Rentner. "After the major flood of 2006, it was clear the levees were the only high ground on the floodplain. That's why they were targeted as important brush rabbit habitat features." "Bunny mounds" of spoils from wetlands excavations created additional shelter.

To provide the dense shrubby environment the secretive rabbits prefer, River Partners planted the levees and mounds with native blackberry, California rose, sandbar willow, golden currant, coyote brush, mule fat, and elderberry. "Structure matters more than species," Rentner explains.

The Endangered Species Recovery Program has been releasing captive-bred rabbits at the main refuge site since 2002, 785 so far. The goal is to saturate the appropriate habitat and hope enough rabbits evade their legion of predators long enough to reproduce.

"Survival at the refuge has been really good," says Riparian Brush Rabbit Project

coordinator Matt Lloyd. "Available habitat has been increasing as River Partners' restoration work matures." Periodic trap surveys show that the rabbits have lived up to their kind's reputation for fecundity. "We've been very successful in getting to a much higher population than we had prior to the flood. The capture rate in extant riparian habitat this May was three times higher than we've ever seen," Lloyd adds. "This is just a boom year for brush rabbits."

The ESRP team surveyed the levees and mounds for the first time in February and March. Over 60% of the rabbits captured were refuge-born: "We found a lot of little rabbits on the mounds. It's clear they're reproducing in these refugia features. The rabbits we've captured are too small to have found their way there on their own. Some areas planted just three years ago are already supporting rabbits."

Rentner finds it ironic that the vegetation the Corps wants to remove from other levees is helping an endangered mammal recover. "It's such a beautiful example of an endangered species that just needs that high ground and vegetative cover," she says. "It will be a critical piece in helping the rabbits persist through the next flood."

The brush rabbit isn't the only sensitive species to benefit from habitat restoration in the Central Valley. In May and June, River Partners biologist Michelle Boercker encountered five threatened valley elderberry longhorned beetles while monitoring sites where elderberries had been planted as mitigation for setback levee construction on the Feather River. The colorful insects, dependent on blue elderberry, are rarely seen in the wild.

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Photo by Cary Edmonson, CSU Stanislaus.





CONFERENCES, WORKSHOPS, EXHIBITS & TOURS

AUGUST 7 SATURDAY BEAVER FESTIVAL

TOPIC: Beaver tours, live music, more
LOCATION: Beaver Park, Martinez
SPONSOR: Worth a Dam
www.martinezbeavers.org

SEPTEMBER 18 SATURDAY NORTH RICHMOND SHORELINE FESTIVAL

TOPIC: Celebrate and discover the North Richmond shoreline
LOCATION: Point Pinole Regional Park
SPONSOR: North Richmond Shoreline Open Space Alliance
www.northrichmondshoreline.org/

SEPTEMBER 22-24 WEDNESDAY-FRIDAY NORTHERN CALIFORNIA RIVER TOUR

TOPIC: Dams, restoration sites, farms, fish hatcheries
LOCATION: Tour begins and ends at Sacramento Airport
SPONSOR: Water Education Foundation
www.watereducation.org/

SEPTEMBER 27-29 MONDAY-WEDNESDAY 6TH BIENNIAL BAY-DELTA SCIENCE CONFERENCE

TOPIC: Ecosystem Sustainability: Focusing Science on Managing California's Water Future
LOCATION: Sacramento
SPONSOR: Delta Science Program and Delta Stewardship Council
<http://baydeltascienceconf.com/>

OCTOBER 13-14 WEDNESDAY-THURSDAY SAN JOAQUIN RIVER RESTORATION TOUR

TOPIC: Dams, restoration sites, Merced National Wildlife Refuge
LOCATION: Tour begins and ends in Fresno
SPONSOR: Water Education Foundation
www.watereducation.org/

NOVEMBER 3-4 WEDNESDAY-THURSDAY 28TH ANNUAL WATERFRONT CENTER CONFERENCE

TOPIC: Urban Waterfronts 2010: The City Resurgent
LOCATION: Baltimore Marriott Waterfront, Baltimore MD
SPONSOR: The Waterfront Center
www.waterfrontcenter.org/



HANDS ON

AUGUST 7 SATURDAY GRATEFUL DAY AT EDEN LANDING

LOCATION: Eden Landing Ecological Reserve, Hayward/Union City
SPONSOR: Save the Bay
[www.safesfbay.org](http://www.safesfbay.org;); (510)452-9261

AUGUST 14 SATURDAY COOL AUGUST MORNINGS AT THE MARTIN LUTHER KING JR. REGIONAL SHORELINE

LOCATION: MLK Shoreline, Oakland
SPONSOR: Save the Bay
[www.safesfbay.org](http://www.safesfbay.org;); (510)452-9261

SEPTEMBER 25 SATURDAY CALIFORNIA COASTAL CLEANUP DAY

LOCATION: Coastal locations statewide
SPONSOR: California Coastal Commission
www.coastal.ca.gov/publiced/ccd/ccd.html

ICONIC ATLAS ON LINE (CONTINUED FROM SIDE PAGE 2)

on line (www.davidrumsey.com/luna/servlet/view/search?q=5788). Linda Vida of UC's Water Resources Center Archives worked closely with Rumsey in the process of digitizing the atlas. **JE**

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Booming Technologies: Stephanie Brown, Oil Response Engineer with the United States Navy, offers background and up-to-date information regarding new booming technologies that can be used to stop and collect oil after a spill.

Claim the Rain: Choosing the right soils and plants can transform home and public gardens into beautiful filtration systems that protect our creeks and the San Francisco Bay.

From Storm Sewer to Babbling Brook: How does creek restoration help the Bay?

Let Plants Do the Work: What is soil bioengineering?

New Oil Spill Legislation: Jared Huffman, California State Assemblymember (6th Assembly District), talks about AB 234: "Oil Spill Prevention and Response: Transfer of Oil"

Parking Strip Landscaping: Removing concrete helps create a more permeable watershed in San Francisco.

Slow it, Spread it, Sink it: Learn about green streets and stormwater.



More Coming Soon!



ESTUARY NEWS

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ESTUARY NEWS is your news source on Bay-Delta water issues, estuarine restoration efforts, and the many programs, actions, voices, and viewpoints that contribute to implementation of the S.F. Estuary Partnership's Comprehensive Conservation and Management Plan (CCMP). Views expressed may not always reflect those of Estuary Partnership staff, advisors, or CCMP committee members. ESTUARY NEWS is published bimonthly and is funded by the San Francisco Estuary Partnership.

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PUTTING PARKING LOTS TO WORK

(CONTINUED FROM PAGE 1)

award-winning *San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook* points out that in a climate with like the Bay Area's, with sometimes six months of little to no rain, it is all the more important to capture and filter that first very greasy, grimy flush.

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Hear an interview with Eric Berntsen (podcast) about rain gardens at <http://sfestuary.org/podcast/>

VETTING LID (CONTINUED FROM SIDE PAGE 1)

as a public demonstration and educational facility on "green" development techniques and materials.

Here in the Bay Area, we are beginning to see local information collected on low impact stormwater measures, such as a "green" parking lot rain garden recently installed in Daly City (see cover story). The San Francisco Estuary Institute's data—and data from places like Washington and Oregon—suggest that using swales and raingardens will not only help improve water quality in our receiving waters, but will also be less costly than building and maintaining traditional stormwater management systems. The Estuary Partnership is committed to sharing this important research with our own communities, as they work toward the use of greener stormwater techniques.

—Judy Kelly, Director, SFEP

OCEAN CANARIES (CONTINUED FROM SIDE PAGE 3)

Miller says the problem of land-sea pollution is sobering: "What are we doing about discharges of potentially contaminated freshwater to the ocean? We've removed the effect of buffering wetlands. We need to slow the water down and allow it to clean itself up." (See cover story.) She praises her State and Regional Water Board collaborators for what they've done to shape policy: "They've been a huge help in this process."

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