

DWR

SPRING/SUMMER 2015

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from the
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Department
of Water
Resources

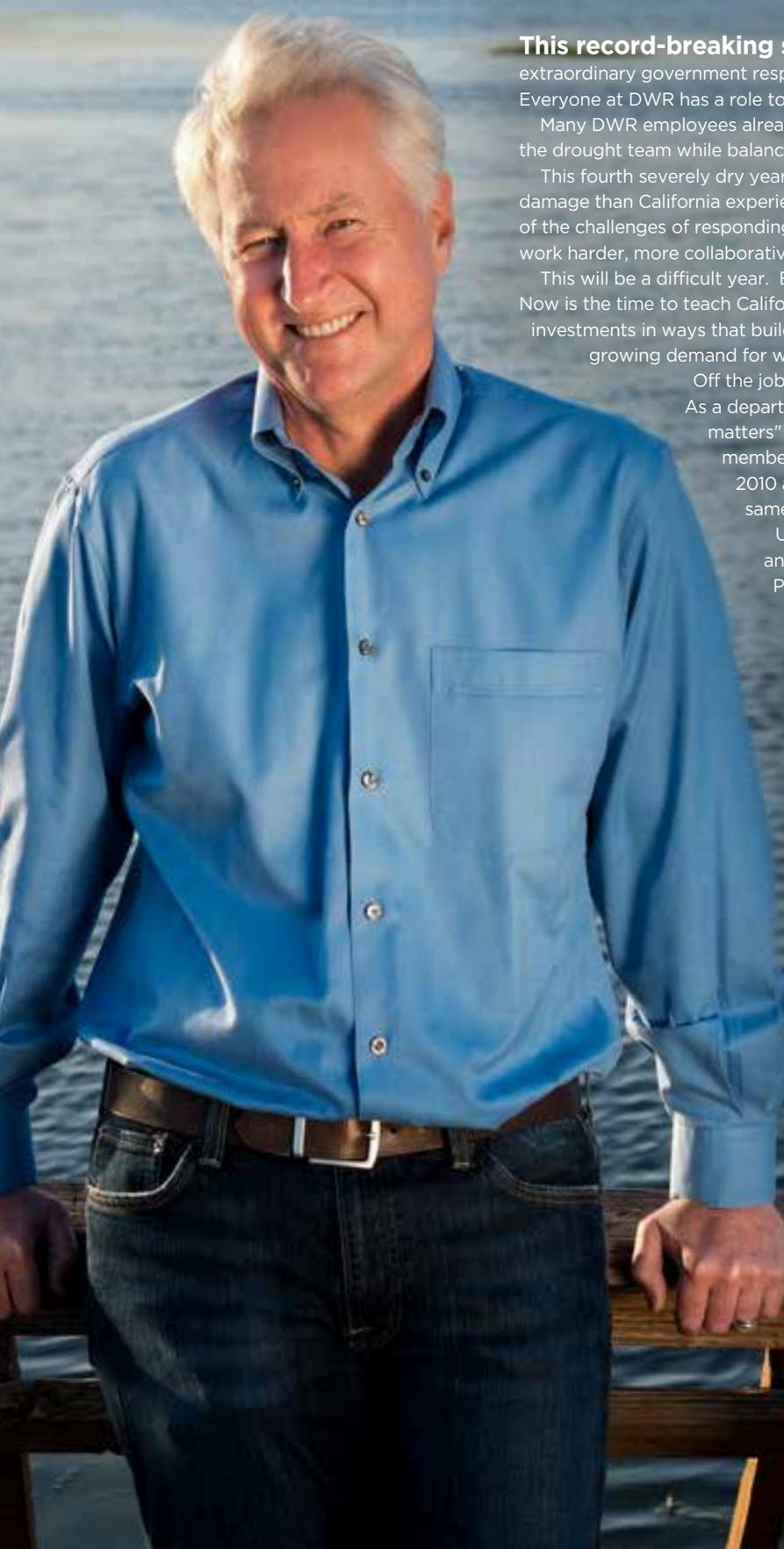
Historic Steps

Governor Announces
Mandatory Drought
Measures at Sierra Site

Page 6



Facing Extraordinary Times



This record-breaking span of drought puts DWR at the center of an extraordinary government response. Much has been accomplished, and much remains to do. Everyone at DWR has a role to play.

Many DWR employees already have stepped up and contributed time, energy and talent to the drought team while balancing non-drought obligations.

This fourth severely dry year threatens to inflict greater economic and environmental damage than California experienced last year. So even as we take a collective breath in light of the challenges of responding to three extraordinarily dry years, we must be prepared to work harder, more collaboratively, and more creatively.

This will be a difficult year. But we've got the attention of the public and political leaders. Now is the time to teach Californians about a resource they often take for granted and channel investments in ways that build our capacity to handle drought, flood, climate change and growing demand for water into the future.

Off the job, every DWR employee can set an example by using water wisely. As a department of 3,500 people, we can easily send the "conservation matters" message reverberating across tens of thousands of friends, family members and neighbors. I'm proud of the way DWR employees between 2010 and 2014 cut on-the-job water use by 36 percent. Let's all do the same at home.

Under the leadership of Bill Croyle, DWR Drought Manager and newly-named Deputy Director of Statewide Emergency Preparedness and Security, DWR has become a go-to agency for the Brown administration's drought response. We track water supply conditions, manage the water project operations that involve difficult trade-offs, help small communities running short of water and coordinate across dozens of state, local and federal agencies to maximize efforts.

In April, the governor issued an executive order that assigns DWR new and important roles. We must:

- Rapidly install a temporary rock barrier in the Sacramento-San Joaquin Delta to repel salinity intrusion and help preserve water stored in upstream reservoirs;
- Work with local water districts to replace 50 million square feet of turf with drought-tolerant landscaping;
- Quickly update the State Model Water Efficient Landscape Ordinance that sets standards for new landscapes in terms of such things as irrigation efficiency and the amount of land devoted to turf;
- Provide technical assistance to irrigation districts as they submit drought contingency plans that quantify water supplies and demand for 2013, 2014 and 2015; and
- Help small irrigation districts draft agricultural management plans that include drought contingencies.

These are historic times that test our organization. We need all DWR employees to rally once again. With that commitment, I am confident we will emerge from this drought as a stronger department better equipped to help California become ever more resilient in the face of future water challenges. ♦

— Mark Cowin, Director
California Department of Water Resources

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California Department of Water Resources

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On the Cover:

Governor Edmund G. Brown Jr. announces a mandatory 25 percent reduction in statewide water use. DWR Director Mark Cowin and Frank Gehrke, Chief of the California Cooperative Snow Surveys Program also speak at the season's fourth manual snow survey on April 1 at Phillips Station.

Photo above:

Frank Gehrke shows snow level comparison for Phillips Station, which has never had dry ground at the April snow survey.

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Big Shoes

Santa Clara Terminal Reservoir Marks 50 Years

Mini but mighty—that's how you might describe the Santa Clara Terminal Reservoir a few miles east of bustling downtown San Jose. At the end of the South Bay Aqueduct, the reservoir makes a big water supply contribution to the Santa Clara area, supplying water to some 100,000 households.

(Above) California Governor Edmund G. "Pat" Brown joined DWR Director William Warne to open the valve on the new facility on July 1, 1965.

Water from the steel holding tank—which sits on the site of the Santa Clara Valley Water District's Penitencia Treatment Facility—flows through a feed line to the treatment plant and then goes to an overflow pipe ending at the district's groundwater percolation basin.

The tank is cylindrical, 160 feet in diameter, 20 feet in height and has an elevation of 478 feet. Its storage maxes out at nine acre-feet. Construction started in 1964. ♦

Below: Jim Odom of Delta Field Division visits the Santa Clara Terminal Reservoir, located at the end of South Bay Aqueduct.



Features



A Sharper View

**Feather River Program
Installs Video Monitoring
System near Hatchery**

By Akiela Moses



Above to below: Video camera records fish near Feather River Fish Hatchery. Jason Kindopp installs video monitoring system. Chris Cook reviews the video feed from inside a trailer.

High-tech cameras are giving DWR a visual record of salmon spawning in the side channel of the Feather River in Oroville.

The recording system, installed late in 2014, gives DWR's Feather River Program the first accurate count of salmon returning to the site to spawn. In doing so, it eliminates the need for post-spawning carcass surveys to estimate spawning runs from the number of dead fish counted. This, in turn, reduces foot traffic in the spawning area where fisheries biologists strive to keep disruptions at a minimum.

The Feather River Fish Hatchery, operated by the Department of Fish and Wildlife, compensates for spawning grounds lost to salmon and steelhead by the construction of Oroville Dam. The side channel, located below the hatchery, experiences substantial Chinook salmon and steelhead fish spawning. DWR's Environmental Services Division installed the new video monitoring system to benefit salmon and steelhead by reducing impacts to this sensitive area.

The concept of installing this system was first introduced by Senior

Environmental Scientist Jason Kindopp.

"Incorporating cameras would not only help reduce human impact on popular spawning areas, but also eliminate the practice of traditional salmon surveys and test the possibility of using similar systems in future projects," said Kindopp.

The monitoring equipment installed on September 11, 2014 along the Hatchery Side Channel is composed of a 36 inches by 53 inches aluminum camera box containing a video camera and underwater LED lights. This equipment provides 24-hour surveillance to help monitor and provide an accurate population estimate of fish within that area. To help save time and resources, a computer with specialized fish detection software is used to record only when fish are present, reducing the amount of footage that is later examined by the staff.

"The system has effectively transmitted enough information to provide an accurate count," said Chris Cook, lead Environmental Scientist of the channels video surveillance.

Although the system was only built to last until the end of the study that ended in January 2015, the equipment is already set to be used in a future long-term Federal Energy Regulatory Commission Project along the Feather River. ♦

Making Every Drop Count

Californians
Mandated to
Save Water

Above, left to right: Governor Edmund G. Brown Jr., DWR Director Mark Cowin and Chief of California Cooperative Snow Surveys Frank Gehrke participate at April 1 snow survey at Phillips Station. **Right:** Lake Oroville, the largest State Water Project reservoir, is 49 percent of capacity on March 2, 2015.



“This historic drought demands unprecedented action.”

— Governor Edmund G. Brown Jr.

With snowpack water content at a record low and California’s drought stretching to a fourth year, Governor Edmund G. Brown Jr. on April 1, 2015 announced the state’s first ever mandatory statewide water reduction.

The season’s fourth snow survey found the snowpack’s statewide water content at just five percent of average. This breaks the previous April 1 record of 25 percent in 1977 and 1991. In the 75 years of April measurements at the Phillips snow course, this year was the first time no snow was found there.

“Today we are standing on dry grass where there should be five feet of snow,” said Governor Brown at Phillips. “This historic drought demands unprecedented action. Therefore, I’m issuing an Executive Order mandating substantial water reductions across our state. As Californians, we must pull together and save water in every way possible.”

The Executive Order implements mandatory water restrictions throughout California to reduce water usage by 25 percent.

To save water, the order includes:

–Replacing 50 million square feet of lawns and ornamental turf throughout the state with drought tolerant landscaping.

–Directing creation of a temporary statewide appliance rebate program to replace inefficient household devices with more water and energy efficient models.

–Requiring commercial, industrial and institutional properties, such as campuses, golf courses, cemeteries and other large landscapes, to immediately implement water efficiency measures to reduce water use.

–Prohibiting newly constructed homes and buildings from irrigating with potable water unless water-efficient drip irrigation systems are used and banning watering of ornamental grass on public street medians.

The Governor’s order also increases enforcement to prevent wasteful water use, streamlines government response and invests in new technologies. To view the Executive Order, visit http://gov.ca.gov/docs/4.1.15_Executive_Order.pdf

Conservation is California’s most reliable drought management tool. From taking shorter showers to letting the lawn go brown, learn simple ways to help California save water at SaveOurWater.com

For information on how California is coping with the drought, visit Drought.CA.Gov

Chief of California Cooperative Snow Surveys Frank Gehrke and Governor Edmund G. Brown Jr. at snow survey at Phillips Station, where no snow was found for first time in 75 years of early-April measurements.



Emergency Drought Barrier installed in the Delta

By Doug Carlson

A Wall of Rocks

Some call it an absolutely critical emergency measure to preserve California's water supply. Opponents call it a threat to the Sacramento-San Joaquin Delta. Still others call it simply a big pile of rocks.

Whatever you call it, DWR's emergency drought barrier on West False River is a dramatic and historic response to California's four-year (and counting) drought. It will be a point of reference for all future droughts in the Golden State.

This barrier now blocks a water channel in the Delta that boaters routinely use, and as you might expect, quite a few of them don't like it, along with many Delta residents.

DWR knew that was bound to be the case as it spent more than a year studying the need for the barrier. "Something there is that doesn't love a wall . . ." is the first line of Robert Frost's famous poem, inspired

by the little barrier between his apple orchard and a neighbor's pine forest:

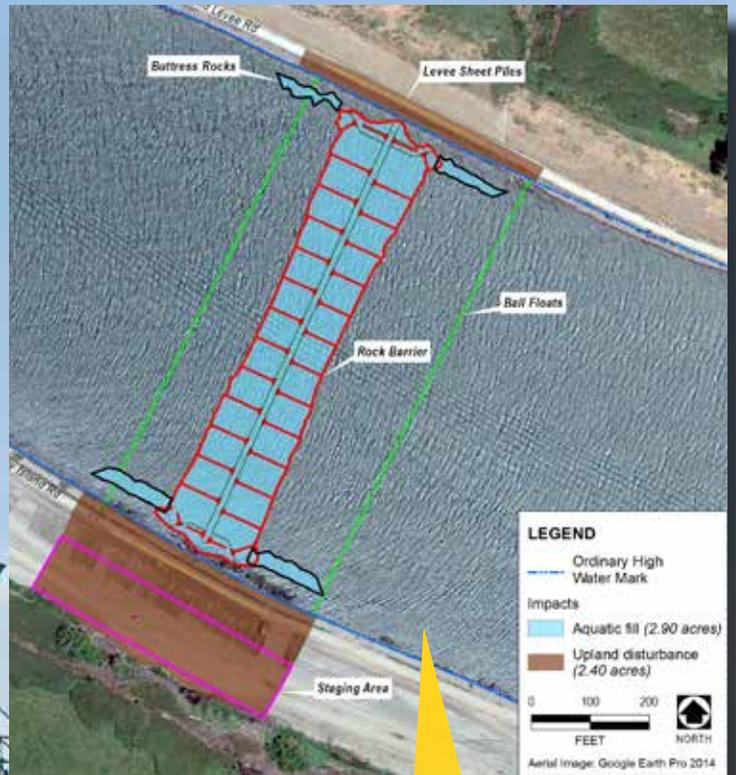
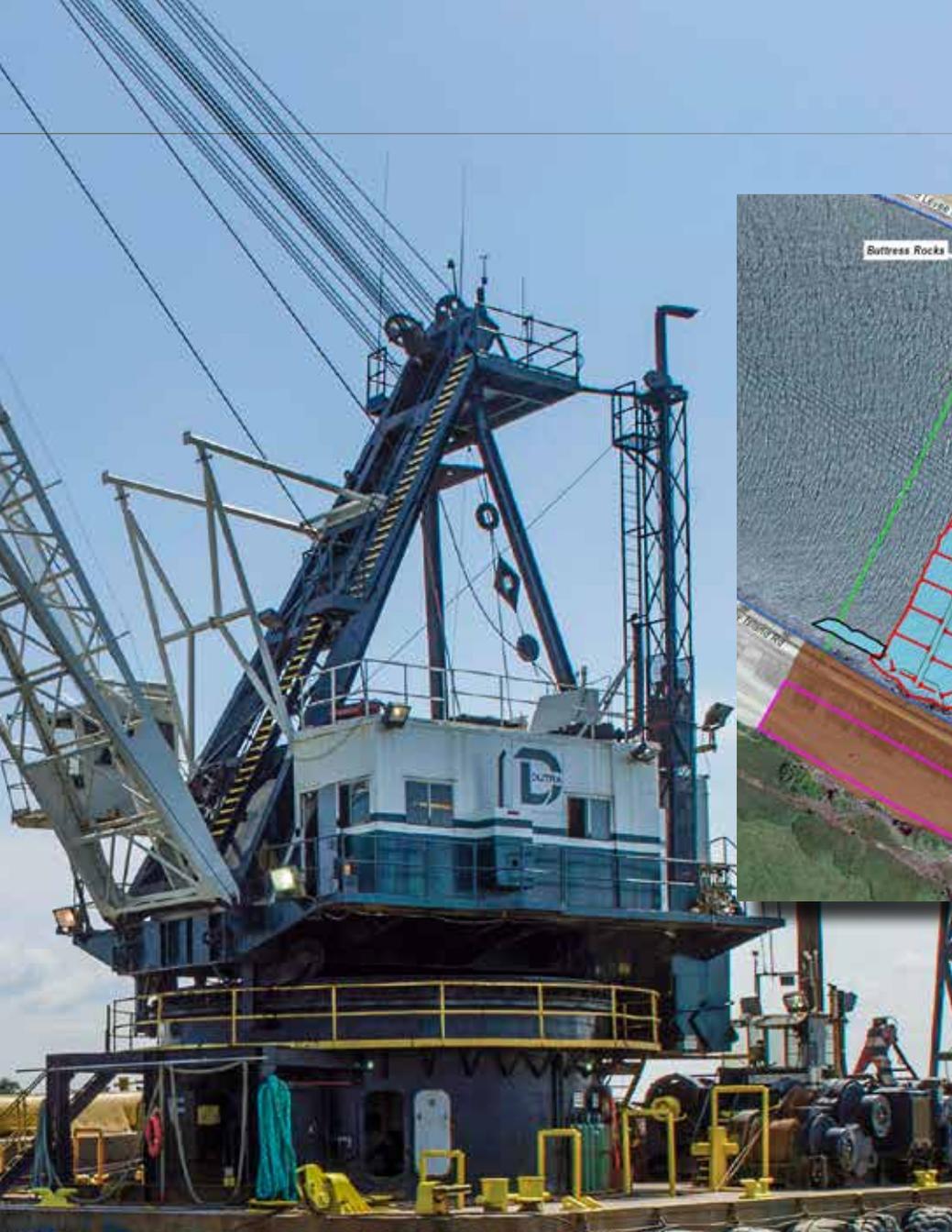
*"Before I built a wall I'd ask to know
What I was walling in or walling out,
And to whom I was like to give offense."*

The drought barrier walls out saltwater and stops it from entering the central Delta, where water flows that's used by Delta residents and farms and by residents of Contra Costa, Alameda and Santa Clara counties.

Mother Nature tries to contaminate that water twice a day with tides that push saltwater from San Francisco Bay into the Delta. The rock barrier blocks that flow into West False River and helps preserve precious water in upstream reservoirs that otherwise would have to be released to push back the tides.

The barrier began taking shape on May 8 when a





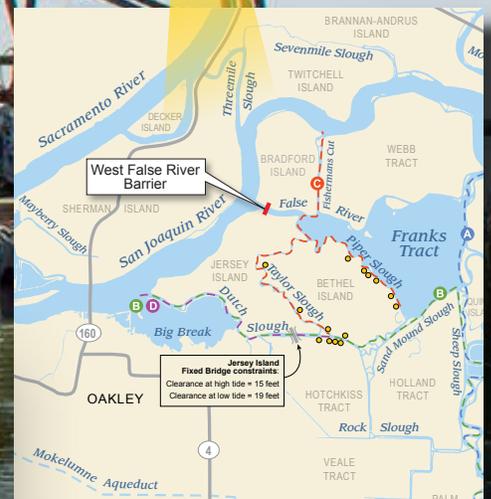
crane dropped its first bucket of basket-ball-sized rocks into the West False River channel. The equivalent of about 30,000 more buckets will follow over the next six weeks to create a trapezoid-shaped barrier spanning the 750-foot width of the channel between Jersey and Bradford islands.

DWR photographers and videographers were on hand for the event, along with news media from Sacramento and around the Bay Area. In announcing the project's start, DWR Director Mark Cowin noted the severity of California's four-year drought:

"With 2015 turning out to be warmer and drier than normal, water conservation is

important," said Director Cowin. "The rock barrier in the Delta is an undesirable, but necessary tool for freshwater conservation."

Call it what you will, DWR believes the barrier was the proper response to this year's severe drought emergency. DWR's website has updated information on the barrier at <http://water.ca.gov/waterconditions/emergencybarriers.cfm>



**Atmospheric Rivers
Leave No Dent to
California Drought**

Rivers in the Sky

By Doug Carlson



National Oceanic and Atmospheric Administration (NOAA) Scientists prepare to board airplane used to gather information about Atmospheric River (AR) storms in February and March 2015.

After one of the warmest and driest winters since the 1800s, Californians understandably are anxious to see the end of the state's four-year drought.

Meteorologists and climatologists are still developing the tools they need to predict when it will end, but they already have a likely scenario of how.

Weather scientists say roughly half of California's droughts have ended after deluges from atmospheric rivers (ARs)—big water-laden storms that blow in from the Pacific and deliver moisture like a fire hose. When these storms pass near the Hawaiian Islands, forecasters often call them the "Pineapple Express."

ARs happen the world over, and no two storms are exactly alike, but all ARs are distinguished from normal storms by their ability to move vast amounts of water vapor in relatively narrow bands that stretch for hundreds or even thousands of miles.

Not particularly well understood two decades ago, ARs are now recognized as a part of the big, sweeping outer cloud

banks that swirl counter-clockwise around low-pressure zones that cross the Pacific and deliver weather to North America.

ARs concentrate the moisture in the first 10,000 feet above the ocean's surface and are typically 300–400 miles wide. When they slam into California, they can produce heavy rainfall for durations typically lasting one day. However, some can last two days or longer and can occur back-to-back.

Scientists who study ARs choose their words for maximum impact when they describe these storms. Dr. Martin Ralph, Director of the Center for Western Weather and Water Extremes at the University of California, San Diego's Scripps Institution of Oceanography, says ARs "are Northern California's equivalent of hurricanes, in terms of impacts."

Dr. Ralph compares the potential damages from strong ARs to damages from hurricanes Katrina and Sandy, which famously pounded the Gulf and Atlantic coasts in 2005 and 2012 respectively.

"River" is an apt description. A strong AR transports water vapor that's 10 to 20 times greater than the liquid flow of the Mississippi River. That much water can create both a beneficial water supply and widespread flooding when it falls as rain in a concentrated location.

As ARs blow into California, they're pushed upwards by the mountains—first the Coastal Range and then the Sierra Nevada. As the air cools, water vapor condenses around aerosols (dust, bacteria and other small particles) and falls as rain and snow.

Much of California's usable water is delivered by ARs, either immediately as rain or as melting snow in the weeks and months after a storm. The AR that drenched much of Northern California last December produced enough rain within a couple days to threaten flooding along the Sacramento and Russian rivers and their tributaries.

And that's the vexing thing about ARs. They're capable of ending a drought, but because they deliver so much rain within just a day or two, ARs can flip parts of the state from drought conditions to flooding almost overnight. In fact, flooding has occurred in the middle of a long drought.

Truly stupendous weather events have been associated with ARs, including the California mega-flood in the winter of 1861–62, which Scientific American described in a 2012 article:

"In 1861, farmers and ranchers were praying for rain after two exceptionally dry decades. In December their prayers were answered with a vengeance, as a series of monstrous Pacific storms slammed—one after another

—into the West coast of North America, from Mexico to Canada. The storms produced the most violent flooding residents had ever seen, before or since."

Rivers swelled to overflowing and beyond, carrying away whole communities in an ever-rising tide of water that created an "inland sea" in the Sacramento Valley that in some places was 30 feet deep. The Scientific American article continued:

"California's new Governor, Leland Stanford, was to be inaugurated on January 10, but the floodwaters swept through Sacramento that day, submerging the city. Citizens fled by any means possible, yet the inauguration ceremony took place . . . anyway, despite the mounting catastrophe."

With road travel impossible, Stanford arrived at the Capitol by rowboat.

It's been only a couple lifetimes since the 1861–62 mega-flood, which other western states also recorded as their worst ever. The potential for another such storm is on the minds of people who manage the state's water resources, including colleagues here at DWR.

One could even argue that California is due for another enormous flood, since studies suggest they occur every 100 to 200 years. Emergency response professionals have planned for a monster AR

Aircraft deployed during AR storms were on display at CalWater-2015 event in Sacramento on February 3, 2015.



they call the ARkStorm—“A(tmospheric) R(iver)k(1,000) Storm.”

Such a storm theoretically could flood thousands of square miles of urban and agriculture land and cause hundreds of billions of dollars in economic loss. A million or more people would require evacuation, and if the operation weren’t conducted smoothly, the human toll could be significant.

It’s therefore understandable why ARs are a top research priority. Better forecasting of even moderate ARs would be extremely useful to DWR water managers.

That’s why it seemed like a stroke of good luck when two early-February ARs arrived almost as if on schedule to coincide with the largest research effort ever conducted on ARs.

For six weeks in February and March, CalWater-2015 focused millions of research dollars, dozens of scientists and technicians from several agencies, four aircraft and a ship at sea to gather massive amounts of data on the storms.

Dr. Ralph said the project team was keen to observe the ARs as they arrived on California’s coast. “One of the things we did was measure the storms to compare the climate prediction models to what we actually observed,” he said, noting there were sure to be differences. The comparisons will be used to improve AR forecasting and climate projections.

The other primary science goal of CalWater-2015 was measurement and understanding of the complex range of aerosols that influence clouds and precipitation. This includes assessment of aerosols from local sources, from the oceans and even from across the Pacific.

Michael Anderson, DWR’s State Climatologist and a CalWater-2015 participant, said DWR has been ramping up its prediction capabilities for years. He’s worked with scenario builders using strong AR events in California’s recent history to approximate what might be expected from an ARkStorm.

ARs that struck Northern and Central California in February 1986, for example, dumped nearly 30 inches of rain in Calistoga in a 10-day period. Storms in January 1969 also were among California’s major ARs of the past half century.

Anderson says it wasn’t even until the mid-1990s that the storms’ significance was well understood – that just a handful of them often deliver 50 percent or more of California’s annual precipitation.

“CalWater-2015 research is designed to get a better understanding of these storms’ structure,” Anderson said. “With greater knowledge, we should be able to improve on forecast models and better anticipate when atmospheric rivers will arrive.”

Storm-penetrating radar stations that probe the storms’ structure as they pass overhead

are being built at Bodega Bay, Eureka, Point Sur and Goleta. Elsewhere, DWR has a dozen NOAA-designed radar stations in place to determine the elevations at which rain becomes snow. Two are on the western edge of the Central Valley at Lake Berryessa and San Luis Reservoir, and 10 are scattered from Happy Camp in the Klamath Basin down to the southern Sierra Nevada.

“We’re trying to find ways to extend our lead time awareness of when heavy precipitation is likely to fall,” Anderson said. Reservoir operations especially could benefit from better AR forecasts.

As for those February ARs, the state’s northern reservoirs benefitted from their considerable rainfall, but precipitation was not sustained in the coming weeks. Storage in Lake Shasta and Lake Oroville began falling in mid-April, the earliest such retreat in recent years. The snowpack benefitted hardly at all, and by April, it held its lowest water content since DWR began keeping records.

The drought wasn’t broken by the end of California’s traditional wet season, and anxious Californians faced new water restrictions as they braced for their fourth consecutive summer of drought. ♦

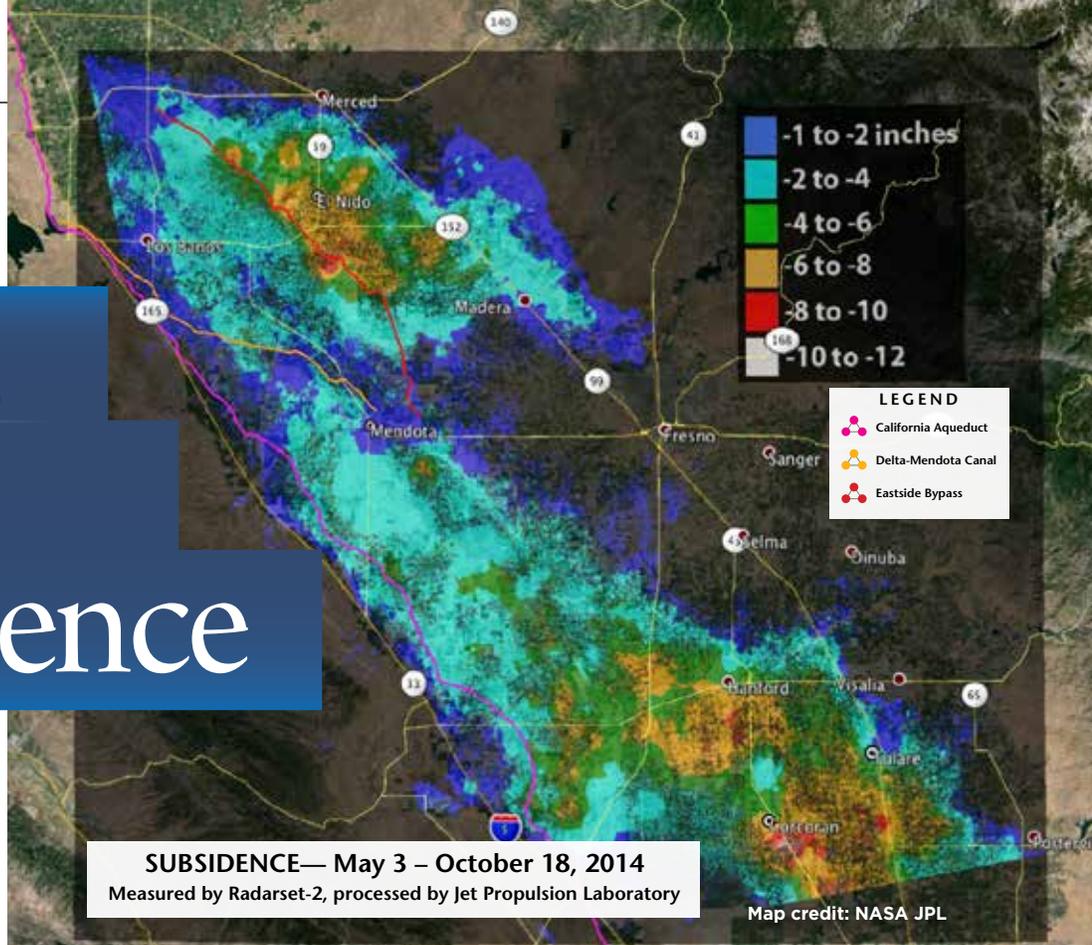
The Bodega Bay Observatory, first of four coastal Atmospheric River Observatories, was installed in March of 2013 as part of a partnership among DWR, the Scripps Institution of Oceanography and the National Oceanic and Atmospheric Administration’s Earth System Research Laboratory.



Monitoring Drought Impacts

Land Subsidence

By Jeanine Jones



Increased groundwater extraction is a common drought response, as those with surface water shortages turn to groundwater to compensate. Increased pumping can lead to increased rates of land subsidence or development of subsidence in previously unaffected areas. Recognizing the increased subsidence risks, DWR contracted with the National Aeronautic and Space Administration's (NASA's) Jet Propulsion Laboratory (JPL) last year in a research project for early detection and monitoring of land subsidence hot spots, primarily in the San Joaquin Valley.

Land subsidence due to groundwater extraction is not a new condition in California; reported San Joaquin Valley land subsidence dates back to the 1920s, and parts of the valley experienced nearly 30 feet of subsidence between the 1920s and the early 1970s. The greatest amounts of California's subsidence (both vertical displacement and areal extent of the affected area) have occurred in the San Joaquin Valley, but regions such as the Santa Clara Valley or Antelope Valley have also been affected. Land subsidence can harm critical water infrastructure such as canals and

flood control levees through either direct structural damage (from localized differential subsidence) or through loss of water conveyance capacity or freeboard (from regional subsidence over a broad area).

DWR's contract with JPL involves use of satellite-based interferometric synthetic aperture radar (InSAR) imagery to assess relative ground surface displacement in targeted areas where imagery is available. InSAR's advantage is its ability to rapidly measure displacement over large geographic areas such as San Joaquin Valley. Although the imagery used through 2014 for DWR's work was only available from fee-based commercial sources, a European Space Agency satellite launched late last year now provides free data, making InSAR monitoring more affordable in the future. DWR is now amending its contract with JPL to use data from the new satellite, which will also allow for expanded geographic coverage.

The figure (*above*) provides an example of last year's InSAR monitoring in part of the San Joaquin Valley where data was available from the Canadian Space Agency's RADARSAT-2, a commercial radar satellite launched in 2007. As shown,

varying amounts of relative land surface displacement were observed in measurements made between May and October. This information facilitates rapid identification of areas where water infrastructure may be affected, providing early notice to water agencies that ground-based subsidence monitoring may be warranted. For example, the State Water Project's California Aqueduct (shown in magenta) traverses subsidence-prone areas. DWR has periodically conducted ground-based surveys along the Aqueduct since its construction; the radar data can point to priority areas for focused surveying efforts.

Moving beyond the immediate needs of monitoring drought impacts on critical water infrastructure, the hot spot detection and early warning capability provided by radar monitoring has longer-term applications. Local groundwater sustainability agencies now being formed to implement last year's landmark Sustainable Groundwater Management Act could use this regional-scale observing capacity to identify areas needing focused attention and to help track outcomes of their management actions. 💧

Achieving Balance

New Era for Groundwater

By Lauren Bisnett

Passage of the Sustainable Groundwater Management Act (SGMA) last September ushered California into a new era of managing groundwater sustainably.

This historic legislation focuses on the fact that groundwater supplies are best managed at the local level, and it gives DWR the responsibility of providing technical support to local agencies in order to bring the State's basins into balance.

Since last September, DWR has been collaborating with stakeholders and speaking at public forums to educate practitioners and professionals from a variety of industries about SGMA and DWR's vision for implementation. In March, DWR released its Draft Strategic Plan for the Sustainable Groundwater Management Program, outlining current groundwater conditions, legislation and drivers of policy, success factors, groundwater sustainability goals, objectives and actions and its commitment to a robust outreach and communications effort throughout the State.

The legislation increases the role and responsibilities of DWR to support sustainable groundwater management. It directs DWR to complete regulations for changing groundwater basin boundaries, to establish content for review of groundwater sustainability plans, update basin boundaries and conduct groundwater assessments into the next decade.

These new responsibilities require DWR to expand its expertise to meet the challenges and opportunities ahead. The Department's success will be measured by the success of the local agencies in achieving balanced groundwater conditions.

Improving groundwater management requires that local and regional agencies have the incentive, tools, authority and guidance to develop, implement and enforce sustainable groundwater management practices to provide the benefits of water supply reliability and resiliency, public health and safety, ecosystem services and a stable California economy.

Below: Located west of Gridley on the Pacific Flyway, the groundwater wells at Gray Lodge Wildlife Area pump water to flood fields and supply water for waterfowl. **Page 15:** Thomas E. Levy Groundwater Replenishment Facility replenishes the eastern Coachella Valley aquifer with 40,000 acre-feet of Colorado River water annually.



“Getting to sustainable water management will take decades, and we need to start now,” said DWR Director Mark Cowin. “This will not be easy, but many local leaders have told me they are ready to step up. We need to begin managing our groundwater so it is available for future generations while we balance the immediate needs of the economy.”

To carry out its groundwater sustainability responsibilities, DWR will:

- **Develop a framework for sustainable groundwater management:**

Providing a structure which will enable groundwater sustainability agencies (GSAs) to achieve success will require that many factors be addressed. This objective will address basin boundaries and prioritization, groundwater sustainability plan formulation and content, best management practices (BMPs) and water budgeting. In order to address directives from the Sustainable Groundwater Management Act, DWR will develop regulations to inform and support regional efforts.

- **Provide statewide technical assistance to groundwater sustainability agencies:**

Providing technical assistance to GSAs will be crucial in enabling their success in managing their groundwater basins.

- **Provide statewide planning assistance to support groundwater sustainability:**

DWR’s Bulletin 118 provides a systematic evaluation of groundwater basins in California and will be updated to reflect critical information, including basin boundaries, groundwater quality data, yield data and water budgets.

- **Assist state and GSA alignment and provide financial assistance:**

Strong alignment and collaboration between and among local, regional and state agencies will be critical to achieving sustainable groundwater management statewide.

- **Provide inter-regional assistance:**

Achieving this objective will require DWR to support regional water managers with



information on water reliability, storage and conveyance opportunities, water availability for replenishment and updated surface-groundwater interactions.

These objectives will be accomplished with a suite of actions undertaken by DWR over the coming years. It is mission critical to identify and understand those challenges as DWR works with State, federal, and local agencies, tribes and other stakeholders.

Intended outcomes of the SGMA include:

- Advancement in knowledge of the State’s groundwater basins
- Establishment of effective local governance to protect and manage groundwater basins.
- Management of regional water resources for self-sufficiency and drought resilience.
- Sustainable management of groundwater basins through the actions of local government agencies, utilizing State intervention only when necessary.
- Protection and operation of all groundwater alluvial basins in California in such a way to maintain adequate quality to support beneficial uses.
- Management of surface water and groundwater as a “single resource” to sustain their interconnectivity, provide dry season base flow to interconnected streams and support and promote

long-term aquatic ecosystem health and vitality.

- Establishment of a statewide framework for local groundwater management planning, including development of sustainable groundwater management best management practices and plans.

- Development of comprehensive water budgets, groundwater models and engineering tools for effective management of groundwater basins.

- Improved coordination between land use and groundwater planning.

- Enforcement actions as needed by the State Water Resources

Control Board to achieve region-

by-region sustainable groundwater management in accordance with the legislation.

Benefits of the outcomes described above will achieve a reliable, safe and sustainable water supply to protect communities, farms, and the environment and support a stable and growing economy. This will include elimination of long-term groundwater overdraft, an increase in groundwater storage, avoidance or minimization of subsidence, enhancement of water flows in stream systems and prevention of future groundwater quality degradation.

“Successful implementation of these laws will require good communication and engagement,” said David Gutierrez, Executive Program Manager for DWR’s Sustainable Groundwater Management Program. “We spell out DWR’s vision for providing support and technical advice in our draft strategic plan, and we want stakeholders to help us improve and refine that vision.”

Draft Strategic Plan comments and input received will aid DWR in developing project management plans for each of the objectives. A more detailed plan will be released in the fall. For more information, visit DWR’s groundwater website at <http://www.water.ca.gov/groundwater/>

Credit Restoration

DWR's Bulk Credit Program Provides a Better Way of Acquiring Habitat Mitigation

By Jennifer Hogan

Left: Jennifer Hogan, Environmental Program Manager I of DWR's Floodsafe Environmental Stewardship and Statewide Resources Office, visits Cosumnes Floodplain Mitigation Bank.

Although “bulk credit” sounds like something economists may be concerned about, or perhaps your financial planner, DWR staff has worked tirelessly to facilitate a Bulk Credit Program with the end goal of obtaining high-quality wetland and upland habitat. This DWR-created program facilitates the acquisition of habitat mitigation resulting from levee maintenance under the Delta Levees Program, some to fill an immediate need, and some to have “in the bank” and ready to use as Delta Levees Program participants' habitat mitigation needs arise. DWR's Delta Ecosystem Enhancement staff pursued the idea of developing a bulk mitigation credit program, but found that implementing it was neither quick nor easy.

The goal of the Bulk Credit Program that was envisioned in 2006 and implemented in 2012 is to help Reclamation Districts (RDs) meet their habitat mitigation obligations in a coordinated and efficient manner. The idea presented by DWR staff to upper management and then to local interests was to use Delta Levees Program grant funds to buy existing habitat mitigation credits “in bulk,” resulting in high-quality mitigation habitat acquired at a lower unit cost than if the RDs had individually acquired these same credits on their own. The challenge was to convince the local interests that this use of program funds had merit.

“Building trust among the local interests and listening to their concerns over a period of six years, Delta Ecosystem Enhancement and Delta Levees Program staff designed and implemented a program that, in a cost-effective manner, increases regulatory efficiency and helps achieve the co-equal goals for the Delta,” said Dave Mraz, Principal Engineer, who oversees the Delta Levees Program.

The Delta Levees Program, administered by DWR for nearly 30 years, provides grant funding to Delta RDs to maintain or improve their levees. The California Water Code stipulates that any habitat impacted by these projects must be fully mitigated.



Above: Cosumnes Floodplain Mitigation Bank located in Thornton is part of the mitigation site where DWR purchased bulk credits.

The Delta Levees Program works with California Department of Fish and Wildlife (CDFW) environmental scientists to regulate the program's habitat impacts and determine mitigation requirements. CDFW staff plays a key role in the approval of any mitigation suggested by the RDs to offset habitat impacts. Historically, mitigation had been accomplished through small, dispersed "postage stamp" mitigation sites that have proven to be costly to maintain and have generally been too small to have high biological integrity.

DWR's Delta Levees Engineering and Ecosystem Enhancement staff, together with CDFW, set out to create a higher biologically functioning option for RDs to meet their mitigation needs, save taxpayer money and ensure that habitat removed as part of levee improvements is readily substituted with mature native vegetation.

For several years, DWR and CDFW staff held public meetings and participated in other outreach efforts with RD engineers and Delta stakeholders to fully engage them in the development of the Bulk Credit Program.

Jersey Island was the first agency to support the program and ultimately agreed to represent the Delta RDs. They submitted an

application in response to the Delta Levees Program's Project Solicitation Package and were awarded \$6 million to complete the acquisition of mitigation credits and then oversee the credit transfers.

They proposed to partner with Westervelt Ecological Services, owner of the Cosumnes Floodplain Mitigation Bank, and purchase approximately 90 acres (credits) of riparian forest, scrub-shrub and freshwater marsh habitat types, as well as 4,000 linear feet of shaded riverine aquatic habitat.

"The Bulk Credit Program has been a tremendous asset to the Delta Levees Program," said Nate Hershey, Principal Civil Engineer, MBK Engineers. "The implementation of [this program] has removed much of the uncertainty for reclamation districts and levee maintaining agencies in performing maintenance or implementing projects requiring removal of habitat. Our experience has been that acquiring credits through the [Bulk Credit Program] is a relatively straightforward process, and our clients are pleased to see such a program in place."

Buying in bulk saved the state a minimum of \$1 million. Since the initial purchase, credit prices have increased 17 to 35

percent, depending on type of credit.

"The hard work and face-to-face time spent communicating with the local interests has paid off," said Gail Newton, Chief of FESSRO. "Since June of 2012, 18 RDs have taken advantage of the opportunity to acquire these mitigation credits."

In various meetings throughout the Delta, the RD engineers are now quick to point out the Bulk Credits Program's attributes.

"The Bulk Credit Program has been a great tool for the Delta Reclamation Districts whose primary responsibility is to maintain and improve the levees protecting the lives, property and habitat within the Delta islands from the constant threat of flooding," said Bill Darsie, Senior Engineer, KSN, Inc. "Often it is necessary to perform work on these levees where there is neither time nor ability to avoid impacts to existing habitat. Having the Bulk Credit Program immediately available to mitigate for unavoidable habitat losses is a great benefit. Once the impacts are identified and documented, it is a very efficient and simple process to purchase the credits. Overall we have been very pleased with the program and applaud DWR's forward thinking to put this beneficial process in place." ♦

GREEN POWER

DWR Reduces Greenhouse Gas Emissions

By Doug Carlson

The State Water Project is internationally famous for the engineering achievement it was when it was built and still is.

Having reached its 55th birthday this year, DWR is attracting new attention for its leadership in helping combat climate change by reducing greenhouse gases (GHG) emitted in powering the project.

DWR was honored in February by the U.S. Environmental Protection Agency as a recipient of a 2015 Climate Leadership Award, which was presented at the Climate Leadership Conference in Washington, D.C. The EPA sponsors the award along with several other organizations, including The Climate Registry, a non-profit organization that operates compliance GHG reporting programs.

Awards went to 15 organizations and two individuals in the public and private sectors for leadership in addressing climate change by reducing carbon pollution.

DWR was recognized for its aggressive goal setting.

The State Water Project (SWP) uses electricity to pump water through its network system of reservoirs and aqueducts and also is a large producer of hydrogeneration from its power plants. It is the largest state-run water and power system in the country. DWR has been a leader in responding to California government policies established a decade ago that require state agencies to reduce their GHG emissions.

The Climate Leadership Award made special note of DWR's commitment. In DWR's 2012 GHG emissions reduction plan, the Department committed to GHG emissions reductions of 50 percent below 1990 levels by 2020



Left: Bank Pumping Plant's pumps provide the initial lift of water 244 feet into the California Aqueduct.



Above: Helping DWR reduce greenhouse gas emissions, Dominion RE Camelot Solar Photovoltaic Project in Kern County is expected to deliver 125,000 megawatt-hours of annual generation to the State Water Project.

and 80 percent below 1990 levels by 2050.

However, DWR's reduction goals didn't meet industry best standards because the 1990 baseline year was too old and not verifiable. DWR responded by establishing a second generation emissions reduction goal using 2010 as its verified baseline year,

The new goals—33 percent reduction below 2010 levels by 2020 and 70 percent reduction below 2010 by 2050—will still result in the same level of total emissions reductions but now also meet industry best standards. That was the key accomplishment recognized by the Climate Leadership Awards committee.

The Department is approaching the 2020 target in part by improving the energy efficiency of pumps and turbines throughout the SWP and incorporating "clean energy" generated by renewable energy power plants.

Veronica Hicks, Chief of DWR's Power and Risk Office, said DWR is one of the first State government entities in the country to have its annual emissions independently verified by The Climate Registry.

"To be able to say that our emissions will be 50 percent below 1990 levels in just five years is remarkable," she said. "This is an

aggressive goal given the amount of electricity used by the State Water Project."

A big step in that direction occurred in 2013 when DWR elected to terminate, not renew, its joint ownership and generation contract for Unit 4 at the Reid-Gardner coal-fired plant in Nevada. DWR has eliminated all coal-fired generation from the water project's energy portfolio.

Reducing emissions in 2050 to only 20 percent of DWR's 1990 emissions seems like a huge challenge that will require a near-revolutionary transition in power generation capabilities.

That's exactly what DWR is attempting. "It is a big challenge," Hicks said, "but we're looking at a variety of different methods to achieve it. We'll get there in part by refurbishing our pumps and generators to improve energy efficiency and by switching to cleaner generation elsewhere. You can see that at the state-of-the-art Lodi Energy Center, which has significantly reduced emissions at start-up and during operation."

DWR has contracted for about one-third of the energy produced by the 296-megawatt natural gas facility, which delivered its first electricity in 2012. It replaced a portion of

the coal plant's energy contribution.

But reducing emissions from fossil fuel generation will get DWR only so far. The rest of the way to achieving the 2050 emissions goal will depend on emission-free generation from renewable energy projects.

The SWP already is a large producer of hydroelectric power as water is released from its reservoirs and turns turbines in the Hyatt Powerplant at Oroville, the Gianelli Pumping-Generating Plant at San Luis reservoir and in other facilities. All power generated by the SWP is scheduled to the California Independent System Operator (CAISO), which runs the statewide power grid, and the SWP schedules power from the CAISO to run its pumps.

Much of the "green" energy of the future will use the power of the sun. Solar panels convert the sun's energy directly into electricity, and mirrors can be used to focus that energy to boil steam, which is pressurized to turn electricity-generating turbines. Wind farms capture sun-fueled air currents and turn those breezes into electrons using generators.

Hicks said DWR will have to embrace renewable energy projects to meet its reduction goals—projects like the Dominion



Southern Field Headquarters, DWR's first LEED-NC project, attained platinum level, the highest level of LEED-NC certification.

RE Camelot Solar Photovoltaic Project near Mojave that began delivering power under its contract with DWR late last year.

"We're constantly monitoring technological developments," Hicks said. "We've even looked at the potential to cover the California Aqueduct with photovoltaic panels in some locations." While that may be technically possible, she said doing so would pose safety and operational challenges at this time.

Hicks said a more practical approach is to place solar power-generating projects on land DWR owns, such as the solar farm planned to be built adjacent to the Southern Field Division Operations and Maintenance Center in Pearblossom.

An existing 30-kilowatt solar system supplies energy to the 20,608 square-foot facility. This renewable energy feature helped the project surpass the Leadership in Energy and Environmental Design – New Construction (LEED-NC) minimum credits of Silver certification during the Design phase. Since 2004, all new and renovated

state-owned facilities paid for with state funds must meet LEED Silver or higher certification in their design, construction and operation.

LEED certification is based on many aspects, including energy performance, water use reduction, on-site storm water retention, sustainable materials, construction waste management and other factors.

Kanta Jasmine, the project's LEED Administrator, said Pearblossom was DWR's first facility built to LEED standards. Jasmine said information compiled and submitted on Pearblossom, including its construction practices, exceeded its original goal of Gold and attained Platinum level LEED-NC certification.

Andrew Schwarz, Senior Engineer in DWR's Climate Change Group, represented DWR at the 2015 Climate Leadership Award presentation and rubbed elbows with other recipients. He said DWR is the first public agency to be recognized for its aggressive goal setting.

Schwarz was the main author of DWR's

Climate Action Plan, which was published in 2012. "DWR was doing a lot of great stuff with climate change and emissions reduction, so we decided to put it together in one place," he said. "DWR has shown a lot of initiative and foresight on emission reduction and the climate change issue."

Schwarz said DWR's Greenhouse Gas Emissions Plan was unique at the time and still is. "No other state resource agency or water agency has developed such a comprehensive and aggressive plan," he said. "The support for this plan coming from DWR's executive management was really extraordinary considering how progressive we wanted to be."

Schwarz noted that due to the SWP's large energy demand, the changes DWR is making in its energy portfolio will significantly reduce GHG emissions. "By committing to aggressively reduce our emissions," he continued, "DWR will have avoided by 2020 more than two million metric tons of emissions beyond what the governor's 2004 executive order required."

Fifteen years into the new century, California is setting records for warmth and dryness in the midst of a four-year drought, with no end in sight. GHG emission control will become an even bigger issue in the years ahead.

Climate change is happening, and DWR is in the forefront of agencies adapting to that change with imagination and innovation. ♦

Below: Dominion RE Camelot Solar Photovoltaic Project uses single-axis photovoltaic panels that track the sun's movement across the sky.



Victoria Ngo, Fish and Wildlife Scientific Aid with the Bay-Delta Office, weighs a striped bass captured by an angler during creel survey.

Pinpointing Pressures

Clifton Court Forebay Predation Study Tracks Fish through the Clifton Court Forebay

By Christina Jimenez

DWR scientists are knee deep in a suite of multi-year Delta fish studies, including the Clifton Court Forebay Predation Study, where they are analyzing fish losses in and around the Clifton Court Forebay, just 17 miles southwest of Stockton.

“In response to regulatory requirements for operation of the State Water Project (SWP) under the National Marine Fisheries Service (NMFS) Biological Opinion, DWR is conducting the Clifton Court Forebay Predation Study to learn as much as possible about what is happening to fish in the Forebay,” said Bay-Delta Office (BDO) Chief Paul A. Marshall. “The results of this study will be used to improve the survival of the numerous listed fish species diverted into the Forebay.”

How the System Works

Serving as a regulating reservoir, the Forebay lies between the Delta’s Old River and the John E. Skinner Delta Fish Protective Facility. It draws in water at its southern end through the intake channel and radial gates when water levels in Old River are higher than the water levels in the Forebay. With the rush of water moving through the radial gates also comes a wide variety of fish. This includes listed species such as Central Valley steelhead, Chinook salmon, longfin smelt, Delta smelt, green sturgeon and non-listed species, such as striped bass and threadfin shad. Fish diverted into the Forebay must then travel a minimum 2.1 miles through the Forebay before reaching the Skinner Fish Facility, where

they are collected and transported back to the Delta.

Scientific studies conducted by the DWR and the California Department of Fish and Wildlife, including a series of mark-and-recapture experiments conducted within the Forebay to determine pre-screen loss of juvenile Chinook salmon and juvenile steelhead, have shown that losses are primarily due to predation by a non-native fish predator, striped bass.

In 2007, DWR conducted a juvenile steelhead pre-screen loss study and found that approximately 80 percent of steelhead that entered Forebay did not make it to the Skinner Fish Facility, while approximately 74 percent of the steelhead reaching the Skinner Fish Facility was successfully salvaged. The study implicated predation by striped bass as the primary source of fish losses. Two prior predation studies in 1990 and 1995 also identified striped bass as the primary predator of listed fish species in the Forebay.

“The focus for the Clifton Court Forebay Predation Study is to find ways to meet the fish survival goals outlined in the SWP regulatory permits,” said Javier Miranda, Senior Environmental Scientist with BDO.

Tracking the Fish

Since predation upon juvenile salmonids in the Forebay is a complex problem, several concurrent study elements are underway to help evaluate the effectiveness of efforts to reduce predation in the Forebay. These study elements include predator sampling, creel surveys, biotelemetry, salmonid survival evaluation, avian surveys, genetic gut content analysis and bioenergetic modeling.

To understand fish behavior in the Forebay, DWR scientists spend four or more hours a day capturing and tagging predator fish by boat or on foot along the shoreline of the Forebay.

“We are using two distinct tagging operations to monitor the fish,” said Environmental Scientist Veronica Wunderlich with BDO.

“We use acoustic tags and Passive Integrated Transponder (PIT) tags to track both listed fish species and the predators.”

The acoustic tags, ranging in size from about the size of a pencil eraser to about the size of a AA battery, are surgically implanted into the fish. The tags send out high-frequency signals that can be detected at long range by stationary receivers placed throughout the study area.

“The receivers are connected to a hydrophone and can detect acoustic tagged fish as they pass. The data is logged and sent to our contractors analyzing the data in Seattle,” said Veronica.

Nine stationary receivers have been strategically placed around the Forebay—near the radial gates, in the Intake Channel, West Canal and nearby Old River—to track the movement of the acoustic tagged fish moving in and out of the system. In the next year, the team will install more sites in and around the Forebay and at the Skinner Fish Facility.

“PIT tags are low cost and easily injected into fish, allowing us to tag large numbers of experimental fish which can give us fish abundance estimates,” said Miranda.

“Each person on the tagging crew wears several hats, and we all help one another with data collection, water quality monitoring and the actual predator tagging process,” said Joshua Martinez, an Environmental Scientist in the Division of Environmental Services.

To date, more than 1,600 predatory fish have been tagged and released back into the Forebay with either a PIT tag or an acoustic tag. Of that total, only 40 previously tagged fish have been recaptured, which is less than two percent of fish tagged for this study and is indicative of an open system.



Left: Veronica Wunderlich, project manager for the Clifton Court Forebay Predation Study, Floy tags a striped bass captured during a predator sampling effort. Fish and Wildlife Technician Bryce Kozak with the Bay-Delta Office prepares for predator sampling effort.



Above: Victoria Ngo (right) of the Bay-Delta Office and Environmental Scientist Megan Sheely, Environmental Scientist of the Floodsafe Environmental Stewardship and Statewide Resources Office conduct avian survey.

Additional predator surveys include a creel survey where anglers at the Forebay are interviewed and asked what they're trying to catch, what they've caught, how often they come to the Forebay and how long they've been out fishing during that particular trip. More than 2,700 individuals have been interviewed to date.

"We can collect a great amount of information about the fish in the Forebay just by asking what people have caught," said BDO Engineer Shah Adil, who helps with avian and creel surveys on the project.

During the winter and spring, when listed fish species are most prevalent in the Forebay, the team increases predator sampling. Some of the predator fish that are caught during this period are killed, their gut tract preserved and sent to a West Sacramento lab to analyze what each fish has consumed. To date, the team has collected more than 1,100 striped bass gut samples.

In addition, avian surveys are conducted three days a week near the radial gates or the Skinner Fish Facility to gather information about avian predation on listed fish species in the Forebay. Surveyors record the species, abundance, weather conditions and

note any feeding behavior. Nearly 15,000 observations of piscivorous have been recorded to date.

Studying Survival Rates

During the early winter through spring, the study team tags juvenile Chinook salmon and steelhead from local fish hatcheries with PIT tags, and releases them near the radial gates at the Forebay intake and at various locations within the Skinner Fish Facility.

These releases are being coordinated between the Forebay Predation Study and the Skinner Fish Facility Evaluation and

Improvements Study. "By releasing known numbers of tagged fish at various points within the system, we can tease apart exactly how many fish are lost and where they are lost as they cross the Forebay and are collected at the Skinner Fish Facility," said Miranda.

The Skinner Fish Facility Evaluation and Improvements Study will use this information to evaluate and monitor the salvage efficiency for Chinook salmon, steelhead, and green sturgeon at the Skinner Fish Facility.

Right: Jamie Suria, Environmental Scientist with the Division of Environmental Services baits a hook during a predator sampling effort.





Environmental Services Team Collects Turbidity Data to Protect Fish and Water Supply

Turbidity Bridge

As the historic drought continues in California, DWR's Division of Environmental Services (DES) has instituted a monitoring study of the distribution and movement of turbid water in the Delta to

Below: Research Analyst Melody Baldwin (left) and Student Assistant Zach Floerke review color-coded maps to provide turbidity levels in the Old and Middle Rivers.



help protect endangered fish species while preserving water supply.

Storms in December 2014 and February 2015 created turbid (cloudy) water in the Delta from runoff and from wind disturbance. Originating from the Sacramento River north of the Delta, the turbidity plumes are important to the State Water Project (SWP) water supply because Delta smelt - an endangered fish species found only in the Sacramento-San Joaquin Delta -- tend to prefer turbid water and avoid clear water. The SWP must avoid entraining Delta smelt or risking having its pumping curtailed. The best way to avoid smelt is to keep them as far as possible from the pumping facilities in the south Delta.

"A continuous path of turbid water between the north Delta and the SWP facilities creates a turbidity 'bridge' that leads to the pumps, and because smelt (and other protected species) prefer turbid water, this bridge creates an elevated likelihood that smelt will come

close to the pumps and be entrained," said Harry Spanglet, DES Program Manager and Drought Coordinator.

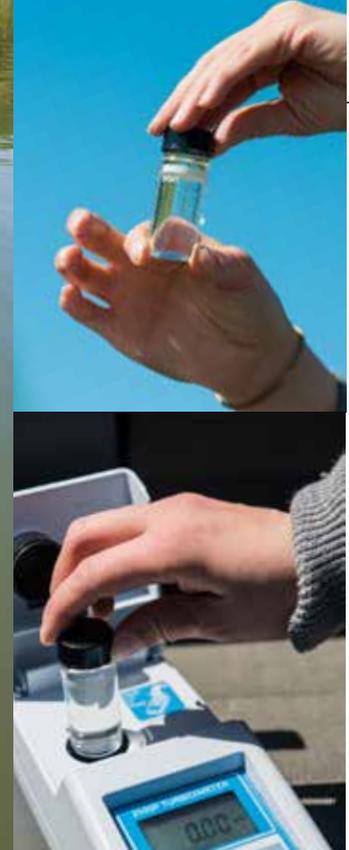
Smelt tend to avoid clear water, so maintaining a clear-water "barrier" in the waterways that lead to the SWP and Central Valley Project (CVP) pumps could reduce the likelihood of entrainment. To protect the smelt and other fish species and to avoid interruptions in water supply, DWR and the U.S. Bureau of Reclamation have actively managed pumping rates and timing to avoid drawing turbid water from the north Delta to the south Delta and creating a turbidity corridor.

A critical part of this effort was daily boat-based turbidity monitoring runs done by DES technicians and scientists.

The turbidity plumes created by the storms gave DWR an opportunity to study movements of turbid water between the northern Delta and the SWP and CVP pumps in the south Delta.



Right: Melanie LeGro collects water samples and tests turbidity.



Above: Mike Dempsey, Control Systems Technician III, and Melanie LeGro, Environmental Scientist, of the Division of Environmental Services collect daily turbidity measurements by boat. **Not in photo:** Team included Division of Environmental Services employees Jay Aldrich, Roberta Elkins, Naoaki Ikemiyagi, Scott Waller and Sarah Leismeister. Jenna Rinde and Tyler Salman of North Central Region Office and Nicholas Sakata of the Bureau of Reclamation also assisted with the study.

“The turbidity transects were invaluable for monitoring the location of the turbidity thresholds that typically indicate the presence of protected fish species,” said Karen Gehrts, DES Environmental Program Manager. “These real-time data allowed for more precise operations at the SWP export facilities in the south Delta while still providing protection for Delta smelt and other fishes found in the south and central Delta.”

The DES pilot project began in December 2014 with three employees, who were later assisted by additional DES and North Central Region Office (NCRO) staff, and continued until March when turbidity concerns had diminished.

Staff collected daily measurements in Old and Middle Rivers by boats that were launched daily, including weekends and holidays, from King Island Marina Resort near Disappointment Slough. A water quality sonde (detector) was attached to a specialized mount, which was designed by DES technicians and built by Division

of Flood Management staff, and deployed into the water where it recorded measurements of turbidity along with other water quality parameters.

Data were collected at five-second intervals, and a built-in GPS receiver recorded a precise location for each point. Data were downloaded and sent to DES Geographic Information System staff Melody Baldwin, a Research Analyst II, and Zach Floerke, Student Assistant, who imported the data and created maps that provided a visual, color-coded, easy-to-read representation of the previous day’s turbidity as well as a comparison with the two previous days. The maps were sent daily to DWR management and operations staff.

This study was created in response to a management need within DWR and other agencies participating in a coordinated drought response. DES’s expertise

in water quality and fish ecology made it the obvious choice to rapidly develop a scientifically sound pilot effort that could be used as a tool for this season.

During this summer and fall, the team will be refining how the samples are collected by testing various mounts and flow through systems for the boat and investigating data anomalies found during the transects. If the drought persists, the team will be able to provide the best available science and information to protect listed fish species while preserving the state’s water supply. ♦

Right: Harry Spanglet is DES Drought Coordinator.



Unraveling the Water Puzzle

By Doug Carlson

Scientists Deploy Buoy on Folsom Lake to Estimate Evaporation Loss

DWR and its predecessor agencies have been studying evaporation from California's lakes and reservoirs for generations.

Dig into the files and you'll find bulletins issued under State Engineer Edward Hyatt (1947), DWR Directors Harvey O. Banks (1959), John R. Teerink (1974), Ronald B. Robie (1979) and others over the years.

The earliest reports were prepared long before word processors entered the workplace, and it's easy to empathize with typists who labored over their keys turning out bulletins that are now tinged with age.

Bulletin 54 issued in 1947 stated why California has spent so much time, energy and money studying evaporation—the conversion of water into a gaseous state:

“These data are of practical and economic importance to all water-using agencies, because evaporation is a basic element in the evaluation of potential water supplies and in the conservation of water resources.”

For decades, the universal tool of choice was the evaporation pan, a shallow metal dish three or four feet in diameter and up to a foot deep in which water does what you'd expect water to do when exposed to sunlight—it evaporates, and when it does, scientists measure that loss to calculate how much water is evaporated from large bodies of water.

Fast forward to 2015. The reason to study evaporation is still the same, but the tool

Above: Floating Buoy at Folsom Lake also installed.

Left to Right: Wyatt Fereday of Desert Research Institute (DRI), DWR Environmental Scientist James Briggs, DWR Senior Environmental Scientist Specialist Neil Rambo, Brad Lyles of DRI, Justin Huntington of DRI and DWR Environmental Scientist Cayle Little install a land weather station at Folsom Lake near Granite Bay on January 8, 2015.



DWR scientists use to perform the studies is something else.

Bekele Temesgen, a Senior Land and Water Use Scientist in DWR's Water Use and Efficiency Branch, is using a 21st century tool, a weather buoy, to study evaporation like it may never have been studied in California before.

Since mid-January, a weather station floating in Folsom Lake has gathered data on the net energy available at the lake's surface, humidity and temperatures above the surface and water temperature down to 360 feet below. A complete on-shore weather station is also collecting data that will be used in conjunction with the buoy data. As Bulletin 54 said nearly 70 years ago, understanding evaporation is basic to understanding water resources.

According to Temesgen, the buoy floating

in Folsom Lake has a lot of instrumentation, and its purpose is to find out at the water surface how much net energy there is to evaporate the water. “This information,” Temesgen explained, “is useful to water managers who want to know how much water they can plan on storing and delivering many months into the future, and knowing the evaporation rate is an important piece of the answer.”

Temesgen noted that more than 60 percent of the water that falls on California is returned to the atmosphere, one way or another. “That's a significant amount, so it's really important to quantify how much is being lost.”

The Folsom weather station project is jointly sponsored by DWR, the Bureau of Reclamation and the Reno-based Desert Research Institute. Temesgen said the buoy will be deployed in the lake for at least two years. ♦

People

An Ecological Detective

Ted Sommer Becomes DWR's Lead Scientist



While watching Jacques Cousteau underwater expeditions as a child, Ted Sommer discovered his desire to become an aquatic biologist. Ted, who became DWR's Lead Scientist in January after 30 years of professional experience, now provides scientific guidance to others.

A roving aquatic expert, Ted shares his scientific knowledge with several DWR divisions, but for the most part with the Division of Environmental Services and the FloodSAFE Environmental Stewardship and Statewide Resources Office. He also provides mini-seminars to share his knowledge about the Delta and help mentor new DWR scientists.

"Ted has worked for the last 24 years at DWR, where he has been involved with numerous high-profile aquatic resource management issues, including endangered species, water rights, floodplain management, the Bay Delta Conservation Plan, the Federal Energy Regulatory Commission license and the Pelagic Organism Decline," said Dean Messer, Chief of the Division of Environmental Services. "He is widely considered to be a leading authority on native fishes, with studies on salmon biology, pelagic fishes, floodplain ecology, food webs and hydrology."

Ted, who oversees and coordinates DWR's science activities, works as principal investigator for several major studies on the ecology of estuarine and floodplain habitats. He is the senior science liaison between DWR and numerous state and federal agencies as

well as university researchers and the State Water Contractors.

In addition to being part of a team that discovered a new insect species in the Yolo Bypass, Ted's career has been highlighted by significant fisheries studies and publication of some 51 scientific papers on aquatic ecosystems.

"My favorite thing by far is working on applied research studies," said Ted. "Our group's Yolo Bypass field studies are the best example. These studies have been very fruitful in finding solutions to help aquatic ecosystems prosper."

The Yolo Bypass studies have led to discovering the need for fish passage facilities and ways to provide better habitat for wild fish to food subsidies to downstream areas.

Ted's expertise has also helped during drought years in determining how much water can be pumped after storms without adversely impacting fish.

For the past five years, Ted has worked to establish a new DWR Delta field station. Ted looks forward to completion this summer of the Environmental Impact Report and Statement for the proposed station. The station, housing five State and federal agencies, will facilitate the expansion of aquatic monitoring and studies in the Delta.

Before joining DWR in 1991, Ted worked as a scientist for a consulting firm, performing fishery studies for the lower Tuolumne River. He also was a scientist in Australia for five years. As the coordinator of a multidisciplinary team to examine the potential for

aquaculture in Western Australia, he studied several species, including algae, trout, salmon and crustaceans.

"I worked in quite a few different locations, including Australia and Switzerland, that prepared me for the diverse issues that we face at DWR," said Ted.

Ted has a Bachelor of Arts degree in Aquatic Biology with Honors from the University of California at Santa Barbara and a Master of Science degree and doctorate in Ecology from the University of California at Davis. He was awarded the American Fisheries Society Distinguished Professional Achievement Award, American Fisheries Society Fisheries Scientist Certification and numerous DWR Outstanding Professional Accomplishment Awards.

"I was born in the prairies of Canada, but became fascinated by picture books showing the ocean and coastal areas," said Ted. "This was reinforced when I finally got to see the ocean in person around age six."

After moving to California's Sacramento Valley, Ted enjoyed his family get-a-ways at Bodega Bay, where he spent many weekends and vacations exploring the coast and creeks. Spending time near water has been a big part of his life, Ted's 25-mile roundtrip bicycle commute to work with co-workers gives him another glimpse of the Yolo Bypass.

From studies in the Yolo Bypass to vacations at Bodega Bay, Ted is glad he can learn and teach about the underwater world. 💧



“Movin’ on Up” in Public Affairs

If Nancy Vogel and Ed Wilson ever need a personal theme song (shouldn't we all have one?), they might well choose “Movin’ On Up”—the theme of *The Jeffersons* sitcom that had a 10-year run decades ago.

Long-time DWR employees probably remember it, but for the benefit of rest of us, that theme is a perfect fit for what's been happening in Nancy's and Ed's lives.

Both literally moved their offices up to higher floors in the Resources Building in early May when Nancy was named Deputy Secretary for Communications of the California Natural Resources Agency and Ed succeeded her as Chief of DWR's Public Affairs Office (PAO).

Ed had been Deputy Assistant Director of Public Affairs with a second-floor office, and now he's in Nancy's former office on the 11th, with Nancy now up on the 13th. Ed oversees a PAO staff of 43 comprised of graphic designers, photographers, videographers, information officers, education specialist, audio-visual technicians and administrative personnel.

Ed arrived at DWR in February from the California Department of Conservation, where he was Assistant Director of Communications. Prior to joining that department in 2000, he held news director and executive news producer positions at several California television stations, including Sacramento's KOVR, KXTV and KTXL.

“Being in a public affairs office is not unlike producing a television newscast,” he said. “Everyone is important. Whether it's about drought, flood control, water use, you name it—we collectively join together to deliver the department's messages during this unprecedented time.

“Water is the number one issue in California,” he continued. “We have the privilege and responsibility to impart information about this precious resource, and that responsibility grows as the drought lingers. It's exciting to come to the office each day and work with such talented people on such a worthy mission.”

Ed said DWR public affairs has a tremendous opportunity to continually educate and inform the public and stakeholders about the drought and using water wisely during one of the most important times in California history.

“We will continue to do that through direct public outreach, advertising in the various media available to us, participating in special events and conferences, speaking to groups, creating stakeholder partnerships, utilizing social media and through an ongoing proactive relationship with the news media,” he said. ♦

Congratulations

Volunteer Trainers and Presenters for 2014

By Sean Walsh

The DWR Training Office would like to congratulate the more than 160 volunteer trainers and presenters who supported DWR's training program throughout 2014. These DWR employees served as class instructors or made presentations as part of a class, in addition to their regular responsibilities.

We are truly fortunate to have such dedicated individuals who are willing to put in the extra time and effort to share their knowledge and expertise to support DWR's training program. These volunteers trained more than 2100 participants in over 130 classes. We thank them for their commitment to employee training and development. 💧



Paul Marshall, Chief of the Bay-Delta Office, provides overview of the Bay-Delta Office at DWR's Orientation Training.

Anthony Agustin
Marcelino Alcantar
Kathy Aldana
Jamie Anderson
John Andrew
Emmanuel Asinas
Gary Bardini
Rob Barry
Ron Bass
Darren Becker
Tom Beiler
Peggy Bernardy
Mike Bingaman
Kora Bitcon
Chris Bonds
Nathan Burley
Rick Burnett
Zambia Cain
De Ann Campagna
Doug Carlson
Susan Carroll
John Carter
Teresa Chaney
Erin Chappell
Tariq Chechi
Samantha Cherry
Andy Chu
Francis Chung
Nova Clemenza
Binta Coleman
Bill Collins
Peter Coombe
Mark Cowin

Cathy Crothers
John Curlless
Sharmane Daniels
Mark DeCell
Brent Dills
Wendi Dodgin
Michael Donlon
Jim Eckman
John Edney
Gordon Enas
Teresa Engstrom
Juan Escobar
Farhad Farnam
Bill Forsythe
Laura Franco
Ted Frink
Guy Gagot
Jeff Galef
Myra Galvez
Tim Garza
Kim Gazzaniga
Jim Gleim
Gretchen Goettl
Ruppert Grauberger
Kamyar Guivetchi
Lorie Hall
B G Heiland
Paul Helliher
Herb Hereth
Gerri Higgs
Ray Hoagland
Don Hoirup
Mark Holderman

Michael Hom
Eric Hong
Marc Hoshovsky
Scott Hunt
Jennifer Iida
Jeffrey Ingles
Gareth Johnson
Jeanine Jones
Shawn Jones
Dave Kearney
Sean Kennedy
Spencer Kenner
Salma Kibrya
Laura King Moon
John King
Roy Kroll
Jeanne Kuttel
Jeanne Lee
Jim Lin
Leiji Liu
Derrick Louie
Elissa Lynn Gruner
Duard MacFarland
Romain Maendly
Andy Mangney
Dan Mardock
Lorraine Marsh
Paul Marshall
Paul Massera
Dan McConnell
Paul Mendoza
Dean Messer
Mutaz Mihyar

Aaron Miller
Mike Miller
Rusty Mills
Jennifer Morales
Ron Mountjoy
Dave Mraz
Jinny Munro
Cale Nasca
Tiffany Navarrette
Earl Nelson
Nate Nelson
Steve Nemeth
Perla Netto-Brown
Linda Ng
Bob Nozuka
Kim Oliphint
John Paasch
Mark Pagenkopp
Karen Parr
Sebastian Perez
Kathy Perry
Dave Pesavento
Bob Pierotti
Rudy Portis
Vicki Price
Nancy Quan
Andy Reising
Jim Rich
Andrea Riley
Doug Rischbeiter
Dave Rizzardo
Michelle Robinson
Robin Rodriguez

Elena Romero
Paul Romero
Maury Roos
Mitch Russo
Raymond Sanchez
Dustin Sanoski
Jane Schafer-Kramer
Kasey Schimke
Andrew Schwarz
M. Elizabeth Scott
Michelle Selmon
Geoff Shaw
Mary Simmerer
Linda Sinnwell
Wendy Slepian
Brian Smith
Martin Stevenson
Keith Swanson
Allen Thompson
Lisa Toms
Craig Trombly
Stephanie Varrelman
Brian Walker
Wendy Wang
Elizabeth Ware
Ray Welch
Nikki Willson
John Wilusz
Dan Yamanaka

Promotions

Angelica Aguilar
Engineering
Supervising Right of Way Agent

Justin Ander
Technology Services
Assistant Information Systems Analyst

Silvia Barillas
Southern Region Office
Associate Governmental Program Analyst

Meredith Barthel
Fiscal Services
Accounting Officer

Michael Berry
Northern Region Office
Senior Environmental Scientist (Supv.)

Jeffrey Blair
Oroville Field Division
HEP* Technician II

William Brewster
North Central Region Office
Senior Engineering Geologist

Forster Brown
Operations and Maintenance
Electrical Engineer

Richard Brown
Delta Field Division
HEP* Technician II

Cheuk Chan
Fiscal Services
Accounting Officer

Gavin Chan
Fiscal Services
Staff Services Analyst

Larry Chick
Southern Field Division
HEP* Technician III

Claire Chung
Human Resources
Associate Personnel Analyst

Bill Collins
San Luis Field Division
Associate Safety Engineer

James Common
North Central Region Office
Engineer

Scott Deal
Flood Management
Environmental Program Manager I (Supv.)

Andrew Devalk
Southern Field Division
HEP* Mechanic Apprentice

Amritpal Dhillon
Fiscal Services
Accountant Trainee

Bonnie Duecker
Southern Field Division
HEP* Operations Supt.

Bryan Dussell
Engineering
Engineering Geologist

Mitra Emami
Central Valley Flood Protection Board
Supervising Engineer

John Everroad
Southern Field Division
HEP* Operator

*Hydroelectric Plant

Guivetchi Awarded for Leadership Excellence



Kamyar Guivetchi has covered a lot of territory in leading DWR's past three California Water Plan Updates. His journey even took him to Chicago, Illinois.

Kamyar, Chief of the Division of Statewide Integrated Water Management, was honored on March 10th by the American Society for Public Administration (ASPA) with the John W. Gaston, Jr. Award for Excellence in Public Service Management, particularly in the areas of natural resource management or environmental protection. He attended the Society's 2015 Conference and awards ceremony in Chicago with his wife Donna.

Kamyar was nominated for the award by Lisa Beutler, vice president of ASPA's Sacramento Chapter, and colleagues on the Water Plan Project Team for his central role in helping shape the California Water Plan's 2005, 2009 and 2013 Updates. "As part of this process," she wrote, "he has pioneered new approaches to water planning and served as a catalyst for improving government agency alignment throughout California."

The nomination noted that the Plan "is widely considered the model for collaborative planning in California.... He is directly responsible for ushering in a new era of California Water Planning through the development of Water Plan Update 2005."

Update 2005 was the first to look beyond meeting future water supply needs of agriculture and urban users to include long-term strategic resource management as well. Under Kamyar's leadership, Beutler wrote, the next Update in 2009 "was the first to integrate the water management plans of California's many state agencies, not just the water agencies."

The Water Plan's evolution continued with the 2013 Update by improving interagency alignment through planning and policy, including collaboration with federal, tribal, State and regional water management governments and groups.

Kamyar is quick to spread credit for the Updates to the hundreds of DWR and State agency employees, tribal representatives, technical experts, policy makers, stakeholders and public members who participated in developing the Plan.

"If you listen well, you can get a lot of free advice," he said. "One of our underlying premises in working with such a large group of stakeholders was that if they agreed on an issue, there was a high probability it would wind up in the Water Plan."

DWR created the path to achieve that agreement, he said. The Plan's 2013 Update is now informing implementation of the Governor's Water Action Plan and policies to guide California's water management in the years ahead.

Kamyar said he was caught off-guard by the Gaston Award. "I hadn't anticipated it, and I feel honored," he said. "Accepting the award in Chicago gave me an opportunity to recognize the work of a broad spectrum of stakeholders and agencies that have made the Water Plan what it is today." 💧



A High Honor

Kevin Mefford Awarded Medal of Valor by the Governor's Office

Kevin Mefford may be retired from DWR, but he's far from forgotten.

Kevin's heroic actions during the Thanksgiving Day 2012 fire at the Ronald B. Robie Thermalito Pumping-Generating Plant have been recognized time and again for his "extraordinary acts of bravery and heroism in order to save the life of another."

The most recent occasion was in April, when he and 51 other current and former state employees were awarded the Medal of Valor by the Governor's Office. The Medal is the highest honor that can be given to state employees.

Kevin's response to the crippling fire earned him the Governor's Employee Safety Award in 2013 and has been documented here in DWR News, but the telling never gets old.

As a volunteer for the Butte County Fire Department, he was among the first to respond to the Thermalito fire, which raged throughout the five-story facility on the holiday.

Kevin had 19 years of experience as a hydro-

Left to Right: Executive Secretary for Governor Jerry Brown Nancy McFadden, DWR Director Mark Cowin and Medal of Valor recipient Kevin Mefford.

electric plant electrician at Thermalito. His intimate knowledge of the plant's layout and equipment was a great asset that day, as his Medal of Valor citation states:

"He acted as a guide for his fellow firefighters, and they made at least eight attacks on the fire as it kept re-igniting and spreading. Some firefighters became low on air and one became tangled in cables as the smoke eliminated visibility.

"In the dark, smoky, confusing and often dangerous situation, Mr. Mefford helped them avoid many hazards, including electrical equipment, confined spaces, stored lubricants and many feet of wiring.

"The next day, although the fire was not extinguished, Mr. Mefford donned his firefighting gear again to assess the situation on each floor. Without Mr. Mefford's heroic service, the plant probably would have been lost."

Kevin retired in 2014 after 21 years of DWR service. ♦

Promotions

Angelique Fabbiani-Leon
Flood Management
Engineer

Paul Farris
Engineering
Principal Right of Way Agent

Andrew Fernandez
San Joaquin Field Division
HEP* Operator

Todd Fisher
Technology Services
Systems Software Specialist II

Catherine Gallimore
Technology Services
Associate Information Systems Analyst

Matthew Gerspacher
Oroville Field Division
HEP* Electrician I

Paul Giordano
Oroville Field Division
Utility Craftsworker

Mathew Goodman
Flood Management
Utility Craftsworker

Mark Hafner
Oroville Field Division
Supervising HEP** Utility Engineer

Charyce Hatler
South Central Region Office
Senior Environmental Scientist (Supv.)

William Haywood
San Luis Field Division
Assistant Utility Craftsworker Supt.

Jewel Huckaby
Delta Field Division
HEP* Operator

Milen Karavan
Flood Management
Engineer

Marianne Kirkland
Executive
Supervising Engineer

Gaurav Kwatra
Bay-Delta Office
Associate Information Systems Analyst

Melanie Legro
Environmental Services
Environmental Scientist

Timothy Lindquister
Business Services Office
Associate Governmental Program Analyst

Alejandra Lopez
Engineering
Senior Right of Way Agent

Mei Lui
Bay-Delta Office
Engineer

Patrick Luzuriaga
Flood Management
Senior Engineer

Kelli Lyons
Fiscal Services
Accounting Officer

Benjamin Newcomb
Flood Management
Utility Craftsworker

*Hydroelectric Plant
**Hydroelectric Power

Promotions

- Mark Nordberg**
Integrated Regional Water Management
Senior Engineering Geologist
- Thomas O'Neil**
Engineering
Senior Right of Way Agent
- Linus Paulus**
Engineering
Supervising Right of Way Agent
- Kelley Pepper**
Environmental Services
Senior Environmental Scientist
- Alisa Pierce**
Business Services Office
Business Service Assistant
- Joshua Pineda**
Operations and Maintenance
Mechanical Engineer
- Parminderjit Randhawa**
Operations and Maintenance
Senior HEP** Utility Engineer (Supv.)
- Gregory Reeves**
San Joaquin Field Division
HEP* Electrical Supervisor
- Andrew Rios**
San Luis Field Division
HEP* Electrician I
- Martha Romaso**
Fiscal Services
Accounting Officer
- Cynthia Schut**
Delta Field Division
Utility Craftsworker Supv.
- Brian Scoles**
San Joaquin Field Division
Utility Craftsworker
- Joseph Scott**
Northern Region Office
Water Resources Engineering Associate
- Jeremy Shaffer**
North Central Region Office
Senior Engineer
- Brianna Shoemaker**
Executive
Associate Governmental Program Analyst
- Karandev Singh**
Bay-Delta Office
Engineer
- Beverly Snipes**
SWP Power & Risk Office
Administrative Officer II
- Ted Sommer**
Environmental Services
Program Manager III
- Christopher Souza**
San Luis Field Division
Utility Craftsworker Supv.
- Marc Sparks**
Southern Field Division
Assistant Utility Craftsworker Supt.
- John Spendlove**
Technology Services
Systems Software Specialist III
- Steven Springhorn**
Integrated Regional Water Management
Senior Engineering Geologist

*Hydroelectric Plant
** Hydroelectric Power

CELEBRATING
40 & 25 Years
of Service

40 Years of Service



Charlotte Coron
Bay-Delta Office
Administrative Officer
May 2015

25 Years of Service



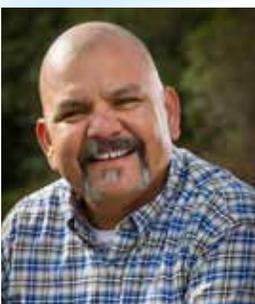
June Blair
San Joaquin Field Division
Hydroelectric Plant Technician
April 2015



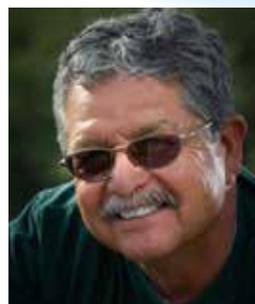
Deserie Campos
Human Resources Office
Senior Personnel and Benefits Specialist
May 2015



Eleuterio (Tello) Diaz
San Luis Field Division
Utility Crafts Supervisor
May 2015



Dean Lara
San Joaquin Field Division
Utility Craftworker Supervisor
January 2015



Demetrio Moreno
San Joaquin Field Division
Utility Craftworker
May 2015



Adrienne Nolan
Statewide Integrated Water Management
Office Technician (Typing)
April 2015



Ted Soderstrom
Oroville Field Division
Associate Hydroelectric Power Utility Engineer
January 2015



Joseph Strain
Oroville Field Division
Hydroelectric Plant Maintenance Superintendent
January 2015



Ken Trillo
Operations and Maintenance
Senior Water and Power Dispatcher
April 2015

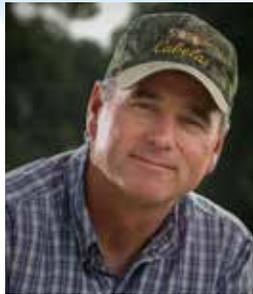
25 Years of Service



Lynn Beck
San Joaquin Field Division
Sr. Hydroelectric Plant Operator
January 2015



Steve Beckley
Flood Management
Utility Craftsworker Supervisor
June 2015



Bryan Carter
San Joaquin Field Division
Utility Craftsworker Superintendent
February 2015



Leroy Ellinghouse Jr.
Operations and Maintenance
Senior Right of Way Agent
May 2015



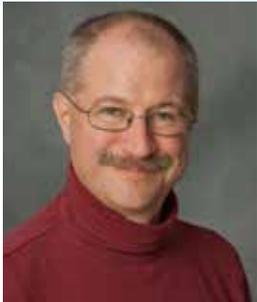
Raquel Jaimes
Business Services Office
Associate Management Analyst
January 2015



Randy Kataoka
Technology Services
Data Processing Manager III
June 2015



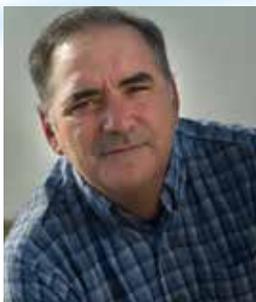
Wilson A. Perez
California Energy Resources Scheduling
Associate Hydroelectric Power Utility Engineer
May 2015



Mark Risney
State Water Project Analysis Office
Engineer
March 1990



Marilyn Salsa
San Luis Field Division
Water Resources Technician II
June 2015



Glenn Ward
Southern Field Division
Hydroelectric Plant Mechanic
March 2015



Patrick Whitlock
Oroville Field Division
Chief
May 2015



Ronald K. Wolfe
San Joaquin Field Division
Assistant Utility Craftsworker Superintendent
March 2015

Promotions

Joshua Stepp
Southern Field Division
HEP* Mechanic I

Anna Tequida
Engineering
Senior Right of Way Agent

Allen Thompson
San Joaquin Field Division
Associate Safety Engineer

Melissa Mengping Tsou
Fiscal Services
Senior Accounting Officer

Valentin Vela
San Joaquin Field Division
HEP* Electrician I

Wesley Watson
Operations and Maintenance
Program Water and Power Dispatcher

Timothy Wehling
Engineering
Supervising Engineer

Thomas Westerhoff
Delta Field Division
HEP* Electrician I

Jasper Wong
Fiscal Services
Accounting Officer

Karen Wood
Engineering
Associate Governmental Program Analyst

Retirements

Kell Brigan
Technology Services
Associate Information Systems Analyst

Ronald Bristow
San Luis Field Division
HEP* Electrician I

Doak Cotter
San Luis Field Division
Water Resources Technician II

Jack Danna
FESSRO***
Senior Environmental Scientist

Michael Dooley
Southern Field Division
Business Service Officer I

Balencia Dozier
Executive
Auditor Specialist I

Kayl Echols
North Central Region Office
Senior Engineer

Austine Eke
Operations and Maintenance
Environmental Scientist

Kevin Elcock
Executive
Senior Engineer

Martin Fuentes
Delta Field Division
Business Service Officer I

*Hydroelectric Plant
***Floodsafe Environmental Stewardship and
Statewide Resources Office

Retirements

Retirements

Neil Gould

Office of Chief Counsel
Assistant Chief Counsel

Robert Grauberger

Engineering
Senior Land Surveyor

Brian Leary

Operations and Maintenance
Systems Software Specialist III (Supv.)

Richard Olebe

Safety of Dams
Senior Engineer

Allan Oto

Flood Management
Engineer

Robert Perry

Engineering
Transportation Surveyor

Mike Purcell

Engineering
Engineering Geologist

Janet Rollins

Southern Field Division
Water Resources Technician II

Ronald Schunk

Engineering
Associate Specification Writer, HS

Kevin Taylor

Northern Region Office
Water Resources Technician II

James Varney

California Energy Resources Scheduling
Senior HEP** Utility Engineer

Julie Weirton

SWP Power & Risk Office
Associate Governmental Program Analyst

Michael Whitten

Technology Services
Staff Information Systems Analyst

Michael Wilkins

San Joaquin Field Division
Utility Craftsworker

Victor Yue

SWP Power & Risk Office
Electrical Engineer

New Hires

Mary Adams

Southern Field Division
Guide I

Christopher Ansell

Delta Field Division
Assistant Safety Engineer

Maci Bacon

Executive
Office Technician (Typing)

Mitchell Bautista

Engineering
Engineer

Sasha Brownlee

Statewide Integrated Water Management
Office Assistant (Typing)

Loralinda Bustamante

Business Services Office
Office Assistant (Typing)

** Hydroelectric Power

Evelyn Rucker

Evelyn Rucker has said her goodbyes to DWR. She retired in March as an Accounting Officer in the Division of Fiscal Services. Here's her goodbye:

"With open arms, I embrace life as it comes," she wrote. "I am on borrowed time. In 1989, I was diagnosed with Stage 3A cancer of the thymus gland. Cancer cells were in my left lung - hence, a lobectomy and a series of radiation treatment therapies a week after the surgery."

After rehabilitation, Evelyn was hired by DWR as a Data Input Coordinator. Eight years later, her heart muscle had hardened from too many radiation exposures. She had four bypasses and three valve replacements in her damaged heart. She has been living with one functioning lung and one kidney. Doctors told her she might live 10 years beyond the heart operation; it's now been 16 years.

"I finally reached my 20th year of state service with the time and age requisites for retirement. I counted each day a blessing and spent it as if it were my last day on earth. All these years, I have thoroughly enjoyed my job,

wherever it has led me. My faith to the Lord is my strength. With complete surrender, I let God be my guiding light.

"I have been blessed with great supervisors, friends and colleagues as my family. Each person has an individual gift I can admire and learn from. I treasure the present moment and look for golden opportunities to show kindness and love to others. I try to be content with what I have and treasure each day's blessings.

"Finally, I have a chance to choose my real Boss in retirement. I will ceaselessly thank Him all my remaining days. We'll share more quality time together. My next mission is to have my kids and grandkids have a relationship with God.

"Farewell to my dear supervisors, BFF, friends, colleagues, my family. I thank you for all the good memories we have shared. I will treasure them wherever I go and will be just a phone call or an email away, still at your service.

"Ever yours, Evelyn." ♦





Bill Fraser

William "Bill" Fraser did not expect that his passion for geology would have such a big impact on projects such as the California State Water Project (SWP).

After 35 years with DWR, Bill can look back on a career that includes significant contributions to the design and construction of major California dams and many other achievements.

Bill retired in July as the Division of Safety of Dams (DSOD) Chief Geologist.

It all began when Bill took a geology class just to fulfill a college requirement. He was hooked and went on to earn a geology degree at Chico State in 1979.

After working for the U.S. Forest Service in Quincy, Bill joined DWR as a Junior Engineering Geologist in 1980, doing studies on SWP dams for the Division of Engineering's Project Geology Section. He transferred to DSOD in 1988 and became Chief Geologist in 1994.

"Working with the dedicated DSOD geology and engineering staff, as well as the professionals in the dam industry is really a career-long continuing education," Bill said.

When Bill was not solving geologic conundrums, he was mentoring junior staff members striving to pursue a career in the field.

"I always enjoy interpreting and explaining geology to people who are interested," said Bill.

Although his work with DWR may have come to an end, Bill hopes to stay involved in the field by working part-time, as well as travelling, sailing, hiking and continuing his new hobby of digital photography. ♦

New Hires

Marisol Chavez
Integrated Regional Water Management
Associate Governmental Program Analyst

Maryanne Ciaraglia
Public Affairs Office
Associate Governmental Program Analyst

Holly Cox
Business Services Office
Office Technician (Typing)

Leanette Dahn
Fiscal Services
Staff Services Analyst

Ramesh Dhungel
Statewide Integrated Water Management
Environmental Scientist

Saskia Donovan
Flood Management
Engineer

Brian Ellis
State Water Project Power & Risk Office
Associate Governmental Program Analyst

Yao-Hsiang Fock
Statewide Integrated Water Management
Engineer

Benjamin Gooding
South Central Region Office
Engineering Geologist

Hal Gounder
Southern Field Division
Associate Safety Engineer

Christopher Gudino
Operations and Maintenance
Systems Software Specialist II

Deborah Hamatani
Engineering
Associate Programmer Analyst

Matthew Hinson
Operations and Maintenance
Heavy Equipment Mechanic

Stanley Ho
Engineering
Engineer

Eric Holland
Flood Management
Engineer

Kimberly Holley
Environmental Services
Environmental Scientist

Summer Iqbal
Business Services Office
Staff Services Analyst

Kate James
Oroville Field Division
Office Technician (Typing)

Ranvir Jawanda
Flood Management
Engineer

Kenneth Johnson
Southern Field Division
HEP Electrician I

William Kelley
Public Affairs Office
Associate Governmental Program Analyst

Daniel King
Environmental Services
Staff Programmer Analyst

New Hires

Kim Koski

Environmental Services
Staff Services Analyst

Shawn Kredel

Southern Field Division
Utility Craftsworker

John Lake

San Luis Field Division
Utility Craftsworker

Victoria Lake

Statewide Integrated Water Management
Senior Environmental Scientist (Supv.)

Chui Wai Leung

Fiscal Services
Associate Accounting Analyst

Jai Lor

Flood Management
Junior Engineering Technician

Darrin Marquez

Technology Services
Systems Software Specialist III

Jose Martinez

Delta Field Division
Materials and Stores Specialist

Jean-Paul Maton

Operations and Maintenance
Mechanical Engineer

Wesley McCandless

Business Services Office
Staff Services Analyst

Robin McGinnis

Office of Chief Counsel
Attorney

Michael Morris

San Joaquin Field Division
Associate Safety Engineer

Rene Mostert

Executive
Associate Safety Engineer

Timothy Nelson

Engineering
Engineer

John Nhan

Engineering
Assistant Information Systems Analyst

John Orgera

Engineering
Construction Supv. II

Sara Paiva-Lowry

Engineering
Senior Environmental Scientist

Elizabeth Perkins

Executive
Office Technician (Typing)

Lisa Peters

Bay-Delta Office
Staff Services Analyst

Justin Pilkington

Delta Field Division
Utility Craftsworker

Michael Pitta

Flood Management
Junior Engineering Technician

Dana Pope

South Central Region Office
Office Technician (Typing)

Jay Punia

Jay Punia, who knew at an early age that he wanted to be a civil engineer, retired last year after a 34-year career that took him to top positions in flood prevention and management.

At the helm of DWR's Flood Operations Branch from 1988 to 2006, Jay directed high-water battles during major winter storms and led a multi-agency response to the June 2004 Jones Tract levee break that kept flood waters from inundating neighboring Delta islands. At the same time, his leadership led to improvements in the State's levee inspection and encroachment control programs.

Jay's work at DWR led to his appointment in 2006 as General Manager of the Reclamation Board (now Central Valley Flood Protection Board). At the Board, Jay was instrumental in the development and adoption of the landmark Central Valley Flood Protection Plan of 2012.

Jay returned to DWR's Division of Flood Management in June 2014 before retiring as a Supervising Engineer later in the year.

Jay's contributions to the Flood Board are recalled by Board Analyst Lorraine Pendlebury:

"Through eight years of some changing and challenging times for the Board, I loved working with and for Jay," said Lorraine. "Working for Jay, you felt as if you were part of a productive and caring team doing important work—helping to provide more public safety by improving the flood protection system in the Central Valley."

Jay is proud of his days at DWR and the Flood Board.

"I will miss my co-workers and friends from DWR," he said, "but hope to continue our friendship and professional relationships."

Armed with Bachelor of Science and Master of Science degrees in Civil Engineering, Jay began his DWR career in State Water Project operations in 1981, steadily moving up the Department ladder.

And the engineering journey isn't over. Jay plans to continue his career in the private sector, but leaving time for traveling, gardening and reading history. ♦



In Memoriam



George Barnes—Retired Principal Engineer George Barnes, who was instrumental in creating the Modeling Support Branch for the Bay-Delta Office, passed away at the age of 74 on March 31, 2015.

A native of Sacramento, George attended C.K. McClatchy High School and later graduated from Sacramento State University with a Bachelor of Science and Master of Science in Civil Engineering. While in college, George began working as an engineering student in 1961.

During his 39 years of DWR service, he worked for the Division of Planning (now known as the Bay-Delta Office) until his retirement in 2000. Starting as an engineering aid II and later water resources technician, George realized the importance of collecting reliable field data and facilitated several field campaigns to improve and update the field data collection and compilation.

“He was a visionary always looking beyond

the current and strategizing the future making the current relevant and conducive to the envisioned future,” said Francis Chung of the Bay Delta Office. “His focus on people was legendary as he used to say, ‘Good talents do not grow on trees.’ He respected his subordinates, gave freedom to them to explore, allowed them to fail and learn from the failure and most of all trusted his people. He was impatient with stagnations and was always on the move for the better world. He was not afraid of challenges or barriers.”

After moving to headquarters, Hydrology and Water Operations Planning Modeling and the Delta Modeling were merged to form the Modeling Support Branch and he became the first chief of the Modeling Support Branch.

“He hired some good engineers graduating from other states,” said Francis. “He firmly believed in people; his motto was ‘people make the difference.’ He did extraordinary and non-conventional HR measures and decisive personnel actions to hire good talents and his effort paid off to the great benefit of DWR. In his realm of management, people always go first.”

For his efforts toward the development of computer simulation models used in water resources planning, George received the Career Achievement Award from the California Water and Environmental Modeling Forum.

“We lost a good friend,” said Gary Bardini, DWR Deputy Director. “I’ve always appreciated George’s vision and capabilities. We all represent some part of his legacy in water management.”

George is deeply missed. Remembrances may be made to the Sacramento Food Bank Services.

George is survived by his wife Molly, his daughters Julie and Lisa, three grandchildren, stepson David and one step grandchild. 💧

New Hires

Timothy Resh
Engineering
Associate Cost Estimator

John Reynolds
Flood Management
Engineer

Joseph Salazar
Southern Field Division
Environmental Scientist

Luis Sepulveda
Oroville Field Division
Water Resources Technician II

Rupa Somavarapu
Flood Management
Engineer

Michael Soto
Engineering
Engineer

Dawn Spolidoro
Human Resources
Office Technician (Typing)

Vadim Stetsenko
Engineering
Construction Supv. I

Latanya Tatum
Delta Field Division
Business Service Officer I

Walter Vance
South Central Region Office
Engineer

John David Vergara
South Central Region Office
Junior Engineering Technician

Kim Vickers
Delta Field Division
Utility Craftsworker Apprentice

Cheryl Woods
Engineering
Office Assistant (Typing)

Mark Yates
Operations and Maintenance
Senior Delineator

*Hydroelectric Plant

**Hydroelectric Power

***Floodsafe Environmental Stewardship and Statewide Resources Office

Memoriams:

Barbara Goff

Bill Miller

Annette Porter

Bryan Walters

Planning

Operations and Maintenance

Management Services

Division of Engineering

March 9, 2015

January 28, 2015

January 13, 2015

March 7, 2015

Gene Snow, retired Chief of DWR's Flood Project Inspection Section, passed away at the age of 83 on March 3, 2015.

Starting in 1957, Gene's flood fighting years included 14 floods statewide. He maintained and patrolled levees along the Sacramento River.

"Gene was instrumental in assessing and acting on critical levee stability and seepage issues during the 1986 flood,"



said Karl Winkler, DWR retiree. "He provided key direction for flood fight actions on numerous Delta islands and the Suisun Marsh. His participation in the recovery effort provided valuable knowledge for prompt and accurate damage repair funding decisions."

Gene's assignments also included working on the Livermore Medfly spraying project as DWR Medfly Coordinator in 1981 and repairing Lower Jones Tract levee in September 1980. As Superintendent of the Sacramento Maintenance Yard

from 1982 to 1985, Gene led several DWR inspections for encroachment control, project levee and designated floodway projects.

Gene, who became Flood Project Inspection Section Chief, supervised and approved inspections for projects along the Sacramento and San Joaquin Rivers and their tributaries from Red Bluff to Bakersfield. Gene led a flood fight training course to 130 Reclamation District employees along with members of the California Conservation Corps. Gene met once a year with the Reclamation District trustees responsible for maintaining the project levee system that protected their land and recommended solutions on how to improve their maintenance practices.

"Gene spent many long hours supervising large scale flood fights on non-project levees in the Delta along with project levees in the Sacramento-San Joaquin watershed," said Donald Neudeck, DWR Flood Management retiree. "Gene was an excellent worker as you could assign him a problem and he always managed to come up with a solution."

He retired with 37 years in 1994.

Known for being an actively involved at events for his children or grandchildren, Gene showed great love for his family and will be missed.

Gene is survived by Pat, his wife of 61 years; three children Jerry, Terri and Lauri; four grandchildren and one great grandson. ♦

Glenn Reddig, retired Training Officer of DWR's Mobile Equipment Office, passed away at age 83 on February 4, 2015 in Sparks, Nevada.

A jack of all trades, Glenn worked in many occupations, such as his processing work at Crystal Creamery, heavy equipment operator, truck driver, bus driver and truck driver instructor at Western Truck Driving School. He earned his GED in the 1960s.

Glenn's 27 years with DWR began in 1964 as a foundation driller. In 1967, he moved to Flood Management's Sacramento Maintenance Yard as a civil maintenance man II and later III. He then moved to the Beckwourth Field Office for 11 years as a maintenance mechanic working on equipment and assisting the watermaster. In 1978, Glenn took a leave to open a trucking business and returned in 1980 to DWR's Lost Hills Maintenance Sub-Center. He worked for the Coalinga Office and the Sutter Maintenance Yard as Civil Maintenance Supervisor. As a training officer for the Mobile Equipment Office, he traveled statewide and gave training courses on safety and operations of equipment such as cranes, trucks, four-wheel drives, bulldozers, graders and boats until his retirement in November 1993.

During his four years in the U.S. Army, Glenn met and married the love of his life Annie Von Lively. Because of Glenn's work, the family lived in many different places until moving to

their final residence of Sparks after his retirement to be closer to their children and grandchildren. He loved spending time with family and was an avid supporter and adoring spectator at their sports events and other events. Glenn was always there for family and would always be there with a helping hand when one was needed.

Glenn will always be remembered for his love of family, honor and responsibility, kindness and his giving heart. He had a special smile and laugh and will always have a special place in our hearts. He will truly be missed.

Preceded in death by his loving wife of 56 years, Annie Von, he is survived by his son Steve and daughter Julie, nine grandchildren and 17 great grandchildren. ♦



DWR Saves Water



As California enters its fourth drought year, DWR is among State agencies finding ways to save water. With a more than 36 percent reduction in water use from 2010 to 2014, DWR ranked seventh-highest in terms of State agencies cutting back on water use.

“DWR gathered water usage data from DWR-owned facilities for the period of 2010 to the present,” said Stuart Chan, Chief of DWR’s Water and Energy Efficiency Branch. “Knowing whether a facility is using more or less water than others is important, so that we can continue to look at conservation measures that will yield the most water savings.”

With outdoor landscapes using the biggest amount of water, DWR has cut water use with drought-tolerant plants at State Water Project facilities, such as San Joaquin Field Division headquarters, Oroville Dam Overlook and Vista del Lago Visitors Center. (Photo above) San Joaquin Field Division headquarters in Bakersfield is reducing water use with new drought-tolerant plants and drip irrigation system.

“Cutting back water use on turf and decorative plants and shrubs is probably the greatest water saving measure,” said Chan.

“However, it is important to continue to appropriately water trees and preserve their ecosystem services.”

The Department also has reduced water use by replacing standard urinals with waterless urinals, installing low-flow toilets, replacing sink aerators with low-flow faucets, checking water systems for leaks, eliminating power washing of sidewalks, reducing vehicle washing to a minimum, posting flyers and signs to remind people to reduce water use, replacing turf with drought-tolerant native plants and replacing old irrigation systems with drip systems.

Mary Simmerer, DWR’s Sustainability Program Manager, is working with employees of the Government Operations Agency, Department of General Services and others to develop climate-appropriate landscaping guidelines for all State agencies.

“We are working on acquiring more detailed water use data,” said Chan. “Having water sub-meters that distinguish between indoor and outdoor use would help us get a clear picture of how much water is used for landscape and how much water is needed for DWR’s business processes, such as water quality labs and maintenance shops.” ♦

DWR Mission Statement

To manage the water resources of California in cooperation with other agencies, to benefit the State's people and to protect, restore and enhance the natural and human environments.

Environmental Scientist Jamie Suria of the Division of Environmental Services inspects his fishing equipment to prepare for predator sampling at Clifton Court Forebay. As part of the regulatory requirement for operation of the State Water Project under the National Marine Fisheries Service Biological Opinion, DWR scientists spend four or more hours a day in the winter and spring capturing and tagging predator fish to understand fish behavior in the Forebay. More than 1,600 predatory fish have been tagged and released back in the Forebay.

