



WATER PAID TO KEEP THE LIGHTS ON in California this spring. Under the Governor's emergency order, \$440 million promised in the 2000-01 budget to the Department Water Resources' flood control account, the Colorado River Project, and CALFED's environmental water account and local assistance grants for water efficiency programs was "temporarily redirected," according to the Department's Lucinda Chipponeri. Though the move set off panic waves about whether CALFED, in its first year of implementation, would hit the ground crawling, rather than running, CALFED's Patrick Wright is confident of getting the money "out of limbo and back in the bank." (CALFED is a state and federal effort to balance the water needs of fish, farms and cities.) This March, a bill (SB23) certifying that programs and projects selected by CALFED are consistent with its EIS/EIR, and thus legitimizing the budget expenditures, passed through two important committees. At press time, CALFED was expected to get its money back via a new bridge loan program reimbursing general funds redirected to the power crisis. By the time the money gets to CALFED, Chipponeri expects to have reviewed most applications for water use efficiency grants, and to be able to fund selected projects "without skipping a beat." On the federal side, CALFED was one of very few programs actually mentioned by name in President Bush's new budget. Contact: Pete Weisser (916)653-7431

NEW PUBLIC ACCESS POLICIES — largely designed to minimize the disturbance of sensitive birds and beasts on the Bay shoreline by humans jogging, biking or passing by — were approved by S.F. Bay Conservation and Development Commission on March 15. Public comments on the draft policy, released in December as a proposed S.F. Bay Plan amendment, resulted in clarifications addressing everything from a perceived "negative tone" about the region's growing need for more public access to regulatory definitions of "adverse" versus "detrimental" effects on wildlife. "In the nutshell, these policies document a consistent, step-by-step approach for evaluating, and addressing, potential adverse effects on wildlife from public access on a case-by-case basis," says BCDC's Caitlin Sweeney. Next steps will include a revision to BCDC's 1985 Public Access Design Guidelines to include information on specific siting, design and management strategies to protect wildlife. Contact: (415)352-3600.

Freaky Weather & Water Loom

As Americans hunkered down through winter's showers, blizzards and blackouts, international scientists confirmed global warming as fact not fiction and a Bay Area think tank suggested that it was a mistake for water czars to think they can manage the droughts and floods of a warmer future the same way they have in the past.



"Adapting to climate change is going to come at a very high cost," says the Pacific Institute's Peter Gleick, lead author of the first really comprehensive, multi-agency national assessment of climate change impacts on U.S. water resources. The assessment, released in late 2000 through the U.S. Geological Survey, also examines impacts on coastal ecosystems, agriculture, forests and human health.

"Planning is cheap," says Gleick, "but here in California, for example, neither of the state's two major water planning efforts—CALFED and Bulletin 160—adequately address climate change. The guiding assumption of long term water planning continues to be that the future will look like the past, which is irresponsible."

Global warming watchdog Bill McKibben, author of *The End of Nature*, puts it a little more strongly. "In the worst case scenario, we'll see an 11 F° temperature increase in the next century. In all likelihood this means we will go through a total remaking of the external world that may look like anything from a horribly enormous environmental problem to science fiction, the freaking end of the earth."

The U.N. Intergovernmental Panel On Climate Change (700 scientists) projects a world surface temperature warming of 1.4 - 5.8 C° by 2100, and accompanying sea level rises of 0.09-0.88 meters as a result of melting ice. The National Assessment contributed to by Gleick suggests that the U.S.

has already warmed by 0.6 C° since 1900, and that mean sea level has risen 10-20 centimeters since the 1890s.

"We're already seeing signs of climate change all over the nation — earlier snowmelts, higher temperatures, earlier migrations of birds and butterflies, plants blooming at different times," says Gleick. "In our own Bay-Delta region over the next 50 years, we'll be seeing salt water intrusion, changes in the timing of snowmelt and river runoff, Bay shorelines disappearing under water, and more extremes in terms of floods and droughts."

So why should water managers give a hoot? The National Assessment water report examined 1,000 peer-reviewed studies and concluded that there is compelling scientific evidence that climate change will pose serious challenges to our water systems; that it should be a factor in all decisions about water investments and the operation of existing facilities and systems; that rigid, expensive and irreversible actions (dams, reservoirs, aqueducts) in climate sensitive areas can increase vulnerability and long-term costs; that sole reliance on traditional management responses is a mistake; and that the more flexibility and adaptability to new extremes we can build into our waterworks, the better.

Global climate models provide few specifics on California impacts, but this February two U.C. Berkeley scientists completed some models that forecast serious water shortages for the state by 2049. Norman Miller and Jinwon Kim projected that if carbon dioxide levels continue to rise by one percent per year, California will get more rain and less snow, and thus less spring and summer snowmelt when cities and farms need the water most. They also projected warmer winters and hotter summers.

Projections are one thing, reality is another. "We don't really know if it will get wetter or dryer in terms of precipitation," says hydrologist Mike Dettinger of the U.S. Geological Survey in San Diego. "But we do

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BURNING ISSUE

RETIRING LAND FOR DRAINAGE PEACE?

Could a settlement in the decades-long battle over responsibility for draining salty irrigation water from the western San Joaquin Valley be at hand? At press time, the Interior Department and valley interests were continuing negotiations over just that, amid widespread speculation that such a settlement might include a large-scale land retirement program similar to one proposed earlier this year by Westlands Water District.

In mid-March, a federal court extended by 30 days Interior's court-ordered deadline for solving the valley's drainage problems. The area is slowly being poisoned by the buildup of salts — a side effect of irrigating with salty Delta water; last spring the court ruled that Interior had a duty to provide drainage to the region, although not necessarily via the highly controversial San Luis Drain. The drain, which was designed to empty into the Delta near Antioch, has been closed since 1986, when bird deformities at Kesterson Reservoir — then the terminus of the drain — were attributed to selenium in the drainage.

Earlier this year Westlands, which provides water to 600,000 acres of the valley, publicly floated a proposal under which up to 200,000 acres of threatened land would be retired and managed as habitat — at a cost to the government of up to \$500 million.

That proposal met with a decidedly wary response from environmentalists and Westlands' neighbors, many of whom are concerned about the impacts on local communities and economies. Some are also concerned that Westlands may simply be maneuvering to secure more water from the federal Central Valley Project than it currently receives. „We don't want this to turn out to be a shell game where Westlands gets guaranteed water at others' expense," says Randy McFarland of the neighboring Friant Water Users Authority.

Participants would not confirm the content of the current negotiations. However, according to BurRec's Mike Delamore „the large plan that has been discussed in the press is not part of the drainage plan proceedings before the court." CH

GLOBAL WARMING CONTINUED

know that it will be warmer, and that drought periods or wet periods may become more persistent, including the possibility of forever droughts that simply don't let up because the climate has changed irreversibly."

But more than droughts or deluge, it's changes in the timing of water highs and lows that may have the biggest impact on California's complicated and carefully negotiated efforts to micromanage flows for the benefit of cities, farms and endangered fish. Right now snowpack sits up in the mountains through the period when most of California's precipitation falls before melting in the spring and summer, when we can catch it all in our reservoirs without worrying about leaving capacity for storms. Climate change will push snowmelt earlier in the year.

"So right now, April 1 is a magical day for water managers," says Dettinger. "Before then, water is the cause of floods and property damage and levee breaks. After April 1, it's hoarded and treated like a resource. If this system gets out of whack with climate change, I personally think we may have to redefine when water is a hazard versus a resource. We may need some major rethinking about how much risk is acceptable."

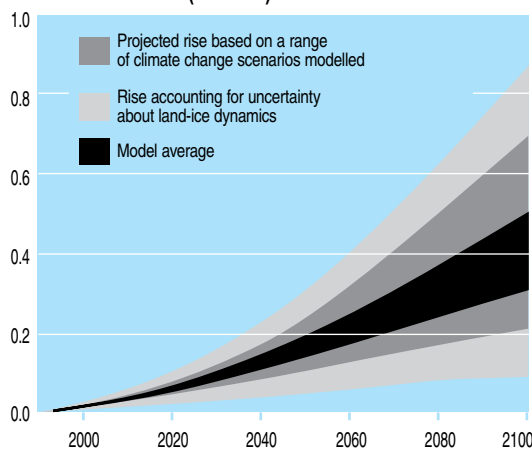
Changes in when flows come down from mountains to rivers and the Bay will also affect years of efforts, and future projects, to shift flows around to where and when they're needed most. "We now know the importance of high spring flows for salmon and ecosystem restoration," says hydrologist Phil Williams, who worked on EPA climate change studies in the 1980s. "Increasing competition for those diminishing spring flows will make it harder and more important to keep the x2 standard in place." ("X2" is scientific shorthand for a water quality standard established by the 1994 Bay-Delta Accord that requires the 2 parts per thousand isohaline of salt to water to remain within a certain range of positions in the Estuary. That range of positions, which supports optimal food production in the aquatic ecosystem, is determined by the amount of freshwater allowed to flow downstream.) Maintaining the x2 standard, and undertaking the massive estuarine restoration program planned by CALFED, may also be critical to

moderating the effects of climate change. A healthier ecosystem adapts better than a weakened one, says Gleick.

So what should water managers be doing now? Williams would like to see more integration of Army Corps flood management efforts in the Central Valley with CALFED efforts to restore floodplains. Better integration of ground and surface water management may also be a must, as droughts or wet periods stress both. Moving people out of flood plains, and curbing sprawl to increase transportation efficiency and reduce fossil fuel consumption and resulting greenhouse gas emissions, are some of the tougher measures that must be taken. Gleick would like to see CALFED factor climate change scenarios into its estimates of future supply and demand for California water, and develop new management rules that increase flexibility in the state's water system.

The international Intergovernmental Panel supports such national and local strategies. "Water demand management and institutional adaptation are the primary components for increasing system flexibility to meet the uncertainties of climate change," it said in a report.

SEA LEVEL RISE (METERS)



Source:

According to Dettinger, studies that document how the demand side of the equation might change in a climate-changed world are much fewer, and more conflicting, than studies of the supply side. "We don't know if plants, or even people, will need more or less water, and any changes may be totally dwarfed by population expansion. On the

demand side, we're pretty much flying blind."

Certainly President Bush and American political leaders seem to be flying blind in the face of international pressure to curb the carbon dioxide emissions that promote global warming. This March, Bush went back on a campaign promise to crack down on power plant smokestacks, citing California's energy crisis. And Congress is yet to ratify, and thus commit to implementing, the 1997 global warming reduction treaty known as the Kyoto Protocol.

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SUPPLY

ISLANDS OF WATER

A long-discussed plan to turn two Delta islands into reservoirs got a crucial green light in February when the State Board issued a decision granting the project water rights.

The decision gives Delta Wetlands, a privately held Lafayette-based company, the right to store up to 238,000 acre-feet of water on Webb Tract and Bacon Island. To mitigate for any environmental impacts, Delta Wetlands will also convert two other islands, Bouldin Island and Holland Tract, into 9,000 acres of permanent wildlife habitat.

"This project can benefit both the environment and the state and federal water systems by providing much more flexibility for the projects," says Delta Wetlands general manager Jim Easton. He notes that because Delta Wetlands would be the reservoirs located closest to the export pumps, water from the islands could be the first shipped to users, preserving upstream supplies for temperature control and electricity generation. The CALFED Record of Decision calls for 950,000 acre-feet of new storage and specifically identifies Delta Wetlands as a possible option.

Still undecided is who will operate the project once it is complete. Delta Wetlands may do so itself, selling the water to the state or federal projects or directly to users. Alternatively, the company may sell or lease the project to state or federal water agencies or to another company. Easton says the latter scenario would be the preference of the current owners, who have been working on the project since 1987. "The investors have waited a long time for a return on their money," he says. Estimates put the project's value between \$500 million and \$1.5 billion.

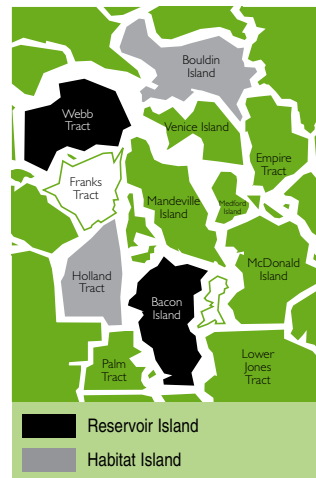
The approval includes a host of terms and conditions designed to protect wildlife, water quality and levees, and to minimize seepage onto nearby islands. However, some of the project's neighbors are unconvinced. "The [interceptor system designed to prevent seepage] may or may not work, and there is a substantial risk to approximately 17 islands," says attorney Dante Nomellini, who is appealing the board's decision on behalf of neighboring landowners. Delta Wetlands maintains that number is significantly overstated and notes that the company has a no-net seepage policy.

Nomellini also maintains that state law prohibits a private company from profiting off water that "belongs to the people of the state," and worries that if the project turns

out to be economically unfeasible, the owners might abandon it. "The project could fall on its face, and then we'd be left with a huge problem right in the heart of the Delta," he says.

Despite these concerns, Easton says the project has reached agreements with most of its opponents, including those worried about its effect on migrating fish. "The project's operations will be very protective of

DELTA WETLANDS PROJECT



fish," he says. "We will be very careful about how much we divert, and about the timing of diversions and releases." Easton also notes that in-Delta storage is one of the least environmentally disruptive of new storage options: "We're not building new dams or blocking new streams."

Permits from the Corps of Engineers are still pending, although they are expected this year. Construction is expected to begin in 2002, says Easton. Contact: Jim Easton (916) 351-0600. CH

REHAB

FRAGILE FRAGMENTS

An effort to save dozens of tiny Delta islands before they are washed away by waves and boat wakes got a big boost in February when CALFED agreed to provide \$928,000 in construction funds.

The Delta In-Channel Islands project is seeking biologically friendly ways to protect the shorelines of these marshy islands, which are all that remain of the area's habitat as it was in the 19th century. "These islands are the last refuge for many of the plants that historically populated the Delta," including tules, willows, button bush, Delta tule pea and Mason's lilaeopsis, says Kent Nelson of the Department of Water Resources. The islands are also stopovers for migratory perching birds, and are used by species of concern such as the Western pond turtle, the giant garter snake, the black rail and troubled Delta fishes.

The fragmentary islands — which were left after dredging barges moved through the area a century ago — have always been subject to tidal action. Historically, however, there was a balance between erosion and sediment deposition. Today, that balance has been upset and the rivers have been isolated from the Delta floodplain by levees, says Nelson. "The most fundamental problem is the large upstream dams that block sediment from coming down river," although the combination of wind-in-

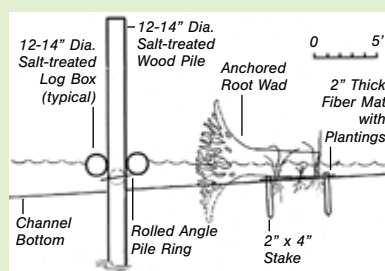
duced waves and heavy boat traffic in the narrow, leveed channels doesn't help matters. There's just no room for the water's erosive energy to dissipate and the unprotected islands take the brunt of it.

The CALFED funding will allow the project — a joint effort of the S.F. Estuary Project, DWR, the Delta Protection Commission, the State Lands Commission, wildlife agencies, the Corps of Engineers, and a team of consultants — to test several erosion control methods on three selected islands, one near Little Tinsley Island and another at Webb Tract. A third site near Webb Tract received a \$450,000 headstart in 2000 from DWR's Delta Levee Flood Protection Program, which values the islands because they provide wave protection for levees.

Among the strategies the project will test are the placement of "brush boxes" around the island. These wooden frames stuffed with willow branches create a permeable but secure wave break, according to Nelson. Old tree stumps, which break the initial shock of wave energy and also allow small fish to hide and feed among their roots, will also be used. The project may also use small amounts of rock to create barriers that divert the water with the highest energy away from the shoreline.

The Delta Protection Commission's Margit Aramburu gives high marks to the persistence and cooperation of the agencies and individuals involved in getting the project of the ground, although she is frustrated that funding took several years to secure. "This is such a natural project — it's a no-brainer," she says. Contact: Kent Nelson (916) 227-7549 CH

EROSION CONTROL STRATEGIES



OUTREACH

LIBERTY AND WATER FOR ALL

When a farm worker must quench her thirst with yellow, smelly water, or a poor fisherman deny his wife and kids a bite of his mercury-laced catch, it's easy to see why they might care about California water policy. Exploring the intersection between environmental justice, civil rights and water is the purpose of a two-year-old coalition of 40 groups facilitated by the Pacific Institute.

"The thing with water is that it has the ability to be a very progressive environmental justice arena, as opposed to problems related to the location of toxic waste and energy plants where we end up playing a defensive role," says the United Farm Workers' Martha Guzman, a member of the coalition. "Water integrates into many different factors of life in our communities, from public health to jobs and energy and wastewater treatment."

To date, the coalition has won concrete environmental justice language in the CALFED Record of Decision (including a commitment to develop a workplan), stepped into two seats on CALFED's citizen advisory council, and co-sponsored public workshops in Sacramento, Pasadena and San Francisco to educate locals about how to access park and water bond money (Prop 12 & 13) for community restoration projects.

"I thought policymakers would want to duck and cover when we walked in the door," says the Urban Creeks Council's Josh Bradt, also in the coalition. "But this is an issue folks respond to, they want to engage us."

Before the coalition made its mark, many considered CALFED an "insider process" dominated by urban water interests, public agencies and agribusiness. "CALFED didn't know who to talk to before the coalition came along," says the Pacific Institute's Arlene Wong.

This year, the coalition is working to break out of its Bay- and CALFED-centric bonds and grow statewide, and planning to draft a blueprint for environmental justice. "For decades, if you were not a propertied person, you were not a person worthy of policy level consideration," says Bradt. "We're trying to change that. It's not enough to put out a pamphlet in another language." Contact: Arlene Wong (510)251-1600 **ARO**

CREEKS

UNPAVING PARADISE

For years, the downtown business district in the city of Martinez has flooded almost every other year. Last year, however, the city undertook an ambitious effort to provide environmentally friendly flood control that rescued a block-long section of Alhambra Creek from entombment beneath an office building (the former City Hall) — and even added a few new parking spaces.

"We decided that we needed to revitalize our downtown in a way befitting the fact that we are John Muir's hometown," says city councilmember Mark Ross.

As part of the project, the city re-routed the creek around the office building and ripped out an adjacent parking lot, where the creek now meanders freely. More parking lots up- and downstream of the daylighting project were torn out as well to make room for the creek, an impressive feat in light of the fact that the city had a severe parking shortage, according to Igor Skaredoff with the Friends of Alhambra Creek. At the former parking lots, the creek's constricted banks were graded back and floodplain created. Meanwhile, the city made up for the parking loss by making some streets one-way and adding diagonal parking. The net result was an increase in parking spaces, says Ross.

Finding a solution to the city's flooding and parking problems took several years and a visit by Ross to San Luis Obispo.

There, shops and restaurants focus on San Luis Creek, which runs through the middle of the downtown and has become somewhat famous in the urban streams movement. Inspired by what he saw there, Ross returned to Martinez and convinced other councilmembers that a creative solution could be found. "We realized that we had a choice," says Ross. "We could keep the mud every two years or work on a sensible parking solution and a companion solution to the flooding."

But the downtown daylighting and restoration projects are only a piece of larger restoration efforts going on throughout the city. Farther downstream, as the creek nears the Carquinez Strait and begins to receive tidal action, the channel was widened and marsh habitat restored alongside it, providing additional, natural flood control. And as part of the city's new intermodal transit station project, two railroad bridges were rebuilt with funding from transportation grants, to accommodate 100-year storm flows. A greenway will soon run alongside the creek, from the mouth of the creek through the downtown.

City officials, downtown businesses and creek-lovers are thrilled with the new focus on the creek — and the lack of mud on their doorsteps. "We had a creek that was a liability and turned it into an asset," says Ross. Contact: Igor Skaredoff (925) 229-1371; Mark Ross (925)372-8400 **LOV**

CENTRAL PORTION, ALHAMBRA CREEK PROJECT, DOWNTOWN MARTINEZ



Drawing courtesy of Gates & Associates; City of Martinez

INFRASTRUCTURE

DELTA CROSS CHANNEL INVESTIGATED

Last fall, the Delta Cross Channel was inundated, not by rain, but by boatloads of researchers armed with traps, sonar and lots more gear, both high and low tech. Their mission — to find out how opening and closing the Channel's gates affects both water quality in the Delta and salmon runs up and down the Sacramento River. For weeks they worked day and night, and in March the team, a part of the Interagency Ecological Program, presented its findings at a workshop in Monterey. Presenters and observers alike agreed that not only was the research itself important, but also that the project showed how well a diverse group of scientists can, within a very short time frame, put together a multidisciplinary study with real-world policy implications.

The project included studies of hydrodynamics and salinity in and around the Channel, as well as the migration of both adult and juvenile anadromous fish in its vicinity. The scientists — from U.S. EPA, U.S. Fish & Wildlife, USGS, Cal Fish & Game and other agencies — released large groups of fish and also tracked individuals; they worked with the channel gates both open and closed, and on both ebb and flow tides. They discovered that almost all water quality benefits were obtained when the channel gates were opened during flood tides, and they found evidence that the fish do "go with the flow" of the Sacramento River, although the full implications of this aren't completely clear.

In general, says Bruce Herbold of the EPA, "For both water quality and fish protection, the tidal time scale is the most important consideration regarding operation of the Delta Cross Channel." He also says that the \$350,000 study shows, "It's possible to do interesting and exciting science on a quick turnaround." During the workshop, one audience member drew loud cheers when he shouted out that the study was "a spectacular example of integrated science."

The scientists are hoping to do a follow up session — possibly in late May — to discuss the data from the November study, and to get ideas for possible follow up research. (The June issue of *ESTUARY* will feature a special insert highlighting the results of the project.) Contact: Bruce Herbold (415) 744-1992 **OB**

SITES ON THE HORIZON?

Plans to build a new off-stream water storage facility in Colusa County are moving closer to reality. Earlier this year, representatives from a range of federal, state and local agencies gathered in Maxwell, just a few miles from the proposed Sites Reservoir, to celebrate the signing of a memorandum of understanding outlining the next steps in its construction.

The idea of building a reservoir in the remote Antelope Valley first surfaced in the 1950s, but failed to get the necessary support and funding. It was revived during the Wilson Administration, and became a part of CALFED's Record of Decision. Current proposals call for storing up to 1.9 million acre feet of water in the reservoir, which would be filled during periods of heavy rainfall.

According to David Guy of the Northern California Water Association, the MOU outlines an "integrated water management program for the Central

Valley," serving agricultural, urban and environmental interests. "Sites Reservoir is critical," he says. The new reservoir would give managers the "flexibility" to manage water above the Delta without the environmental damage caused by damming one of the state's major rivers. Environmentalists are "pretty wary" of the project, which would drown some fourteen thousand acres, according to Steve Evans of Friends of the River. "On paper it sounds like it might not have much impact to the environment," he says. Most of the Antelope Valley is already severely degraded, due mostly to grazing activities, he acknowledges, but it also includes stands of native oak and grasslands. As for the claim that it will serve multiple interests while doing little harm, he says. "We've been sold that stuff before."

Supporters hope to complete the environmental review process by August 2004. Contact: David Guy (916) 442-8333 **OB**



SPECIES SPOT

STEELHEAD STRATEGIES

One of the hot topics at the Salmonid Restoration Federation conference in Chico last month was not so much new science as a call for a new paradigm for managing steelhead and rainbow trout in California's streams.

"Historically, there's been a big gap in the way we manage resident (non-migratory) rainbow trout and anadromous steelhead," says Cal Fish & Game steelhead biologist Dennis McEwan. "The old paradigm was to separate resident and anadromous fish and manage them separately. But genetic testing has shown no differences between resident and anadromous fish occupying the same stream — geography is the most important factor." In other words, native resident and anadromous fish from the same stream are closer genetically than steelhead from one stream are to steelhead from another.

McEwan says we need to manage steelhead — both resident and anadromous (migratory) fish — based on their unique biology and adaptations they have evolved in response to the extreme habitat conditions in their southernmost range (most of California). Chief among these is their polymorphic ("many forms") population structure. Steelhead do not form discrete popu-

lations within streams, says McEwan. Instead, they freely interbreed, and adults can produce young that behave much differently than they do: migratory fish can produce resident rainbow trout and vice versa. While some steelhead migrate to the ocean, others just move down to the Estuary, while still others merely move up and downstream. This flexibility allows the population to survive in the upper reaches of a stream during extreme conditions, such as droughts, when the lower reaches dry up and lose their connection to the ocean.

These survival strategies also enable "sink" populations—those that may exist only for a few decades—to act as a buffer against the wholesale extinction of a particular population, says McEwan. While source populations—those that persist for millennia—are found in the larger river systems, sinks are often found in smaller, sometimes seasonal streams. Although local extirpations (or extinctions) of sink populations are a natural phenomenon, so is recolonization from the source population, says McEwan. But with the extensive human plumbing of rivers — dams, flood control structures, diversions, etc. — limiting fish passage, extirpations have been greatly accelerated and opportunities for fish to recolonize severely reduced.

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NEXT GENERATION

GREEN COLLAR WORKERS AT RICHMOND HIGH

As spring moves into high gear, Richmond High's CreekKeepers — students learning about a variety of watershed issues — are busy renovating their school's greenhouse, setting up a compost bin and worm boxes, planting a garden of native plants and maintaining the school's creek.

Richmond High didn't always have a creek. The inspiration came six years ago from School-to-Career Coordinator Lana Martarella Husser, when she began a "Teacher Cadet" class for 10th-12th graders interested in becoming teachers themselves. The year-long program included internships for the cadets in local elementary schools. After observing interns' reluctance to take charge in the classrooms, Husser formed the idea of making them experts in a subject not taught by most elementary school teachers at that time: environmental education.

"We used to meet at a local creek at 8 a.m.," remembers Husser. "We'd get back to school soaking wet." Clearly, the students needed a place to train on site. At Husser's instigation, another Richmond High student group, the "Career Explorers," who were interested in engineering jobs, teamed up with engineers from Chevron Corporation to build the Outdoor Science Classroom. Chevron donated mechanical engineer Kevin Fitzpatrick's time and expertise, as well as materials: two tons of sand and gravel, two tons of river rock, and two heavy-duty pumps. Thus was Richmond High's very own creek born.

The Outdoor Science Classroom exposes students to what Husser calls "green-collar" occupations, careers with an environmental twist that can include both teaching and engineering. In September of 2000, the Richmond Wastewater Treatment Plant gave the CreekKeepers a grant for \$5,000 to create a composting program on school grounds. The program has also spawned an Environmental Club sponsored by the Science and Industry Technology Partnership Academy. Contact: Lana Martarella Husser, martarella@aol.com ZF

RESTORATION



CLEAR CREEK COMEBACK

An ambitious restoration plan that uses one problem to fix another is underway on 2.5 miles of Clear Creek, the first major tributary to the Sacramento River downstream of Shasta Dam.

Clear Creek's problems began in the 1840s, when it was mined for gold — first by hand, then hydraulically, then with dredges. Later, the creek bed was harvested for its gravel, which destroyed spawning opportunities for fish. Large pits for excavating gold and gravel also wreaked havoc on the floodplain; huge piles of tailings still clutter the landscape. "Basically, the floodplain was mined out almost valley wall to valley wall," explains Scott McBain, one of the fluvial geomorphologists designing the restoration project for the Lower Clear Creek Restoration Team, a group of environmentalists, private landowners and multi-agency stakeholders.

Dams — large and small — added to the creek's troubles. In 1903, Saeltzer Dam was built across the stream's lower reaches to provide water for agriculture and other users. Then in 1963, Whiskeytown Dam was plopped in nine miles upstream, further depleting the stream of spawning gravels and flows. As a result, the creek bed dropped about seven feet, down to the clay hardpan. Not only could fish not find good spawning and rearing habitat, but adults and juveniles were being trapped in the pits in the floodplain when low flows cut off their access to the main channel. As a result of all of these activities, the channel itself became highly braided and unstable. "One of the major goals of our project is to restore a dynamic alluvial channel within the limits of the regulated flow regime," says McBain. "We want to rehabilitate the form and function of the channel and floodplain, reverse the incision, decrease salmon strandings, and help the riparian vegetation come back on its own—we want to help the channel heal itself." If the restored channel begins to move back and forth across its floodplain on its own (similar to historical conditions), says McBain, that will be a sign of success.

Because of its large scale, the project is being implemented in phases. Phase 1 was completed in 1998 when 30,000 cubic yards of tailings were used to isolate several pits that were particularly problematic for fish, says Jeff Souza with the Western Shasta Resource Conservation District. Phase 2 — partially completed — concentrates on fill-

ing pits in the floodway to change a braided channel back to a more functional, mostly single-thread channel, and recreating and revegetating the new floodplain. Phase 3 will use more dredge spoils to raise the incised bed of the stream off the clay hardpan and replenish gravels for fish. The last phase (scheduled for completion in 2006) will fill an old mining bypass channel and recreate the natural path of the creek.

The project is among the first of its kind, both because of its large scale and several design innovations. As part of Phase 2, old abandoned channels and depressions were designed as part of the floodplain, instead of a "laser-leveled" monotypic floodplain, says McBain. Backwater sloughs offer fish places to hide, yet their slopes are just steep enough to allow water—and fish—to meander back into the main channel. The floodplains are being planted with a variety of riparian species, including cottonwood, several species of willow, mulefat and others. Adjacent uplands will be planted with mulefat, valley oak, elderberry and other species.

The genesis of the project was several years ago when the Western Shasta RCD did a watershed analysis. The increase in flows that began in 1995 — the result of an MOU between the Cal Fish & Game, U.S. Fish & Wildlife and BurRec—led to an immediate increase in numbers of fall-run salmon, Souza says, so the Restoration Team's predecessor decided that better flows—and better sediment transport and deposition for fish—were a high priority. Last summer, Saeltzer Dam was removed, which will allow fish better access to upstream habitat and improve gravel transport from upstream.

The total project is estimated to cost approximately \$10 million. So far, CALFED has chipped in a healthy \$3.5 million, and other agencies more than \$1 million more. The Bureau of Land Management owns most of the land surrounding the channel and floodplain, so private property issues were minimal. The project is not without snags, however. Offsite wetlands must be created to compensate for filling of the mining pits, which were providing seasonal wetlands used by birds and other wildlife. And more recently, the potential of mercury in the dredger tailings used to fill the mining pits has become an issue. Mercury is a concern in the Clear Creek watershed because it was used in the gold-mining process to line the sluices on dredge barges—and a lot of it ended up in the creek's waters and sediments. Although Clear Creek is not listed as

PLACES TO GO & THINGS TO DO



WORKSHOPS & SEMINARS

APR
FRI
19
20
HABITAT RESTORATION WORKSHOP
Cost: \$ 240
Sponsor: U.C. Davis Extension
Location: Sacramento
(800) 752-0881

APR
TUES-FRI
24
THRU
27
WETLAND RESTORATION COURSE
Topic: Wetland Restoration: Practical Design and Application
Cost: \$550
Sponsor: The Restoration Trust
Location: Richmond
(510) 596-2690 or carissaw@zentner.com

MAY
WEDS-FRI
9
THRU
11
ACWA SPRING CONFERENCE
Topic: 2001: A New Era, A New Approach
Sponsor: ACWA
Location: South Lake Tahoe
(916) 325-4849

JUNE
THURS-FRI
14
15
GROUNDWATER CONFERENCE
Topic: Characterization and Remediation of Recalcitrant and Emerging Contaminants.
Sponsor: Groundwater Resources Association of California, others.
Location: San Jose
www.grac.org



HANDS ON

APR
SAT
28
BERKELEY BAY FESTIVAL
Topic: How people affect the environment and what they can do about it. Activities, music and food.
Sponsor: City of Berkeley
Location: Berkeley Marina
(510) 644-8623 or www.ci.berkeley.ca.us/parks/marina/marinaexp/bayfestival

MAY
SAT - SUN
5
THRU
JULY
1
WETLANDS EXHIBITION
Topic: Tidal Marshes: The Interface of Land and Sea
Sponsor: Bolinas Museum
Location: Bolinas
(415) 868-2006

MAY
SAT-FRI
12
THRU
19
NATIONAL RIVER CLEANUP WEEK
Sponsor: America Outdoors
Location: Various
(865) 558-3595
www.americaoutdoors.com

MAY
SAT
12
ANNUAL FREMONT STEELHEAD FESTIVAL
Sponsor: Alameda Creek Alliance
Location: Fremont
(510) 845-4675.

MAY
WED-FRI
23
THRU
25
WATER TOUR
Topic: The San Joaquin Valley. Stops include Panoche Irrigation District, San Luis Reservoir, Westlands Water District, Grasslands Water District, Mendota Pool, Friant Dam, the San Joaquin River parkway, local farms and agricultural processing plants.
Sponsor: Water Education Foundation
(916)444-6240 or www.water-ed.org

RESTORATION CONTINUED

an impaired waterway, the Regional Board has suggested that sampling and studies be done to make sure the restoration project is not inadvertently creating a larger problem, according to the Central Valley Board's Guy Chetelat. "We're just starting to learn about this issue and address it," says Chetelat. To that end, says Souza, the CALFED Science Board is helping the Restoration Team design a study to find out what's there, how much mercury methylation (a chemical process that converts inert mercury to a more toxic form) is going on, and how significant any lurking "pockets" of mercury may be.

As it monitors the work it's done so far, the team continues to plan the rest of this large-scale project. "As development continues, more pressure continues to be put on our resources," says McBain. "We need to do restoration on a similar or greater scale than the development of our watersheds. This is one of the first projects that does this. We're breaking new ground here."

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Scott McBain (707) 826-7794x11;
Guy Chetelat (530) 224-4997

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Pulse of the Estuary: Monitoring and Managing Contamination in the S.F. Estuary 1993-1999
S.F. Estuary Institute
(510)231-9539 or www.sfei.org

Restoring the Estuary
San Francisco Bay Joint Venture
Copies from jsteere@igc.org or www.sfbayjv.org

Start at the Source (video)
Bay Area Stormwater Management Agencies Association
Copies from gabrosseau@home.com

San Francisco Bay Fund Inventory of Projects
www.lib.berkeley.edu/WRCBA/bayfund

Water Infrastructure Now: Recommendations for Clean and Safe Water in the 21st Century
Water Infrastructure Network
Copies from (202) 833-4655 or www.amsa-cleanwater.org

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STEELHEAD CONTINUED

Contrary to the National Marine Fisheries Service view that to be protected, steelhead must be a "permanently reproducing population," a better way of managing steelhead, says McEwan, would recognize that resident rainbow trout help maintain the larger population by adding genetic diversity and diverse survival strategies, and would offer them the same protection given to their more mobile cousins—or brothers. Unlike migratory steelhead, rainbow trout are not protected under the Endangered Species Act. "Management agencies need to recognize that the sink populations are important because they allow the species to rapidly expand their numbers and their range when habitat and climate conditions are good. This allows populations to weather cycles of drought and years of poor habitat conditions."

Recovery plans for steelhead should also focus on reestablishing linkages within populations—and genetic flow between the resident rainbow trout and steelhead—by restoring access to the upper

reaches of streams wherever possible, according to McEwan. "Since California rainbow trout have evolved in the face of extreme habitat conditions, they are tremendously resilient to man-made disturbances. But this resilience absolutely depends on their having access to the upper reaches of our rivers, where habitat conditions are more stable and conducive for fish for surviving the bad years."

Contact: Dennis McEwan (916) 327-8850

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GLOBAL WARMING CONTINUED

"The bad news is that our energy crisis is being used to justify a new push for oil drilling in the Arctic wildlife refuge, to develop more fossil fuels nationwide, even to revive a known environmental and economic loser like the Auburn Dam project," says Barry Nelson of the Natural Resources Defense Council. "The good news is that there's broad consensus in California that the cheapest, fastest, cleanest way to solve our energy problems is to promote sustainable energy. There's a stack of bills in the legisla-

ture right now saying that energy efficiency is the way to go, and that it's not only the environmental response to this crisis, but the smart response."

California's energy crisis certainly came home to the average person on the street in a way that global warming, however related, never has. "Climate change has become a deeply abstract issue that doesn't touch people's lives," says McKibben.

"To the average citizen, the nation's dams, aqueducts, reservoirs, treatment plants and pipes are invisible. Yet they help insulate us from wet and dry years, and permit us to almost forget about our complete dependence on climate," says Gleick. "We can no longer ignore this dependence. Adaptation is inevitable, and it will come at a very high economic and human cost."

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