



ESTUARY

THE SOUNDS OF SALMON SPAWNING on the San Joaquin were once so loud that riverside residents couldn't sleep at night, according to testimony in a 16-year-old lawsuit to restore flows to the river below the giant Friant Dam. These days, no one has trouble sleeping because there are few fish left. But fishing and conservation groups say the fish can now return, hailing a ruling by U.S. District Court Judge Lawrence Karlton that found that BurRec has violated state and federal laws by sending most of the river's water to agriculture for the past 50 years. Enviro and some water agencies also predict that greater flows in the river will help improve water quality in the Delta. Meanwhile, downstream water users say the judge misinterpreted Cal Fish & Game Code Section 5937, which states that BurRec must "allow sufficient water to pass over, around, or through the dam, to keep in good condition any fish that may be planted or exist below the dam." Downstream water users claim fish below the dam have been maintained in good condition, while enviros point to stretches of the river that are completely dry during certain periods of the year.

URBAN CREEKS ARE FOR THE BIRDS— and fish. In a discovery that surprised even local creek activists, more than 130 steelhead trout—some at least a foot long—were relocated recently from a reach of Codornices Creek that is being dewatered for restoration. The restoration work on Codornices Creek, which defines the border between Albany and Berkeley, is part of a larger effort—paid for by grants from CALFED, the State Water Resources Control Board, the Coastal Conservancy, CALTRANS, and a creek restoration fund passed by voters in Albany—that will reshape and revegetate the creek between I-80 and San Pablo Avenue. In the long run, the re-vegetated, restored creek should offer better habitat for the fish, says project director Drew Goetting of the Restoration Design Group.

BUSINESSES NEED TO PAY MORE attention to water as prices go up, demand for urban and agricultural uses increases, water quality declines, and water resources become more limited, according to *Freshwater Resources: Managing the Risks Facing the Private Sector*, a new report by the Pacific Institute (August 2004; www.pacinst.org). According to the

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Pandora's Cauldron

For a charm of pow'rful trouble like a hell-broth boil and bubble

William Shakespeare, *MacBeth*

From the aspirin we gulp for headaches, to the lotion we smooth on to soothe our skin, to the deodorants and perfumes we spritz to avoid offending or to attract other human beings, to the insect repellent we coat ourselves with to offend virus-carrying mosquitoes, to the sunscreen we apply to stave off cancer, to the myriad pharmaceuticals we take to lower blood pressure, regulate our hormones, stay happy, or rev up our sex lives, our drugs and "personal care products" seem to be turning up everywhere in the environment, often via treated—or sometimes untreated—wastewater. Each year, wastewater treatment plants around the Bay discharge approximately 230 million gallons of treated effluent directly into the Bay, not including what gets discharged into the Delta and major rivers, according to the S.F. Estuary Institute's Daniel Oros. With our growing population, increasing volumes of effluent, and new chemicals continually being introduced to the market, are the Bay and its tributaries becoming a witch's brew for the critters that live in and around them? Some scientists and resource managers are worried that "feral pharmaceuticals" (over-the-counter and prescription drugs) and personal care products—together referred to as "PPCPs" for "pharmaceuticals and personal care products"—have run amuck and could be having impacts we don't yet understand on aquatic and other life forms.



"If you had talked to me about this three or four years ago, I would have said that it's still not an important concern for San Francisco Bay," says U.C. Berkeley's David Sedlak, who is working with U.C. Davis' Bernie May to study fish in the Central Valley rivers that flow to the Bay. "But then we started looking at some streams in the Central Valley and found concentrations of steroid hormones similar to what was coming out of wastewater treatment facilities." In streams consisting largely of wastewater, says Sedlak, the researchers are finding feminized fish—male fish that are putting their energy into building female egg sacs. "That can't be good at a population level," says Sedlak.

Bryan Brooks at Baylor University, who is studying wastewater-dominated ephemeral streams in Texas and the arid Southwest, has found trace amounts of antidepressants in fish living in a creek downstream of a wastewater treatment plant. Brooks is interested in such situations because they are what he calls "an excellent example of a worst-case scenario." Closer to the Bay, while most of our treatment plants discharge directly into the Bay, several Central Valley streams (some ephemeral) and rivers receive direct discharges of treated wastewater. "During the dry season, the only source of flow in a lot of the small creeks and streams tributary to the Sacramento River is [treated] wastewater," says the Central Valley Regional Board's Robert Holmes. The City of Vacaville discharges to a creek that flows to the Sacramento River, Napa discharges to the Napa River, Petaluma to the Petaluma River, and Sonoma to Sonoma Creek, while Stockton and other cities discharge into the San Joaquin River, which, though not ephemeral, already has considerable water quality problems. The City of Brentwood discharges its wastewater into Marsh Creek, which at times, says the Board's Renand

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BULLETIN BOARD CONTINUED

report, during a recent drought in India, Pepsi and Coca-Cola bottling plants lost their licenses to pump local groundwater, while Anheuser-Busch, the world's largest beer brewer, found itself low on barley (a key brewery ingredient) after water for irrigating the crop was cut back. The report recommends that companies measure their current water use, assess local water conditions and risks, consult community and other stakeholders, and establish a water policy with clear goals for reducing energy and water use.

WANT TO TRACK wetlands restoration projects around the Bay or let others know about your project? Visit <http://www.wetlandtracker.org>, the Bay Area Wetland Project Tracker created by the S.F. Estuary Institute. The site provides free public access to information about the location, size, sponsors, habitats, contacts, and status of wetland restoration, mitigation, creation, and enhancement projects in the Bay Area. Planned and completed wetland projects are displayed on an interactive regional map. Summary information is displayed alongside the map. More information is found on separate project information sheets. Each project can have files associated with it, such as reports, data, photos, videos, other maps, or commentary. Anyone can submit files and make them available for others to download.



PEOPLE

BAY LOVER'S LEGACY

Biophysicist Will Siri, who frequently traveled to—and climbed—some of the highest peaks in the world, never lost his love for the lower elevations of the Bay Area. In a 1960s KQED interview conducted after Siri returned from an Everest climb, he told anchorman Mel Wax, "No, Mel. Returning to San Francisco Bay is never an anticlimax."



Siri died in August at the age of 85, after a life of research, adventurous climbs, and activism to protect the Bay. Siri was president of Save the Bay from 1968-1988 and vice chairman of the Bay Institute from 1985-1999. He was also president of the Sierra Club from 1964-1966 and a director from 1956-1974.

"He was very motivated, very dedicated to working with individuals and organizations to reverse the damage that had been done by filling [and dumping]," says Doris Sloan, who succeeded Siri as president of Save the Bay. Sloan also praised Siri as being vital to the efforts of Citizens for the Eastshore State Park, which protects more than 1,800 acres of shoreline between Richmond and Emeryville.

Siri worked on the Manhattan Project during World War II, but his career at Lawrence Berkeley Lab focused on applying physics to medicine. While he was 18,000 feet up on a snowy Everest slope, he used a kind of radiation detector to study the effects of high altitude on the blood.

Siri's widow, Jean, an East Bay Regional Park District board member and former El Cerrito mayor, says her husband was already an ardent conservationist and environmentalist when they met in the 1940s. He likely inherited his mother's love of mountains, she says. As Richmond—and later El Cerrito—residents during the 1960s, the couple became increasingly worried about dumping in the Bay. Many neighbors saw no problem with the influence of heavy industry in the area, but the Siris saw that the region could be transformed for the worse as the Bay became filled in. "The only thing that makes the Bay Area is the Bay," says Jean Siri. "It was just going to be a stinky river, and that doesn't make the Bay Area a place to live."

For all his passion and work to keep the Bay vast and clean, Siri's style was always civil and never strident, says environmental author and former S.F. Chronicle environmental reporter Harold Gilliam. "His effort was to build bridges between opposing groups, whether they were developers, power companies or various factions within the environmental movement. He tried to accommodate differing interests while acting decisively on his deeply held convictions about defending the natural environment." As a result, says Gilliam, Siri held the respect even of those he lobbied against. "By any measure, he rightfully belongs in California's environmental hall of fame."

Siri's reputation and esteem became invaluable to the growing environmental community in the mid-1980s. "The Bay Institute I started in 1981 needed a name like Will Siri on its board to help gain recognition of TBI as a major player in Bay issues," says William Davoren, who had admired Siri ever since that post-Everest KQED interview.

Jean Siri says she hopes her husband's legacy will be the continued strengthening of environmental activism in the Bay Area. "You just hope that you have motivated a lot of people. You have to leave people who will keep working at it, or it will disappear." **DO**

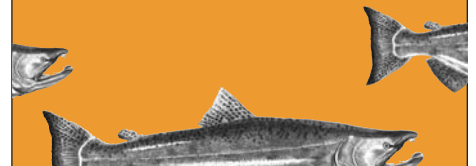
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ENVIRONMENT



VIRUS VIGILANCE

The dreaded West Nile virus finally arrived in California this summer, as scientists predicted it would. By mid-September, California vector control agencies had reported 486 human infections and 13 fatalities, mostly in Southern California. Dead birds infected with the virus have been found in all Bay Area counties. On September 16, one human case was reported in San Jose, and scientists expect to see more human infections in the region soon.

With the virus upon us, vector control districts are busier than ever trying to reduce mosquito populations. And the S.F. Bay Joint Venture (SFBJV) is worried that the public may implicate California's wetlands as factories for West Nile virus-transmitting mosquitoes.

Earlier this year, the SFBJV began to prepare for a major virus outbreak. It developed a public communications plan that includes key media messages to help organizations working on wetland restoration projects explain why wetlands are not the main sources of mosquitoes carrying the disease.

One media point is that tidal wetlands breed few mosquitoes because the moving water flushes out eggs and larvae. Another is that the most troublesome mosquito species—i.e., those implicated in West Nile—don't live in tidal marshes: *Culex tarsalis* lives in fresh or brackish water and *Culex pipiens* thrives in stinky habitats like underground storm drains and sewage treatment plants. Well-designed non-tidal wetland restoration projects, which might be attractive to *tarsalis*, provide drainage to keep the water moving, so they are not good mosquito habitats either. Finally, a key message is that county vector control districts work hard to prevent both tidal and non-tidal marshes and other wetlands like creeks from producing large mosquito populations.

According to vector control district staff, however, the problem is that it's hard to control mosquitoes perfectly 100% of the time. Also,

research on the virus is ongoing, and some additional mosquito species have turned out to be capable of transmitting it. "You could almost say that the virus hasn't found a mosquito it doesn't like," says Alameda County entomologist Bruce Kirkpatrick.

One strategy is to keep water moving. But Kirkpatrick says that Alameda County, for example, has many marshy areas along the Bay with drainage ditches that need to be kept clear. Unfortunately, the vector control district can only get to 30% or 40% of the ditches each year, so stagnant pools form, he says. Santa Clara County Vector Control District's Kriss Costa says that tidal marsh gates sometimes fail, causing water to back up and sit. "When that happens, we can get big fly-offs of *Aedes squamiger* or *Aedes dorsalis*," she says.

These saltwater species were not thought to carry West Nile Virus, but in September, vector control district staff found *squamiger* mosquitoes infected with the virus in San Luis Obispo. And recent laboratory tests showed *dorsalis* capable of transmitting the virus, although not as efficiently as other species. Both types of mosquitoes concern scientists because they can fly 20 miles, are very aggressive, bite during the day and breed in such huge numbers that if even a small percentage carry the virus they could be a problem, says Sonoma/Marin County Mosquito and Vector Control District's Chris Canterbury.

This news has given vector control district staff pause, but even when stagnant water in wetlands leads to mosquito breeding, they are confident that their larvicidal spraying programs work well most of the time. First, technicians inspect wetland areas for mosquito larvae; then, using an environmentally friendly, narrow-spectrum larvicide, they kill mosquitoes before they become biting adults. Kirkpatrick says that in Alameda County, 10 technicians visit several sites a day, armed with truck-mounted spray machines for large areas, and hand pumps and tiny spritzers for smaller hotspots. To reach deep into wetland areas, they drive spray-rigged ATVs, known as "swamp buggies."

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Reproduction of an illustration in an 1888 edition of *Drainage Journal* showing critters fleeing a drained swamp.

Lisa Krieshok

BIRDWATCH



DOOMED HARBINGERS?

To some, they're noisy nuisances, crop-raiding pests, omens of misfortune. But to biologist Carolee Caffrey, American crows are "the coolest birds in the world."

Caffrey, a National Audubon Society science associate who teaches at the College of New Jersey, was attracted to crows by their swagger. She was told no one had studied them systematically because they were too smart to be caught and tagged. Caffrey developed capture techniques, though, and has followed the complex lives of crows for more than 20 years, first in California, then in Oklahoma. Since the advent of the West Nile virus, she's also watched them die.

These are no ordinary birds. Long-lived and behaviorally flexible, crows have strong family ties. They may strike out on their own but return to visit Mom and Dad, or even move back in with them. Some adults postpone nesting and help their parents rear another brood. They play tricks on each other and care for sick or injured relatives. And Caffrey is convinced they understand death, and mourn their dead.

American crows have been hard hit by West Nile; laboratory studies documented 100% mortality after infection. Crows and their relatives may be more susceptible than other birds. Their sociability favors bird-to-bird transmission. (Humans can't contract the disease from birds, though.) When the virus reached Oklahoma in 2002, it killed more than a third of Caffrey's study population within two months; an additional two-thirds died the following year. If resistance is evolving, it's happening slowly: in two field studies, only 2% to 3% of the birds had West Nile antibodies.

How do massive crow die-offs affect ecosystems? "Good question," says Caffrey. "No one really understands the role of crows in ecosystem balance." Farmers may find that these "pests" helped keep harmful insects in check.

Contact: Carolee Caffrey, (215)355-9588 ext. 23 or clcaffrey@audubon.org

RECYCLING



HAUTE COMPOST

Bite into that Cherokee Purple tomato from the Ferry Building Farmer's Market, and you close a circle running from San Francisco's finest restaurants through a Solano County composting facility to organic growers and back to urban consumers. The common thread is Four Course Compost, a product of employee-owned Norcal Waste. Every day, 300 tons of plate scrapings and kitchen trimmings from San Francisco and Oakland restaurants, including such tony establishments as Farallon and Boulevard, are trucked to Norcal's Jepson Prairie Organics plant near Vacaville.

"San Francisco was the first large American city to establish a city-wide food-scrap compost program," says Norcal's Robert Reed. Today it is the largest program in the United States, involving more than 2,000 restaurants and food-related businesses. Mayor Jerry Brown's interest prompted expansion of the program to Oakland, where 125 businesses now participate.

Growers appreciate the end product. Chris Simas, who raises 35 tomato varieties, stone fruits, citrus, and figs in the Capay Valley, opted for Four Course three years ago. He's seeing bigger tomato yields, peaches with a brighter blush, Mandarin oranges with better color. Simas has also been able to cut back on costly fishmeal fertilizer.

Another grower, Nigel Walker of Eatwell Farms near Dixon, says he's using less bird guano since switching to Four Course. "I don't like the idea of compost made from Foster Farms chicken manure," Walker says. "We're trying to make ourselves more sustainable, and it makes financial sense for us to do the right thing." He started farming in an El Niño year and had to pump out his flooded fields, but good compost has helped his soil absorb more water.

Along with produce growers, 30 vineyards use Four Course compost. Diverting leftovers from the waste stream pays off in soil and water quality, with a bonus of fine wine and tasty produce. "We've demonstrated here that it works," says Norcal's Reed.

Contact: Robert Reed (415)875-1205; Chris Simas csimas@farmfreshyou; Nigel Walker (800)648-9894

JE

MANAGEMENT

X2 FRIES FISH

As water managers and others furrow their brows this fall examining how well the 1995 Delta Water Quality Control Plan is working, it is becoming clear that efforts to balance freshwater and saltwater levels in the Delta sometimes conflict with the protection of upstream fish.

One water quality standard at issue is known as X2, the theoretical distance from the Golden Gate at which saltwater from the Bay meets freshwater from rivers in the Delta. The goal of X2 is to help Delta fish—particularly smelt—forage and reproduce in freshwater areas that would otherwise be too salty.

To meet this standard, which applies from February through June of each year, the State Water Project and BurRec monitor salinity in the water from the point where the San Joaquin and Sacramento rivers meet westward to Suisun Bay. If salinity levels rise and move too far into the Delta, officials release more water from dams or divert less water from the rivers, sending more freshwater down the Delta to push the saltwater out toward the Bay.

The X2 standard has three compliance points—the westernmost at Port Chicago, a central one at Chipps Island, and one to the east at Collinsville. Of the three, the only one with any flexibility is Port Chicago. When there is a lot of water flowing into the Delta from the Central Valley's eight rivers, officials must incorporate the salinity at Port Chicago into their calculations. When river flows are lower, officials can ignore Port Chicago.

In 2003, a lot of water came into the Delta from the rivers as a result of the heavy January rains. The officials were required to meet the Port Chicago standard for X2 in February, but decided to wait, thinking rain would come in February. When February was dry, they were stuck with an emergency situation and turned

to the fastest source of freshwater, Folsom Dam on the American River.

The result brought dramatic changes on the river. In the span of a few days, it went from having flooded gravel bars and upland riverbanks where spawning salmon and steelhead trout laid their eggs to rocky, drying banks carpeted with a young fish feast for hungry gulls.

"People say BurRec shouldn't have waited so long to meet the standard, but it had to meet it 25 out of 28 days, so there wasn't much flexibility there," says Richard Denton of the Contra Costa County Water District.

Nonetheless, the wiggle room afforded by the Port Chicago standard is something the U.S. EPA's Bruce Herbold would change. Herbold, who developed the X2 standard, is working with Denton and others on a way to overcome the fluctuations in flows that stranded fish the last two years. Instead of ramping up flows down the Delta for a few days to meet the X2 standard—followed by a drastic drop-off—Herbold and Denton would like to see the flows elevated slightly, but maintained over more days to keep levels constant.

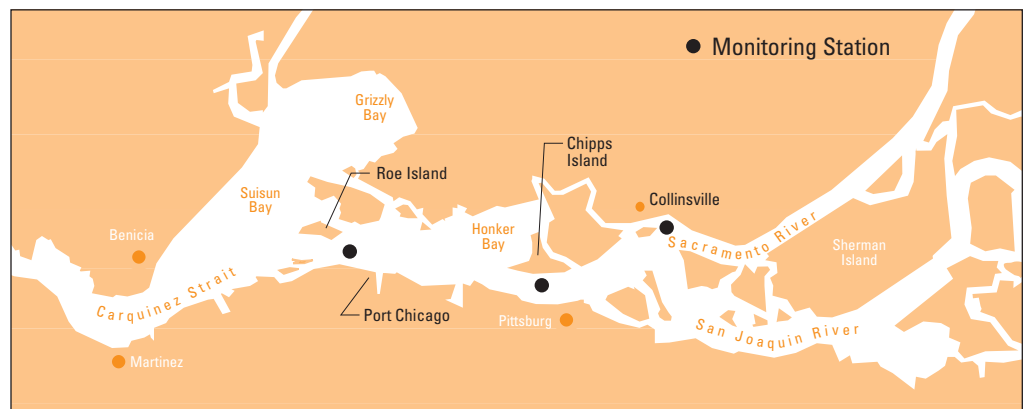
"If the water rises once, you don't want it to go down quickly because that disturbs the fish as they are spawning," explains Denton.

The fish strandings have uncovered another problem in the watershed—the fact that the American River has no state-mandated flow standard.

Without the flow standard, the river becomes the first source used to meet water quality standards, says Andy Fecko of the State Water Resources Control Board. That's because officials can get water from behind Folsom Dam to the Delta in one day. The result is a river and a dam that have very little cool water by late summer and early fall, a time when fall-run salmon need it. "We hope cooler temperatures abound, but we're always right on the edge in August and September," says Fecko.

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X2 MONITORING STATIONS



CAULDRON CONTINUED

Jauregui, is made up almost entirely of wastewater. At the south end of the Bay, several wastewater plants discharge into sloughs that lead into the Bay, according to the S.F. Regional Board's Tom Mumley.

"We used to think that dilution was the solution," says Brooks. "Now we're worried about the boomerang effect." Brooks worries about how "pseudo-persistent compounds like PPCPs" could be affecting aquatic organisms. Some critters—especially those downstream of wastewater discharge pipes—are continuously exposed to low levels of various chemicals, which could "overload" their cellular first line of defense, the "efflux pumps" (think of a sort of bilge pump for toxics). U.S. EPA's Christian Daughton, a leading researcher in the PPCP field, theorizes that once those "pumps" are overwhelmed, other chemicals might be able to make their way past that defense system and cause problems they ordinarily wouldn't.

One reason we don't fully understand what effects we are having on fish and other critters is that PPCPs affect them differently than they do humans. "The receptors [in cells] aren't necessarily the same," says Daughton. Plus, he adds, we don't always even know exactly how drugs work in the human body; we often just know that they work. Daughton and Thomas Ternes (with the Institute for Water Research and Water Technology in Germany) have posed the possibility that PPCPs could be causing subtle, perhaps invisible, behavioral changes in organisms that, in the long run, could have effects at the population level. Laboratory studies have shown that antidepressants may delay maturity in mosquito fish and frogs, which could affect their reproduction and survival. Studies have also shown that antidepressants cause zebra mussels to increase their spawning activity. But quantity may not always be the problem. Even minuscule concentrations of certain chemicals can bioaccumulate, says Daughton. For example, researchers suspect that chemicals in sunscreens are bioconcentrating in fish in German lakes, while musks (from perfumes, deodorants, fabric softeners, and detergents, among others) are building up in the tissues of mussels.

Stanford professor David Epel has found that musk compounds are interfering with the cellular pumps that normally kick out toxins in Monterey Bay mussels. "Whether they're doing that in nature, we're not sure yet. But we're finding that the musks are

effective long-term inhibitors of these pumps; they work at very low levels." Epel's concern is that because the musks may be inhibiting the mussels' toxin defense system, toxins that would normally be excluded might now get into the cell and cause damage. Says Epel, "This raises the question of whether there are other chemicals in the environment that might be having similar effects."

Because the topic of PPCPs is so complex (and often confusing), it can be difficult for regulators to know where to begin to try to take action—or to determine whether action is needed at all. The Central Valley Regional Board, concerned about the findings of feminized fish, has begun designing an assay for steroid hormones in fish. But beyond that, the Board's Robert Holmes admits that his

agency is somewhat frustrated. "We don't know out of all of that suite of chemicals that [steroid hormones] are the worst. We're sort of limited to what tools we have to evaluate effects. We can only focus in on them with what tools are available."

Despite all the unknowns, Bay Area wastewater folks are beginning to take some preventive action. Galvanized by the U.S. Geological Survey's 1999 nationwide survey for unidentified organic contaminants in streams and rivers, the Emerging Contaminants Working Group (ECWG) and the Bay Area Pollution Prevention Group (BAPPG) are attempting to come to grips with PPCPs, says the City of Palo Alto's Karin North, who is in both groups. ECWG

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SCIENCE SPOT**WRACK IS BACK**

There's a name for everything, even the thick tangles of kelp and sea grass that wash up onto beaches and settle in large clumps along the tide line where they decay and attract flies: they're called beach wrack. Many surf- and sand-lovers have never heard that term, but they've seen the stuff—and smelled it—and prefer their beaches wrack-free. That's why for the past several decades, cities along the Southern California coast have sent tractors out at dawn every day during summer to rake up the wrack along with the previous day's litter.

But biologists are finding that wrack plays an important role in beach ecology. An ongoing study of more than 40 Southern California beaches by scientists from U.C. Santa Barbara's Marine Science Institute shows that beaches with lots of wrack have a much greater diversity and abundance of intertidal life than beaches without it. Now biologist Jenifer Dugan, who leads the study, is letting other scientists, beach managers and the public know about the study's findings.

It turns out that beach wrack supports an intricate food web. Dugan says that wrack is home to several species of beach hoppers, tiny crustaceans that feed on the wrack, and to numerous beetles, isopods, and flies—these creatures are treats for shorebirds like sandpipers, plovers, and sanderlings. Wrack also helps anchor beach sand, which provides more stability and nutrients for dune plants.

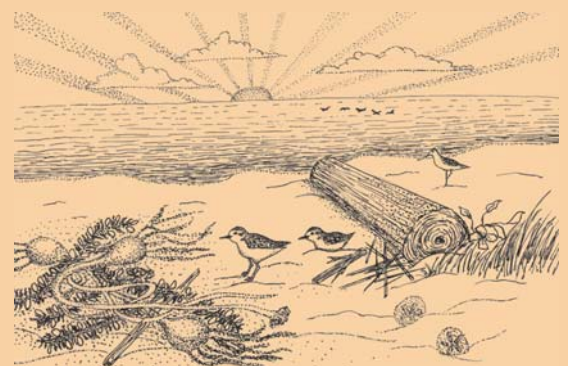
Counties and cities along the coast are starting to change their practices, says Dugan.

The City of San Diego has stopped grooming from March to September along a five-mile stretch of beach to avoid killing the eggs laid by grunions, a fish that comes up onto the beach each spring to spawn. Leaving beach wrack undisturbed is a permit condition for the new emergency sea wall at Santa Barbara County's Goleta Beach.

Biologist Jules Evens says, "We're fortunate that most Northern California beaches have a hands-off approach." Shorebirds clearly thrive on the invertebrates found in wrack, says Point Reyes Bird Observatory's Nils Warnock, who adds, "It's common to see birds walking along the tide line and tossing the wrack as they look for crustaceans."

Contact: Jenifer Dugan, j_dugan@lifesci.ucsb.edu; Nils Warnock, nwarnock@prbo.org; Jules Evens, jevens@svn.net **SPW**

*Drawing by Karina Racz
Courtesy of the Gulf of the Farallones National Marine Sanctuary*



WETLANDS

SUTRO BIRD BATHS



San Francisco's once-glamorous Sutro Baths may be in ruins, but the birds and ducks that frequent the cove overlooking the baths don't seem to notice. They are thriving in an eight-acre urban oasis that includes a marsh and brackish lagoons formed where crumbling bathhouse foundations trap seawater. Golden Gate Audubon's Alan Hopkins is concerned that invasive plants are taking over the marsh, however, and that the lagoons are filling up with silt. The area should be restored, he says, both to provide a higher-quality habitat for wildlife and to showcase the wetland for the 1.5 million folks who visit the adjacent Cliff House and the Sutro Historic District each year.

But Golden Gate National Recreation Area's Rich Weideman says that the project is low on the group's priority list. "We don't have the staff time or money to do all that we'd like to. We choose projects by advantages," he explains, "and the marsh and lagoons are not significant according to our criteria because they're manmade, and they don't have listed species needing protection. Also, the area's invasives don't pose a fire hazard or compromise visitor safety."

Ecologist Peter Baye says that because there are no listed species and because the cove area is small, restoring or just improving it would be easy and inexpensive. He says, "The Cliff House attracts a lot of people who wouldn't normally seek out wetlands or learn about how important they are, so it's a real opportunity. Golden Gate Recreation would get more public benefit from each dollar spent there than with most of their projects."

He adds that visitors could see a "distinctive combination of geology, ground-water, and coastal processes." They would also find native birds like white-crowned sparrows, black phoebes, and goldfinches, says Hopkins. "People should have the chance to see spectacular native plants like lupine, lizard tail, and yarrow in the marsh," he says and adds, "These plants are as much a part of San Francisco's culture as the Museum of Modern Art or Coit Tower."

Contact: Alan Hopkins, (415)664-0983; Rich Weideman, (415)561-4730 **SPW**

CAULDRON CONTINUED

gathers the latest research and disseminates it to wastewater treatment agencies around the Bay, while the BAPPG has started, through North, to work with local hospitals and hospices to encourage them to use best management practices when disposing of pharmaceuticals. For example, instead of overfilling a syringe, tapping it for air bubbles, and disposing of the remainder down a sink drain, hospital workers are being encouraged to put the leftover drugs in hazardous waste receptacles. But a broader public education effort is needed, say North and Daughton. In addition to humans excreting or washing PPCPs off their bodies, the most common route into wastewater is people flushing medications down the toilet.

One solution to the flush problem would be pharmaceutical take-back programs—like those implemented in several European countries, Australia, and Canada. Maine recently legislated creation of a drug mail-back program in which people are given envelopes they can use to send their unused drugs to the Drug Enforcement Administration (the only endpoint in the United States considered legal). In the Bay Area, take-back programs are piloting in Marin County and under consideration in San Francisco and Palo Alto, according to North.

Daughton predicts that as water supplies become scarcer and recycled wastewater eventually begins to be used directly for drinking water, the general public will become more concerned about the issue. The presence of even minute residues of excreted drugs will remind people of where their water originated, says Daughton. He also thinks that, instead of taking a chemical-by-chemical approach to assessing risks associated with wastewater, we may need to take a more holistic approach: measuring and assigning toxicity based on the total amount of chemicals in wastewater that share the same "mode of action," or way of working—without knowing exactly what the individual chemicals are.

In the meantime, could—or should—our treatment plants be doing a better job at removing these contaminants? Ann Heil with the Los Angeles County Sanitation Districts

says that when her agency upgraded its plants to better remove ammonia, wastewater ended up with a longer residence time in the plants, which ended up breaking down more organic pollutants. "The one thing we noticed in particular was surfactants in detergents," says Heil. Reverse osmosis also removes many of the large-molecule PPCPs, but it is expensive (although less so if it is not being used to remove salts), and there is still

a waste disposal issue—the membranes themselves and a leftover stream of dirty water. Heil says other options might include UV or ozone treatment, both of which are less costly than reverse osmosis. (But Daughton points out that both UV and ozone treatments tend to create numerous oxidation products, thereby increasing the number of chemicals present.) Ultimately, says Heil, her agencies believe source control is cheaper than retrofitting plants, and they have been discussing take-back programs with pharmacies: her agencies would fund the programs and pick up the returned drugs. But while she believes in taking preventive measures, Heil, too, wants to see more research on the topic. "Before we take really big expensive steps, let's try to get some idea of how much of a substance in a water body is a

problem. We still don't know the target yet, and that's what makes it really difficult. If it can be done for a reasonable price, most people are willing to pay for cleaner water."

Some of these uncertainties may be addressed with additional research and better technology. "It's a matter of understanding the complexities of an ecological system and where its vulnerabilities are," says Daughton. "Once you understand it, you can probably design a sustainable lifestyle." Due to advances in drug design and manufacturing, he says, it's likely that pharmaceutical companies will begin developing new drugs with smaller amounts of active ingredients, reducing the overall quantity of chemicals that make their way into the environment—one of many aspects that would make up what he calls "the sustainable green pharmacy." In

"We don't want to say the sky is falling if it isn't, but we don't want to sit around twiddling our thumbs while the farm burns down around us either."

PLACES TO GO & THINGS TO DO



WORKSHOPS & SEMINARS

OCT
27
THRU
29
WEDS - FRI

2004 WATER QUALITY CONFERENCE

TOPICS: Perchlorate, pharmaceuticals, disinfection byproducts, arsenic, and radon; features leading specialists in the fields of research, treatment technologies, health effect issues, regulations, policy, and finance.

LOCATION: Ontario, Calif.

SPONSORS: East Valley Water District, Water Education Foundation & others
Jo McAndrews
conferencecoordinator@eastvalley.org or (951)787-9267

www.eastvalley.org/wq04/wq04_sponsor.shtml

OCT
28
THURS

BAY PLANNING COALITION EDUCATIONAL SEMINAR

TOPIC: Experts discuss current Bay Area water recycling challenges and obstacles.

LOCATION: Oakland

SPONSOR: Bay Plan. Coalition & others
Gary Oates (415)896-5900; Eric Hinzle (415)243-2507

NOV
8
THRU
10
MON - WEDS

THIRD INTERNATIONAL CONFERENCE ON INVASIVE SPARTINA

TOPICS: Integrating the science and management of invasive Spartina. Conference will also showcase the work of the U.C. Spartina Research Team.

SPONSORS: S.F. Bay-Delta Science Consortium, California State Coastal Conservancy, U.S. EPA & U.C. Davis
www.spartina.org/2004conference

NOV
18
THURS
19
FRI

14TH ANNUAL CALIFORNIA WATER POLICY CONFERENCE

TOPIC: The best and brightest from all perspectives in the state will argue, clarify, distinguish, and advance potential solutions to the problems facing the future of water.

LOCATION: Los Angeles

SPONSORS: Metropolitan Water District; East Bay Municipal Utility District; BurRec and others; and consulting firms

www.cawaterpolicy.org

Debbi Dodson ddodson@san.rr.com or (858)272-9627

NOV
30
THRU
DEC
3
TUES - FRI

ACWA 2004 FALL CONFERENCE AND EXHIBITION

TOPIC: California's Water Workout: Who Will Do the Heavy Lifting?

LOCATION: Palm Springs

SPONSOR: Assoc. of Cal Water Agencies (916)441-4545

www.acwanet.com/events/FC04_conference.asp



TALKS

OCT
12
TUES

FLUIDS AND FAULTING: WATER AND EARTHQUAKES IN CALIFORNIA

TOPIC: Lecture by Mark Zoback, professor of geophysics, Stanford University. Part of the California Colloquium on Water.

LOCATION: U.C. Berkeley

SPONSOR: California Water Resources Center Archives

(510)642-2666;

waterarc@library.berkeley.edu

<http://lib.berkeley.edu/WRCA/ccow.html>

NOV
9
TUES

WHEN MYTH TRUMPS HISTORY: THE RECLAMATION BUREAU AND THE FAMILY FARM, 1902-1935

TOPIC: Lecture by Donald Pisani, Merrick Professor of History, University of Oklahoma. Part of the California Colloquium on Water.

LOCATION: U.C. Berkeley

SPONSOR: California Water Resources Center Archives

(510)642-2666;

waterarc@library.berkeley.edu

<http://lib.berkeley.edu/WRCA/ccow.html>

DEC
7
TUES

WATER FOLLIES: THE ENVIRONMENTAL CONSEQUENCES OF GROUNDWATER PUMPING

TOPIC: Lecture by Robert Glennon, Morris K. Udall Professor of Law & Public Policy, University of Arizona. Part of the California Colloquium on Water.

LOCATION: U.C. Berkeley

SPONSOR: California Water Resources Center Archives

(510)642-2666;

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<http://lib.berkeley.edu/WRCA/ccow.html>



MONEY

NOV
19
FRI

CALIFORNIA BAY-DELTA AUTHORITY ECOSYSTEM RESTORATION PROGRAM

DEADLINE: FRIDAY, NOV. 19, 2004

The California Bay-Delta Authority's Ecosystem Restoration Program (ERP) is seeking applications for projects that will monitor and evaluate ecosystem restoration actions, or groups of restoration actions, previously funded through ERP solicitation processes or by directed actions. The geographic area of interest is California's Sacramento and San Joaquin watersheds and the S.F. Estuary.

Helpline (877)408-9310

http://calwater.ca.gov/Solicitation/ERP_Solicitation.shtml

NOW IN PRINT & ONLINE

Aquatic Protected Areas as Fisheries Management Tools. J. Brook Shipley, ed. August 2004.

<http://64.224.98.53/publications/catbooks/x54042.shtml>

Bair Island EIS/EIR. August 2004.

U.S. Fish & Wildlife Service.

www.southbayrestoration.org/Bair-EIR-EIS.html

California Performance Review Chapter 5: Resource Conservation and Protection. 2004.

California Performance Review.

www.report.cpr.ca.gov/cprprt/issrec/res/index.htm

California Watershed Assessment Manual [DRAFT].

September 2004. California Watershed Assessment Manual team. Public review copy. Comments accepted until Oct. 31, 2004.

<http://cwam.ucdavis.edu>

Climate Change in California: Choosing Our Future.

September 2004. Union of Concerned Scientists.

www.climatechoices.org

Energy Down the Drain: The Hidden Costs of California's Water Supply.

August 2004. Natural Resources Defense Council.

www.nrdc.org/water/conservation/edrain/contents.asp

Freshwater Resources: Managing the Risks Facing the Private Sector.

September 2004. Pacific Institute.

www.greenbiz.com/toolbox/reports_third.cfm?LinkAdvID=53409

Nonindigenous Aquatic Species Alert System.

September 2004. U.S. Geological Survey.

<http://nas.er.usgs.gov/AlertSystem>

Overview of Sacramento-San Joaquin River Delta Water Quality Issues.

G. Fred Lee & Associates, June 2004.

<http://www.members.aol.com/apple27298/Delta-WQ-IssuesRpt.pdf>

Pulse of the Estuary 2004. 2004.

S.F. Estuary Institute.

www.sfei.org/rmp/pulse/POE2004.pdf

HOT OFF THE PRESSES:

The latest science, politics, and restoration progress around the Bay.

State of the Estuary Report: Proceedings of the October 2003 State of the Estuary Conference.

2004. S.F. Estuary Project. (510)622-2321; fma@rb2.swrcb.ca.gov, or send \$5 per copy for shipping and handling (payable to the Friends of the Estuary) to:

S.F. Estuary Project
1515 Clay Street, #1400
Oakland, CA 94612



CAULDRON CONTINUED

any event, drug companies should share in the cost of take-back programs, say North and others. Eventually, legislation may be passed requiring such a cost-share.

Nonetheless, pharmaceutical companies continue to design yet new drugs—which use new modes of action and possibly even genetically altered plant material—so the challenge of staving off unforeseen trouble appears likely to continue.

Says Heil, "Right now, we're in a really difficult place. We've identified a potential problem, but we don't know how bad it is. We don't want to say the sky is falling if it isn't, but we don't want to sit around twiddling our thumbs while the farm burns down around us either."

Contacts: Christian Daughton daughton.christian@epa.gov; Bryan Brooks Bryan_Brooks@baylor.edu; David Sedlak sedlak@ce.berkeley.edu; David Epel depel@leland.stanford.edu; Karin North (650)494-7629; Ann Heil (562)699-7411; Daniel Oros, daniel@sfei.org **LOV**

X2 CONTINUED

Fecko and others believe that a flow standard for the American River will force state and federal water officials to plan further ahead and potentially use other sources, Shasta and Oroville, perhaps, where it takes four days or so for water to reach the Delta.

"A flow standard like that provides assurance that down the line, through the years, the river will be protected," says Leo Winternitz of the Water Forum.

Winternitz, along with Denton and Herbold, is working on a report on X2's impacts on the American River and ways to minimize them while maintaining water quality. Their report, along with reports by water contractors and other state and federal water agencies, will go before the State Board this fall as the agency holds a series of public hearings to decide whether and how to modify the Water Quality Control Plan. See www.waterrights.ca.gov/baydelta.

Contacts: Andy Fecko (916)341-5393; Richard Denton (925)688-8187 **KC**

VIRUS CONTINUED

Technicians agree that controlling mosquitoes in wetlands is easier than getting a handle on residential breeding areas. "I worry more about the backyard mosquito sources like abandoned pools because we don't even know they're there unless someone calls," says the City of Albany's Dan Wilson.

"Mosquito prevention in wetland areas works because we stay at it constantly; it's like housecleaning," says the Santa Clara Valley Vector Control District's Dan Strickman. "And we have to remember that with wetland restoration projects, the sum total for human health is very positive. Mosquito abatement costs are just the price we pay for these benefits."

Contacts: Chris Canterbury chris@msmosquito.com; Bruce Kirkpatrick (510)783-7744; Dan Strickman (408)792-5542 **SPW**

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Editorial Office: PO Box 791
Oakland, CA 94604
(510)622-2412
Lowensvi@earthlink.net

Estuary Web site at www.estuarynewsletter.com

Subscription Q&A: (510)622-2321

STAFF

Managing Editor: Lisa Owens Viani
Senior Editor: Kristi Coale
Copy Editor: Kathryn Ankrum
Graphic Design: www.dcampeau.com
Contributing Writers: Joe Eaton
David Orenstein
Susan P. Williams

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