YOUR INDEPENDENT SOURCE FOR BAY-DELTA NEWS & VIEWS

ESTUARY

**Courtesy of CALFED**

A DEAD CROW found on a San Jose lawn in June announced the arrival of West Nile Virus in the Bay Area. Several people have already been infected with the disease in Southern California. Four out of five people exposed to the virus, which is transmitted by mosquitoes to humans and animals, will not experience any symptoms and may develop lifelong immunity to the disease. Others will develop flu-like symptoms, including headache and fever; the disease is occasionally fatal. The S.F. Bay Joint Venture has published information about West Nile Virus and guidelines for resource managers involved with wetlands at http://www.sfbayjv.org/.

A DOZEN SOUTH BAY salt ponds took one step closer to becoming salt marsh in July after tidal gates were installed, the construction of which was funded by $2.5 million from the Resource Legacy Fund, a group of private foundations. Over the past few months, Cargill diluted the ponds, which stretch along the South Bay from Palo Alto and Mountain View through Sunnyvale to Alviso, to prepare for restoration.

FOR NOW, $O_2$ in the Stockton Deep Water Ship Channel will remain on the low side. A plan to improve oxygen levels in the channel was sent back to the drawing board to give the San Joaquin River Water Quality Management Group (which includes the city of Stockton, the Port of Stockton, and water agencies that take water from the Delta) time to solve the problem without an order from regulators. The channel is perpetually low in dissolved oxygen as a result of high algae and ammonia levels caused by the deepened channel; pollution from farms, businesses, and sewage treatment; and low flows in the river.

SALMON SCIENTISTS—28 of them—are joining forces and sharing ideas as part of "Salmon 2100," a problem-solving coalition organized by Oregon State University and U.S. EPA with the aim of finding innovative ways to protect and restore salmon runs in California, Oregon, Washington, Idaho, and southern British Columbia. A key goal is to identify policy options that would help sustain wild salmon through this century. Results will be published. More info: (541)754-4607.

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# Suisun Rising

The "L word"—levees, that is—seems to be on everyone's lips these days, mostly in regard to the break at Jones Tract or the super-sized structures proposed for the River Islands subdivision in the Delta. But a few folks—like the Department of Water Resources' Chris Enright—have their eyes on some less conspicuous levees—levees that, if allowed to let some tidewaters into Suisun Marsh, might give us a bigger bang for our restoration buck than trying to restore the Delta, and, in the long run, stop subsided land from sinking any further.

Many scientists are beginning to wonder whether restoring the Delta (see insert) is wise or even possible. It is, after all, a complicated water conveyance system first and foremost, not to mention the fact that much of it is now 20 feet below sea level. But Suisun Marsh, the Estuary's forgotten stepchild, is the ideal place for restoration, says Enright, who has spent the last eight years studying its hydrology and geomorphology.

Enright is raising questions about the way we have been traditionally been thinking about—and managing—the marsh (but stresses that his opinions, which were presented at the recent Suisun Marsh Science Conference, do not necessarily reflect those of DWR). For the past 30 years, BurRec and DWR have managed it primarily as diked, brackish wetlands, as mitigation for the impacts of the state and federal water projects. When the State Water Project and Central Valley Project were built, the general consensus in the water management community was that because of all the pumping and water diversions, salinities in the marsh would be too great to offer good waterfowl habitat—that the marsh would no longer support the annual plants that produce more seeds, which ducks love to eat—hence the need for mitigation. But, says Enright, that mitigation—building and upkeep of levees, berms, and salinity gates to maintain the diked, brackish wetlands—may have been based on "wrong thinking." Enright's research and models show that salinities in Suisun Bay have only increased from an annual average of about 6 ppt to 7 ppt since the water projects were built, and there is no evidence to suggest that plants such as alkali bulrush have been impacted as predicted. Enright believes climate, coastal ocean conditions, and the changing bathymetry of the Estuary are having a much greater impact on salinity trends than the big diversions.

Enright says our expensive mitigation efforts—fiddling with levees, fish screens, and salinity gates—may be unnecessary, haven't boosted waterfowl numbers, and may even be harming fish. They have also encouraged land use practices that he predicts will not be sustainable over time. Every summer, duck club managers drain and dry out portions of the marsh for maintenance: some of the land is disked and burned for weed control; duck blinds are repaired, and infrastructure—pipes and ditches—is kept in good working order, according to Suisun Marsh RCD's Steve Chappell. But when the marsh's organic peat soils are dried out, they decompose, causing the land to subside, says Enright. Although subsidence is occurring much more slowly than in the Delta, which is already too far below the tidal range to restore to tidal marsh, says Enright, in 20 or 30 years, Suisun Marsh may be too far gone too. "If the land subsides below the tidal frame," he warns, "bioaccretion will at some point no longer be an option, and elevations of the marsh won't rebuild themselves."

In a 70-acre pilot project that Enright hopes will prove that more of the marsh could be easily and quickly restored, DWR is managing water to grow large numbers of tules, which will encourage inorganic and organic materials to drop out, accrete, and build elevations. Over time, restoration to tidal marsh should benefit species like the black rail, Suisun song sparrow, and salt

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# HOW I SEE IT

## CALFED, PAST AND FUTURE

SAMUEL N. LUOMA

Serving CALFED was an unprecedented opportunity to try to incorporate rigorous scientific practices into a critical policy arena. Two challenges define whether we in the scientific community are affecting policy: Has knowledge been generated that provides new insights relevant to the issues that challenge CALFED? How has that knowledge affected policy and politics? It is worth evaluating where we had success and where some future challenges lie.

By the mid-1990s, many basic attributes and issues in the San Francisco Bay-Delta and its watershed were described; the result of 30 years of study and monitoring by agencies, universities and the private sector. Two examples were the description of the basic issues in the system by Nichols et al (1986, *Science*) and the trends in fish abundances evident in the monitoring data of the Interagency Ecological Program. Yet contentious scientific debates surrounded important policy issues (e.g. freshwater inflows, mortalities from diversions, in particular exports in the Delta, restoration goals). It was clear to policy makers that the base of on-going science was not sufficient to support the ambitious agenda of the Bay-Delta program.

The Bay-Delta Program expanded (perhaps doubled) the regional investment in science, beginning in 1997. Just six years later there are substantial payoffs. The new findings offer exciting opportunities to improve species protection, water quality, and our ability to meet water supply needs more reliably. For example, it made sense that floodplains were crucial to many of our endangered species, because large annually flooded areas of habitat were such a distinct characteristic of the original system. Now we know that floodplains offer a place where young fish grow faster than in channels. We know the characteristics of floodplains that allow native fishes to take advantage of high water and escape as the water recedes. We know about links to riparian groundwater, and how natives and invasive species differ in the timing of their uses of floodplains.

Our knowledge of the Delta has grown dramatically. We have learned that fish, even young salmon, move with velocities in the Delta, especially at channel intersections. Discovering the details of how this works at the Delta Cross Channel diversion point was especially valuable. We better appreciate how tides are instrumental in governing net movements of sediment, contaminants, fish, and water during much of the year. We have learned that shallow water habitats, one original goal of Delta restoration, yield habitat suitable for native species in some cases but not in others. Delta water bodies, in fact, differ dramatically in their ecology, one to another. If we are to reverse the trajectory of native species declines by habitat restoration, knowledge of the Delta environment and floodplains will be critical.

Similarly, our approaches to managing exports are changing. Experiences like the Environmental Water Account (EWA) make the Bay-Delta an international example for novel approaches to managing water supplies and environment simultaneously. Less known is that sustaining these programs is the result of difficult day-to-day work at collaboration. We now commonly integrate advice from academic experts, but it is not always easy. And the continuing dialogue about new findings in ecology and hydrology are behind ongoing management attempts to adapt to new understanding. The impact of science on water operations is evidenced by how discussions have changed with regard to managing species and exports. Subjects now common in the debates include population effects of mortalities caused by diversions, population estimates, multiple stressors, and improving conditions upstream of the Delta.

The plethora of new findings after 1997 are clear every year in the CALFED Science Conference or the State of the Estuary Conference. But are they affecting policy? Today, unlike ten years ago, managers and policy makers are using day-to-day new conceptual models of things like water movement, fish movement, sediment fate, and restoration in their decisions. This is how science affects policy.

An active science program also has benefits to policy beyond new findings. The open scientific dialogue of CALFED has added transparency to CALFED's actions. It helped all parties confront the reality that uncertainties are a part of every management decision. Acknowledging those uncertainties is the key to both credibility and novel solutions. Dialogue opens agencies,' stakeholders,' and academics' eyes to each other's science and helps relieve some of the suspicions inevitable in the different roles we all play. Peer review is also becoming part of the "CALFED way"; the Ecosystem Restoration Program (ERP) has worked hard to set the example. The ERP grant selection system enhanced trust and credibility among stakeholders and academics but retained the ownership the agencies need for their own missions.

Other rewarding things happened in the last three years. To name just a few: the energy of the CALFED Science conferences and the State of the Estuary conferences; inception of a new on-line publication outlet: *San Francisco Estuary and Watershed Science;* the building of an excited, effective science program staff; developing performance measure protocols; and engaging the advisory boards for ERP, EWA, and the Authority.

Four challenges for the future stand above all others. First, we must not return to advocacy science, or re-build the barriers between agency and academic science. These courses of action failed before, and they will again. But partnerships take energy and time. Can we find them? Second, when budgets are cut, science and scientific engagement are often the first to go. Proposition 50 was novel in its requirement that some proportion of funding for every action go to expanding its underpinning of science. Prop. 50 recognized that the technical aspects of CALFED (what will be done and how will it be done) are as important as the politics and the process. And the technical aspects require a fairly funded science partner, whether the pace of the overall effort is fast or slow. Third, it is crucial that decision-makers and managers retain a positive view of what their support for science accomplished in the first three years of CALFED, and continue their support for an even stronger partnership for the future.

Finally, much is left to learn and do. Trends in all the indicators of CALFED performance are complex and their causes are even more complex. Many actions are occurring at once and natural variability complicates responses. Climate is changing and must be a stronger consideration in all water issues. And whole areas of the watershed are inadequately studied (the rivers in general and especially the rivers south of the Delta). The new journal will need continued support from the scientific community in the agencies and the universities. CALFED's borders need to be expanded to take in South Bay issues. Present interpretations of California law continue to handcuff contracting and partnering. A more constructive dis-

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# ENVIRONMENT

## SANDS OF DISCONTENT

When Hanson Aggregates Mid-Pacific, which mines two million tons of sand from the Bay's floor each year to supply the construction industry, notified the S.F. Bay Commission (BCDC) and other Bay regulatory agencies that it hoped to increase the volume of sand it mines by 25% to 50% per year, it stirred up more than just Bay muck. The ensuing controversy prompted the Bay Planning Coalition, a non-profit group of businesses, to send a letter to the Governor suggesting that BCDC should no longer regulate dredging, sand mining, or filling in the Bay.

The trouble all began when BCDC, in responding to Hansen's request, applied its 2002 Subtidal Policy. The agency told Hanson to conduct an environmental study of the impacts of sand mining on the Bay, and later asked the company to look at the feasibility—including the economic feasibility—of getting sand from sources other than the Bay.

Hanson agreed to the environmental study, but was upset about the economic feasibility study and raised its concerns with the Bay Planning Coalition. The Coalition, thinking that the Subtidal Policy could be harmful to many marine industries, then sent its letter to the governor. The letter also recommended that BCDC's authority and staff be reduced because its permit requirements duplicate those of other agencies.

Hanson's Bill Butler believes BCDC doesn't have the authority to ask for an economic analysis or to ask his company to look at mining alternatives outside the Bay. Says Hanson, "The economic analysis requirement is burdensome, and the implication is that the Commission could deny our permit if we show that it's economically feasible to get sand elsewhere." He emphasized that other marine industries would face the same damaging requirements. But BCDC has stated that it would not apply the Subtidal Policy to other marine industries in the same way.

According to the BCDC's Will Travis, "Hanson already imports sand from British Columbia, which proves they can get it from outside of the Bay." What's really driving this issue, he adds, is that BCDC found Hanson to be violating its permit conditions by mining outside of specified areas. Says Travis, "Hanson didn't realize when it bought [some] smaller sand-mining companies back in 1999 that it was buying a bunch of violations."

Meanwhile, a draft of the environmental study, an in-depth literature review, has been reviewed by several state and federal regulatory agencies. Marine biologist Dr. Chuck Hanson (no relation to Hanson Aggregates), who led the study, says, "We monitored sand-mining operations to see where and how they occur in the aquatic environment, and we reviewed over one thousand research papers from around the world. The study examined available information on the potential effects of sand mining on fish, macroinvertebrates, and their habitat within the Bay-Delta Estuary and adds substantially to our understanding."

Despite the study, questions about sand mining's impacts remain. The Coalition's letter says that environmental analyses conducted to date have identified no significant impacts from sand mining. And Hanson's Bill Butler says environmental impacts aren't a problem because Hanson mines in the most environmentally sensitive way possible. NOAA Fisheries' Brian Mulvey disagrees. "The literature is fairly incomplete; it doesn't show conclusively that there aren't impacts. For example, the study doesn't have any data on whether or not the mercury deposits in Suisun Bay are stirred up by sand mining." Chuck Hanson also says that more information is needed on sediment dynamics, and on the entrainment of aquatic species.

What do we know about sand mining's effects on the Bay floor? After 10 years of taking sonograms of the Bay's floor, the U.S. Geological Survey has pieced together startling three-dimensional maps of this underwater world. They show a world that has been reshaped dramatically by human activities—by dredging channels and then depositing dredged sediment at other Bay locations, by blasting away huge rocks and reefs, and by mining sand, millions of tons annually.

BCDC's Steve Goldbeck says, "Now we can see more clearly that sand mining, dredging, and filling have altered the Bay floor, but we'd like to know more: what happens when sand is mined from the Central Bay? Is it possible that sand from upstream locations moves in to backfill? Does this cause erosion of downstream beaches? Does it cause upstream waters to deepen? If so, how does this affect fish that need shallow water? Are any subtidal areas changed from sand to mud because of sand mining, and if so, is this detrimental to fish dependent on sandy habitat?"

BCDC holds a hearing on August 19 to discuss the environmental study and the complaints from Hanson and the Coalition. Says Travis, "We'll try to put the vitriolics aside, go through all of this and see if we should clarify the Subtidal Policy and decide if we should further streamline our permitting process."

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SPW

# HANDSON

## GARDENING FOR STEELHEAD

It's not like Louann Tung—nuclear engineer, creeks activist, and mother of a three-year-old—had a lot of time on her hands. But when $12,000 for a watershed project became available through the S.F. Regional Board, she found herself taking on the creation and maintenance of a native plant park on the banks of Arroyo Mocho, a tributary to the South Bay's Alameda Creek, where the indomnitable Alameda Creek Alliance is working to bring back steelhead runs. With help from the Friends of the Arroyos, Tung transformed a trashed-out wasteland near Livermore's Granada High School into the Granada Native Gardens. "If steelhead were to return—after all the barriers are removed in the next 10 or so years—they should return to creeks that are not full of garbage," says Tung. "I believe that if you make an area beautiful and educational, it will not be trashed."

Tung had no landscaping or native plant experience. But she connected with San Jose-based landscape designer Alrie Middlebrook, a native plant specialist. "You're just what I've been looking for," Middlebrook told her. The landscaper discounted her design services and arranged for plants from six area nurseries.

Tung, meanwhile, had to negotiate gaining approval from the school district, which owns the land, and the local water district. Getting water there was nothing short of a miracle, she says. High school students cleared the site, and Tung's network of volunteers mulched it last fall. Hardscape, including paths, went in this March; plants were in the ground by April. Local Boy Scouts helped assemble mosaic-topped picnic tables depicting some of the watershed's endangered species: burrowing owl, California red-legged frog, and, of course, steelhead.

The Granada gardens contain chaparral, grassland, oak woodland, and riparian sections, the latter echoing the willows and cottonwoods along the Arroyo. There are also big-leaf maples, flannelbushes, eight kinds of native sage, and bunchgrasses. Tung hopes the garden will someday be a great place to watch the steelhead pass on their way to their old spawning grounds, 37 miles up a chain of creeks from S.F. Bay.

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# WATERSHED

## CATASTROPHIC CASTOFFS

Well-meaning folks who wouldn't toss a can on the ground might be inadvertently polluting Bay ecosystems by "freeing" non-native critters into "the wild." A squat, Godzilla-like frog with clawed feet has recently taken up residence in Golden Gate Park's Lily Pond, while invasive turtles in two Marin County reservoirs and Lake Merritt have resource managers and biologists squirming in distress.

Medical researchers discarding lab animals are the presumed culprits behind Lily Pond's African clawed frog infestation. The unusual frogs feed underwater, which means they compete with fish. The frogs eat mostly invertebrates, but will also eat each other, or other frogs and toads. With no natural predators here, a population could become dangerously dense, says Jack Crayon with Cal Fish & Game, who adds that the frogs tolerate estuarine waters and could even invade the Bay.

"It is hard to find the smoking gun that proves that clawed frogs are responsible for displacing another species," Crayon says. But they are the only frogs left in two Southern California habitats that used to have other frogs. So far the frogs haven't harmed Lily Pond, where they are feeding on their own tadpoles, says Phil Rossi, integrated pest management coordinator for the San Francisco parks department.

Still, many area biologists worry that the frog could somehow spread. U.C. Berkeley's David Wake advocates eradicating them before people—kids, perhaps—introduce them into other Bay Area waterways where they could do more harm. The frogs might also be the source of a fungal infection that kills other frogs. Crayon says eradicating the frogs is worth killing everything else in the pond, if need be. "I would use Napalm to get rid of them if I could," he says.

Neither that idea nor any other action is likely. Fish & Game abandoned draining Lily Pond last year after officials became skeptical of success. The frogs can survive by burrowing under sediment. Fish & Game also wants more

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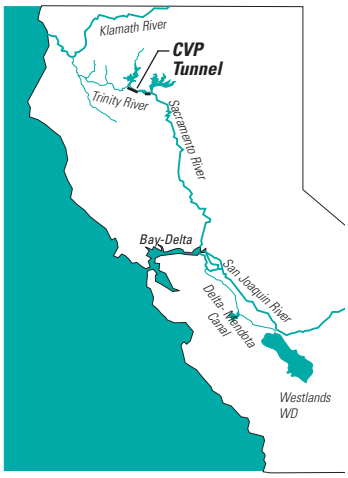
# WATER WARS

## TRIBE-TRINITY TRIUMPH

Mike Orcutt knows the flow levels he and his fellow Hoopa have been pushing for on the Trinity River by heart. But after toiling for years on the Sisyphean task of restoring these water levels and the fisheries to the river's main stem, he just had to read them once again in black and white—in the 9th Circuit Court decision of July 13 pasted on his office wall.

The 9th Circuit threw out a lower court order requiring a supplemental environmental impact statement on the flow levels authorized by the Clinton administration in its 2000 Record of Decision, effectively ending the longstanding lawsuit brought by a group of power generators led by the Westlands Water District.

**TRINITY RIVER DIVERSION**




"Nothing remains to hold up the ROD," says Orcutt.

The 9th Circuit reversed the 2003 ruling by Judge Oliver Wanger criticizing the environmental impact reviews supporting the Clinton administration's ROD, particularly the effects of reduced flows on the Delta. Since the 1960s, when the federal government built dams on the Trinity, 90% of the river's flows have been diverted to the Central Valley Project for irrigation and power generation. Judge Wanger capped the annual releases from Lewiston Dam down the Trinity at 369,000 to 452,000 acre-feet, a maximum release that is only about half of what is called for in the 2000 ROD.

Wanger also ordered a supplemental environmental impact statement to discuss the mitigation of impacts that annual releases in the range of 340,000 to 815,000 acre-feet of water down the Trinity would have on Sacramento River temperatures and the California energy crisis.

In rejecting this part of the Wanger order, 9th Circuit Court Judge Alfred Goodwin wrote: "The number and length of studies on the Trinity River, including the EIS, are staggering, and bear evidence of the years of thorough scrutiny given by the federal agencies to the question of how best to rehabilitate the Trinity River fishery without unduly compromising the interests of others who have claim on Trinity River water."

And that means local officials like Tom Stokely of the Trinity County Planning Department, who's spent the last 15 years studying environmental impacts of increasing flows down the Trinity, can finally get on with the business of restoring the river.

At times during this lengthy dispute, it has seemed that the Hoopa were going it alone. BurRec offered the Hoopa a settlement in February that tribal leaders rejected, stating that it resembled an earlier offer from Westlands.

"The offer was designed to get this out of court and water down the river," says BurRec's Jeffrey McCracken. "But the department has been committed to implementing the ROD all along."

What has been at stake for the Hoopa are runs of chinook salmon, a fish of dietary, cultural, and economic significance to the tribe. Diversions from the Trinity have decimated its population. The 2002 spring run of chinook was estimated at 35,000. Fall runs ordinarily outnumber spring runs by a factor of 2 to 1. Based on the spring numbers, officials expected a fall run of 70,000, but only 18,000 chinook returned to the Trinity.

Westlands and other water districts have something at stake as well. Water diverted from the Trinity for nearly 40 years helped sustain California's agricultural boom. The water that will go back into the Trinity represents a significant amount of the flow that goes to Central Valley farmers. In its appeals, Westlands contended that the government never looked at the effects on agriculture when it devised the 2000 ROD. "We didn't do it because the law didn't require us to," says McCracken.

Westlands spokesman Tupper Hull says the water district is exploring the possibility of an appeal. One area it may pursue is that of salinity levels in the Delta. With Trinity water taken out of Delta pumps, the possibility increases that the point in the Delta where saltwater from the Golden Gate meets with freshwater from the rivers ("X2") will move further inland and degrade water quality for fish and users. On this issue, the 9th Circuit Court ruled—upholding a part of Wanger—that the responsibility for mitigating this impact lies not with the Trinity River but with the Central Valley Project and State Water Project.

"That's how it should be," says Stokely.

Now attention turns to the restoration plan, which includes rehabilitation of 47 sites, sediment management, and gravel placement. Most immediately, Stokely says, there will be changes to accommodate higher flows on the river, such as replacing four bridges and modifying another, which should be done by the end of this year.

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## SUISUN CONTINUED

marsh harvest mouse, species that have evolved there and will flourish without a lot of human intervention.

Chappell says he isn't opposed to restoration per se, but before we attempt to bring tidal action back to 5,000-7,000 acres of Suisun Marsh, as called for in the CALFED ROD, he wants to see whether or not we can design an effective restoration project. "Before we embark on large-scale restoration we need to come up with a good strategy," says Chappell. He worries that restoring existing diked, brackish wetlands to tidal marsh will impact a "whole suite of mammals and invertebrates," not to mention ducks. He points out that without the duck club owners, "we wouldn't even have a canvas upon which to discuss these opportunities. If we can go to management strategies that reduce subsidence, that would be good, but only if they are consistent with landowner wants and needs."

Ducks Unlimited's Mark Petrie also remains open-minded about restoring tidal action, but says there are many questions yet to be answered about the marsh's role in supporting duck populations. "The question is, will you affect the ability of the marsh to support some percentage of the Pacific Flyway's waterfowl? The answer is, we don't know. We don't know what's being produced in the marsh on a per-acre basis." Petrie says restoring more of it to tidal wetlands wouldn't be as much of an issue if the Central Valley, which is also critical to the Flyway, hadn't been so transformed. "The problem is, we're cramming lots of birds into a smaller wetland base, so the issue of food production becomes pretty important."

In addition to restoring 5,000-7,000 acres to tidal wetlands, the CALFED ROD calls for "enhancing" 40,000-50,000 acres of managed wetlands in Suisun Marsh. One way to do that, says Enright, would be to restore muted tidal action to some of the managed wetlands using smaller, wider, more habitat-friendly levees that are occasionally allowed to overtop (see diagram). Muted tidal wetlands could meet multiple goals, such as reversing subsidence, enhancing habitat for endangered species, and providing waterfowl habitat and food plants. This would buy time while land elevations are restored, allowing us to head toward full-scale tidal restoration in the future while preventing further subsidence and preserving heritage land values, such as duck clubs.

Like Chappell, Enright has great respect for the duck club owners and the way they have conserved the marsh, but he is taking the long view and warns that traditional duck club management may soon no longer be an option. "As the land continues to subside, they won't be able to rely on gravity for seasonal drainage operations. They're in a hole, and the water will have to be pumped." Enright says the club owners understand his arguments but are unable to tell him what the marsh will look like in 30 years.

The biggest expense in the marsh today, says Enright, is maintaining 220 miles of levees, a practice that in turn promotes land use (disking and burning and drying out) that encourages subsidence—and then the building and strengthening of more levees. According to Enright, the bigger picture lesson we're not learning, despite the recent levee breaks and concern over the super-sized structures proposed for Delta subdivisions, is that "subsidence and levees are tied at the hip. Every increment of elevation lost on the land surface is another increment of levee strength that needs to be added."

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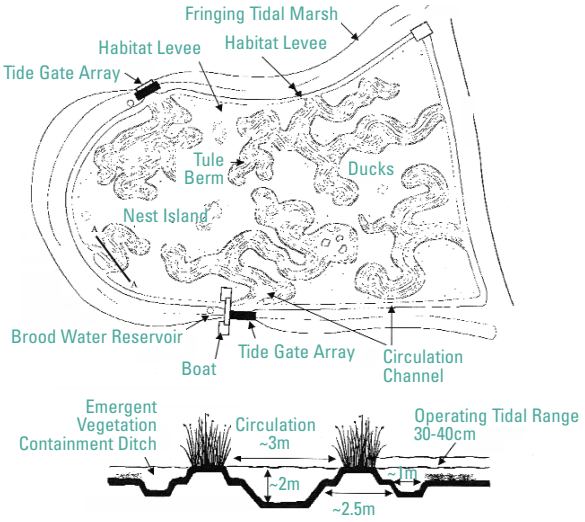
**DRAFT CONCEPTUAL DESIGN OF A MICROTIDAL WETLAND**




# SPECIESSPOT

## SHREWD SURVIVORS

A voracious predator prowls the pickleweed jungles of Suisun Marsh. Constantly on the lookout for food, it may consume up to twice its own weight every day in delicacies such as small crustaceans and insects. It's a good thing the Suisun ornate shrew is only about four inches long, with the bulk of a hummingbird.

This secretive mammal, confined to the tidal marshes fringing San Pablo and Suisun bays, has been listed as a state species of special concern. Once considered a distinct species, it is now classified as a subpecies of the ornate shrew found throughout most of California west of the Sierra and in northern Baja California. However, the Suisun race has darker fur than typical ornates. And U.C. biologists William Lidicker Jr. and Warren Hays have discovered that it also has unique behavioral and physiological traits.

Most shrews are solitary and fiercely territorial. But Lidicker and Hays, in field work at the Rush Ranch Preserve, found that Suisun ornate shrews are gregarious. The shrews they live-trapped belonged to two stable groups, with some seasonal turnover and an influx of males in spring. (The males may winter lower in the marsh, surviving high tides by holing up in burrows with air pockets or clinging to taller vegetation). Being social may help the shrews conserve body heat by huddling together or aid in construction of burrows and runways.

Another surprise: the shrews lost up to 40% of their body weight after their breeding season. This phenomenon, the Dehnel Effect, had previously been observed only in shrew species in areas with severe winters, and had been interpreted as an adaptation to seasonal reduction in prey availability. But the Suisun shrews don't have to cope with extreme cold, although winter flooding may limit their food supply.

Like other marsh specialists, Suisun ornate shrews are vulnerable to habitat loss, and to disasters like the Kinder Morgan diesel-oil spill in diked marshland this past April. Greg Massey of the Oiled Wildlife Care Network says no dead shrews were recovered after the spill. According to Warren Hays, though, this sensitive species may have been in the impacted area: "Within their range, they're likely to be found on any piece of marsh with pickleweed and exposed mud, unless the area has been disturbed."

Contact: Warren Hays (808)236-5842; Greg Massey (530)752-1218 **JE**

## WATERSHED CONTINUED

data before considering a poison called Rotenone, which successfully eradicated the frogs on the U.C. Davis campus in the 1970s, but which also poisoned Lake Davis in 1997 while failing to eliminate invasive pike. Furthermore, getting the frogs out of the pond is just not a high enough priority in a tight budget climate, says Fish & Game's invasive species coordinator Susan Ellis. Adds Rossi, "Eradication methods by draining or chemical treatments have been determined to be either ineffective, budgetarily unfeasible, or environmentally incorrect."

In Marin, faced with an invasion of red-eared slider turtles in two reservoirs, the Marin Municipal Water District has turned to trapping. District aquatic ecologist Eric Ettlinger is trying to remove the sliders before they wipe out native Western pond turtles, which just can't seem to compete for food or basking space. The pond turtle is listed as a state species of special concern.

When Ettlinger removed his seasonal traps in June, he had caught 78 sliders, or two-thirds the estimated population in Phoenix Lake and about 40% of the sliders in Alpine Lake. Ettlinger suspects that the sliders, a common pet, have been dumped in the district's most publicly accessible reservoirs. Trapping will resume next spring.

Freshwater sliders and soft-shell turtles are also turning up in salty Lake Merritt. Susan Porter, a science teacher at St. Paul's Episcopal School in Oakland who recently won a U.S. EPA award for her work at the lake, says the sliders might have been released as part of a Buddhist ceremony. Every June Buddhists around the world buy and release sliders and other captive creatures, a well-meaning rite that has alarmed some environmentalists.

Porter and her sixth graders help clean the lake and over the last few years, have fished out sliders, dead and alive. Volunteers from the Lake Merritt Institute also help retrieve the misplaced critters. "The salt destroys their kidneys, and it is probably a slow death," says the Institute's Richard Bailey.

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# REHAB

## OYSTERS AHOY

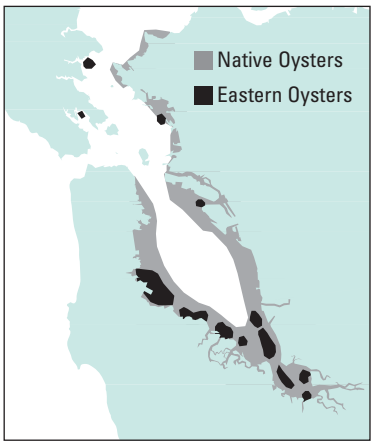
The Bay's native oysters, Ostrea lurida, were once so plentiful that they practically paved many shallow tidal areas and helped San Francisco oyster houses proliferate. Now the oyster houses are gone, and the oysters have almost disappeared, victims of commercial overharvesting, gold mining silt, and industrial pollution. Their scarcity concerns biologists who, for the past couple of years, have been trying to figure out what it would take to help the critters make a comeback.

What's got them excited about a possible bivalve revival is not the commercial value of oysters on the half shell with a twist of lemon—the fifty-cent-piece-sized oysters are no longer the desirable commodity they once were. It's that oyster reefs would boost biodiversity in the Bay by providing habitat for small fish and invertebrates, which, in turn, would provide food for larger fish and birds. It's also that these mollusks filter as much as 25 gallons of water a day—either trapping sediment and pollutants in their bodies or forming them into packets, which they discharge onto the Bay bottom—meaning that a substantial oyster population could improve the Bay's water quality.

Biologists know that oyster populations can be increased; restoration projects in Chesapeake Bay, begun in the mid-1990s, are beginning to show results. Says Chesapeake Bay Foundation's Stephanie Reynolds, "At this point we can't see an increase on a baywide scale, but we see major increases in selected tributaries like the Lynnhaven River in Virginia." Using population estimates for the 1600s as a baseline, biologists hope to increase Chesapeake Bay's oyster population from 2% to 10% of its original level by 2010.

Just a few years ago, Bay Area biologists weren't certain that native oysters still lived in the Bay in areas that researchers and volunteers could easily reach. (Scientists prefer to try to boost existing populations, rather than bringing in juveniles from other locations, which is much more time consuming.) They were only aware of a small pocket of oysters near Marin Island, a fairly inaccessible spot. Then, in 2001, Save the Bay staff and volunteers dropped "oyster necklaces," strings with oyster shells tied on, into the Bay at several locations to see whether tiny oyster larvae would attach themselves to the shells and start to grow. They did. Oysters were found at Coyote Point, in Richardson Bay, and most remarkably, in Sausal Creek next to the Fruitvale Bridge, a very urban area.

**BAY OYSTERS BEFORE 1915**




Impressed by these findings, NOAA Fisheries, with funding from local foundations and groups like Tiburon Audubon, started two pilot restoration projects: one in Tomales Bay in 2002 and the other in Richardson Bay this spring. The projects are using an approach that has been successful in the Chesapeake: placing mesh bags filled with oyster shells and weighing a couple hundred pounds each into shallow warm water where oysters are likely to live. Biologist Mike McGowan, who is leading the Richardson Bay project, explains that any larvae that may be drifting around need to settle on hard surfaces—like the shells and reefs that have mostly disappeared along with the oysters—in order to grow; otherwise they just die or get eaten. By serving as reefs, the shell bags could solve the "critical mass" problem. McGowan says that oysters also seem to promote the growth of eelgrass, which is common in healthy estuaries but not so abundant in the Bay. "The oysters filter particulates from the water, so more light gets through and the eelgrass grows better." Eelgrass provides spawning places for fish and food for invertebrates.

Each month, researchers check the plastic settlement plates that were submerged along with each bag to see whether juvenile oysters are attached and growing. Says NOAA Fisheries' Natalie Cosentino-Manning, "The Tomales Bay project has had settlement problems so far, but we know the oysters are there. Researchers will have to move the shell bags around until they find a hot spot." She says that the Richardson Bay project may have findings to report in a few months.

If the pilot projects are successful, Cosentino-Manning expects to see native oyster restoration projects in both locations on a much larger scale. Tiburon Audubon's Michele Pearson is optimistic. Says Pearson, "Oysters won't save the Bay, but they're one piece of the puzzle."

Contacts: Mike McGowan (510)593-6345; Natalie Cosentino-Manning (707)575-6081; Stephanie Reynolds (410)268-8816. SPW

# PLACES TO GO & THINGS TO DO

## WORKSHOPS & SEMINARS

### CALIFORNIA BAY-DELTA MEETINGS

AUG 12 THURSDAYS SEP 9

TOPIC: Meetings of the California Bay-Delta Authority (August 12) and the California Bay-Delta Public Advisory Committee (September 9).
LOCATION: Sacramento
SPONSOR: California Bay-Delta Authority
(916)445-0533

### DAM REMOVAL WORKSHOPS

AUG 16 MON & 17 TUES
AUG 30 MON & 31 TUES

TOPIC: Economic, biological, hydrological, and social impacts of dam removal.
LOCATIONS: August 16 & 17, Berkeley; August 30 & 31, Fort Collins, Colo.
SPONSOR: Environmental & Water Resources Institute of the American Society of Civil Engineers
*www.ewrinstitute.org/damremoval04/*

### EROSION & SEDIMENT CONTROL WORKSHOPS

SEP 9 THURS & 29 MON

TOPIC: Methods for managing sediment and other pollutants at construction sites.
LOCATIONS: September 9, Novato; September 29, Concord
SPONSOR: S.F. Estuary Project
(510)622-2419; ct@rb2.swrcb.ca.gov

### WEAVING RESTORATION INTO THE TAPESTRY OF COASTAL LIFE

SEP 12 SUN - 15 WEDS

TOPIC: Hear talks from experts and leaders in all aspects of restoration and take a comprehensive approach to habitat restoration through plenary sessions, workshops, and in situ learning opportunities.
LOCATION: Seattle
SPONSOR: Restore America's Estuaries
*www.estuaries.org/2ndregistration.php*

### 2004 OFWIM MEETING & CONFERENCE

SEP 23 THURS - 26 SUN

TOPIC: Partnerships and the future of fish and wildlife information management.
LOCATION: San Diego
SPONSOR: Organization of Fish & Wildlife Information Managers
Ofwim@ofwim.org;
*www.ofwim.org/meetings/OFWIM2K4.html*

### THIRD BIENNIAL CALFED SCIENCE CONFERENCE

OCT 4 MON - 6 WEDS

TOPIC: Integrating science and management to achieve system-level responses.
LOCATION: Sacramento
SPONSOR: CALFED
*http://iep.water.ca.gov/calfed/sciconf/2004/*

### INVASIVE PLANTS & WILDLAND-URBAN INTERFACE

OCT 7 THURS - 9 SAT

TOPIC: Annual symposium with talks and posters on volunteer weed control efforts, funding urban projects, and cutting-edge research on the biology and control of invasive plants.
LOCATION: Ventura, Calif.
SPONSOR: California Invasive Plant Council
*http://groups.ucanr.org/ceppc/2004_Symposium/*

## CALL FOR ABSTRACTS & PROPOSALS

### THE U.S. EPA

AUG 30 MON

is soliciting initial proposals for a technical assistance program: Making Smart Growth Work: Reuse and Revitalization of Vacant and Abandoned Properties; Regional Networks for Smart Growth; and Smart Growth and Brownfield Redevelopment.
DEADLINE: MONDAY, AUGUST 30, 2004

### THE THIRD INTERNATIONAL CONFERENCE ON INVASIVE SPARTINA

SEP 24 FRI

is soliciting original papers and posters on all scientific and technical aspects of invasive Spartina. The organizing committee is especially interested in submittals that speak to the theme of the conference: "Integrating the Science and Management of Invasive Spartina." Topics of interest include methods and uncertainties predicting Spartina invasion rates and patterns, ecosystem effects and adaptation to invasive Spartina, and strategies and methods for monitoring the spread of invasive Spartina.
*www.the-conference.com/2004/spartina/abstracts.*
DEADLINE: FRIDAY, SEPTEMBER 24, 2004

## GRANT OPPORTUNITY

### THE S.F. ESTUARY PROJECT

OCT 15 FRI

is pleased to announce its 3rd Annual Small Grants Program. We invite any Bay Area resident, organization, school, business, or public agency to apply for funds ranging from $3,000 to $10,000. This year we have a total of $100,000 to award. Request a copy of the RFP from Carol Thornton (510)622-2419 or ct@rb2.swrcb.ca.gov, or online at
*www.abag.ca.gov/bayarea/sfep/projects/index.html.*
DEADLINE: FRIDAY, OCTOBER 15, 2004

Have a conference, workshop, or event to announce? Please send it to ESTUARY by the 21st of January, March, May, July, September, and November for the month following.

## NOW IN PRINT & ON LINE

***Agricultural Water Quality Grant Program and Federal Clean Water Act Section 319 Nonpoint Source Implementation Grant Program Guidelines. July 2004.***
State Water Resources Control Board & Regional Water Quality Control Boards.
www.swrcb.ca.gov/funding/awqgp/docs/agguidelines072004.pdf

***Framework for the East Contra Costa County HCP/NCCP Preliminary Working Draft. January 2004.***
East Contra Costa County Habitat Conservation Plan Association. www.cocohcp.org

***Klamath River Inter-Tribal Fish and Water Commission. June 2004.***
Klamath River Inter-Tribal Fish and Water Commission. (news about the Klamath River Basin)
www.kritfwc.homestead.com/

***OFWIM News. July 2004. Organization of Fish and Wildlife Information Managers.***
www.ofwim.org/docs/newsletters/OFWIM_News_July04.pdf

***Protecting Water Resources With Smart Growth. July 2004.***
U.S. EPA.
www.epa.gov/smartgrowth/pdf/waterresources_with_sg.pdf

***Sacramento National Wildlife Refuge Draft Comprehensive Conservation Plan and Environmental Assessment. July 2004.***
http://pacific.fws.gov/planning/draft/docs/CA/docssacriver.htm

***Smart Growth Is Smart Business: Boosting the Bottom Line and Community Prosperity. July 2004.***
The National Association of Local Government Environmental Professionals (NALGEP), the Smart Growth Leadership Institute (SGLI) & U.S. EPA.
www.sgli.org/SGisSBfinal.pdf

***The Weed Workers' Handbook–A Guide to Techniques for Removing Bay Area Invasive Plants. July 2004.***
California Invasive Plant Council. (510)843-3902, dwjohnson@cal-ipc.org; or The Watershed Project (510)231-5655, staff@TheWatershedProject.org

***Virtual Summit 2004: The STRAW Project. July 2004.***
The Bay Institute.
www.bay.org/virtual%20summit04/virtual_summit_2004.htm

***West Nile Virus Strategy and Communications Plan. 2004.***
San Francisco Bay Joint Venture.
www.sfbayjv.org/wnv/SFBJV_WNV_STRATEGY.pdf

## BULLETIN BOARD CONTINUED

VOLUNTEERS—and the non-profits that use them— no longer have to worry about "going to jail" (see April and June ESTUARYs) as the California Senate voted 35-0 on July 1 to pass a bill that refines the definition of a volunteer for purposes of grant-funded projects. The Assembly version of the bill, authored by Assemblywoman Loni Hancock, passed unanimously in May. As ESTUARY went to press, the Assembly was poised to take up a reconciled bill with amendments from the Senate, the final step before the bill makes its way to Governor Schwarzenegger's desk for signature.

## CALFED CONTINUED

cussion of adaptive management is needed. And a more coherent strategy to account for restoration successes and failures badly needs to be developed.

The four goals of CALFED raise many potential complications that must be addressed as we try to find ways to better manage California water and its ecosystems. CALFED is committed to collaborative decision making to achieve its goals. But true collaboration, especially where complications exist, also necessitates transparency, common understanding about the status of technical knowledge, the credibility that comes from listening to advice from people of stature from outside the system, and a constant stream of new knowledge. More than one stakeholder told me in the last three years that the credibility of CALFED is entwined with the credibility of the science it encompasses. We all must continue to keep both at the top of our agenda.

Luoma, Senior Research Hydrologist, U.S. Geological Survey, was Lead Scientist, CALFED Bay-Delta Program from August 2000-end of 2003.

YOUR INDEPENDENT SOURCE FOR BAY — DELTA NEWS & VIEWS

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