BAY AREA WATER SUPPLY AND CONSERVATION AGENCY

BOARD POLICY COMMITTEE MEETING

November 15, 2019

Correspondence and media coverage of interest between September 30, 2019 and November 11, 2019

Correspondence

Date: October 21, 2019
From: Peter Drekmeier, Policy Director, Tuolumne River Trust
To: President Ann Moller Caen and Commissioners
Re: Item 6-C on your October 22 agenda (Water Supply Planning Update)

Date: October 8, 2019
From: Steven R. Ritchie, Assistant General Manager, Water
Tim Ramirez, Division Manager, Natural Resources and Lands Management
To: SFPUC Commissioners
Re: Education Opportunities and Recreation Improvements on the Peninsula Watershed, including Montara Mountain

Date: October 10, 2019
From: Office of the Mayor, London N. Breed
To: Nicole Sandkulla, CEO/General Manager, BAWSCA
Re: Re-Appointment to the SFPUC Citizen's Advisory Committee

Date: October 3, 2019
From: Spreck Rosekrans, Restore Hetch Hetchy
Michael Wier, California Trout
To: The Hon. Michael Reynolds, Superintendent, Yosemite National Park
Re: Proposal for boating and public access at Hetch Hetchy

Media Coverage

Water Supply Conditions:

Date: November 11, 2019
Source: Mercury News
Article: Bay Area rainfall: When's it coming and when should we start to worry?

Date: October 23, 2019
Source: Yale Environment 360
Article: Climate Change is Making El Ninos More Intense, Study Finds

Date: October 8, 2019
Source: GVWire
Article: With No El Nino, How Does California's Winter Shape Up?

Water Supply Management:

Date: November 11, 2019
Source: Water Finance & Management
Article: EPA, Bureau of Reclamation advance cooperation on water supply, reuse funding

Water Supply Management, cont'd.:

Date: November 5, 2019
Source: Courthouse News Service
Article: California Pushed to Revamp Water Plans for Increasingly Wild Weather

Date: October 23, 2019
Source: Mercury News
Article: Newsom must not cave to Trump on Delta water safeguards

Date: October 23, 2019
Source: San Francisco Chronicle
Article: Federal officials rejigger rules on water deliveries – some say at expense of fish

Date: October 22, 2019
Source: Maven's Notebook
Article: Biological opinions for long-term operations of the Central Valley Project and the State Water Project released

Date: October 22, 2019
Source: The Sun
Article: Trump administration releases plan to deliver more water to Valley

Date: October 22, 2019
Source: Sacramento Bee
Article: Trump rewrites Delta rules to pump more California water to Valley. Will Newsom fight him?

Date: October 22, 2019
Source: KQED
Article: Trump Water Rules Erode Protection for Endangered Salmon

Date: October 21, 2019
Source: Politico
Article: California fights Trump on everything – except water

Date: October 21, 2019
Source: CalMatters
Article: A new approach for managing California's water and improving the environment

Date: October 8, 2019
Source: Bloomberg Environment
Article: California Water Czar Seeks Resource Collaboration, Not Combat

Date: October 8, 2019
Source: Courthouse News
Article: Chinook Salmon Flocking to Revitalized San Joaquin River

Date: October 7, 2019
Source: Meeting of the Minds
Article: California as an Example for Managing Urban Water in Drought Periods

Water Policy:

Date: October 22, 2019
Source: Public Policy Institute of California
Article: New Laws Address Safe Drinking Water, Groundwater Recharge, River Health

Date: October 16, 2019
Source: Best, Best and Krieger, LLP
Article: Groundwater Recharge Projects Get Boost Under AB 658

Date: October 16, 2019
Source: Water News Network
Article: New California Law Creates Path to Water Industry Jobs for Vets

Water Infrastructure:

Date: October 29, 2019
Source: Mercury News
Article: Opinion: How shutting off power makes it harder to fight fires

Date: Nov/Dec. 2019 Issue
Source: WaterEfficiency.net
Article: Using Artificial Intelligence to Influence Water Infrastructure

Date: October 29, 2019
Source: Public Policy Institute of California
Article: Taking on Tough Challenges at the State Water Board

Date: October 22, 2019
Source: New York Times
Article: The World Can Make More Water From the Sea, but at What Cost?

Date: October 11, 2019
Source: Monterey Herald
Article: Court ruling pauses Cal Am desal plant project

Water Infrastructure:

Date: October 10, 2019
Source: Morgan Hill Times
Article: Quake threat looms over Anderson Dam project

Date: October 7, 2019
Source: Business Insider
Article: A California county has some of the purest tap water in the US. Here's how it filters out sewage and chemicals so effectively

Watershed:

Date: November 4, 2019
Source: Mercury News
Article: This Bay Area city owns more taxable land than anyone in Santa Clara County, and it's not San Jose

Watershed, cont'd.:

Date: October 14, 2019
Source: Mercury News
Article: East Bay Water district considers buying giant cattle ranch that straddles four counties

Date: September 30, 2019
Source: Bay Nature
Article: The Largest Land Sale in California

Conservation:

Date: October 22, 2019
Source: Irrigation and Green Industry
Article: Less water, more green

Tuolumne River Trust

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October 21, 2019

President Ann Moller Caen and Commissioners
San Francisco Public Utilities Commission
525 Golden Gate Ave.
San Francisco, CA 94102

Re: Item 6-C on your October 22 agenda (Water Supply Planning Update)

Dear President Moller Caen and Commissioners:

Thank you for the opportunity to comment on the Water Supply Planning Update you will receive at tomorrow's meeting. The Tuolumne River Trust (TRT) has two main points to share.

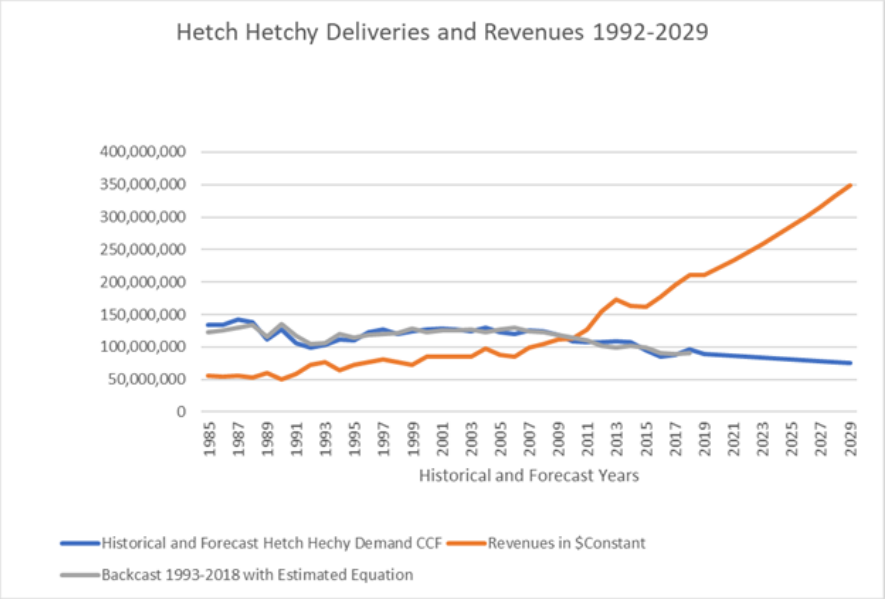
Water Demand Projections

As in most previous SFPUC documents, this report suggests that 265 million gallons per day (mgd) will be the future system-wide demand in the SFPUC service area. As you know, 265 mgd is the overall sales cap the SFPUC adopted along with the Phased Water System Improvement Program (WSIP) in 2008. As far as I know, there has never been a study identifying this number as potential future demand.

The SFPUC has a track record of over-forecasting future demand. For example, the WSIP projected system-wide demand in 2018 would reach 285 mgd. Actual demand in 2018 was 196 mgd – 31% below the forecast. It is likely system-wide demand will remain well below 265 mgd as a result of price elasticity. As the price of water increases, demand decreases.

The graph on the following page was produced by Brian Browne, a retired economist and former member of the SFPUC's Revenue Bond Oversight Committee. It suggests demand will remain relatively flat in the future, despite population growth.

The orange line represents the price of water, and the blue line represents past and projected deliveries (where it overlaps with the gray line, it represents actual demand, and beyond the gray line it represents projected demand). The gray line backcasts Mr. Browne's model vs. actual demand, and you'll see that his model was extremely accurate.



Source: Brian Browne

TRT requests a serious study of projected future water demand, and would like to be involved in choosing the entity to conduct such a study.

Goals 3 and 4 of Water Supply Planning Priorities

Goal 3 of the SFPUC's Water Supply Planning Priorities is to make current interruptible customers permanent. Goal 4 is to meet increased demand of existing and interruptible customers. The Cities of San Jose and Santa Clara, the SFPUC's two interruptible customers, have requested additional water. San Jose has requested an additional 4.5 mgd, and Santa Clara has requested an additional 2 mgd.

Goals 3 and 4 (especially 4) are irresponsible, given the SFPUC's opposition to increasing desperately needed instream flows in the Tuolumne River for the benefit of fish and wildlife, water quality and recreation. Why does the SFPUC always manage to find water for development, but rarely for the environment? I hope you will address this issue tomorrow, especially given the fact that developing new water supplies is much more expensive that utilizing existing supplies.

Thank you for the opportunity to comment.

Sincerely,

Peter Drekmeier

Peter Drekmeier
Policy Director

San Francisco
Water Power Sewer
Operator of the Hetch Hetchy Regional Water System

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October 8, 2019

TO: Commissioner Ann Moller Caen, President
Commissioner Francesca Vietor, Vice President
Commissioner Anson Moran
Commissioner Sophie Maxwell
Commissioner Tim Paulson

THRU: Harlan L. Kelly, Jr., General Manager

FROM: Steven R. Ritchie, Assistant General Manager, Water
Tim Ramirez, Division Manager, Natural Resources and Lands Management

SUBJECT: Education Opportunities and Recreation Improvements on the Peninsula Watershed, including Montara Mountain

Purpose

The Commission approved the Montara Mountain Rainfall Prediction and Radio Replacement Project at the August 13, 2019 meeting, and in response to public comments directed Water Enterprise staff to meet with local community representatives to discuss their concerns related to public access. Water Enterprise staff previously provided the Commission an overview of education opportunities and recreation improvements on the Peninsula Watershed in December 2014, and this memo updates this overview and summarizes staff activity since the August 13, 2019 meeting regarding Montara Mountain.

Overview

The SFPUC Peninsula Watershed encompasses approximately 23,000 acres of land in San Mateo County. The Peninsula Watershed is a state-designated Fish and Wildlife Refuge, the Golden Gate National Recreation Area (GGNRA) administers federal scenic and scenic/recreation easements over the watershed, and it's an important component of the Golden Gate Biosphere, as recognized by United Nations Educational, Scientific, and Cultural Organization (UNESCO).

London N. Breed
Mayor

Ann Moller Caen
President

Francesca Vietor
Vice President

Anson Moran
Commissioner

Sophie Maxwell
Commissioner

Tim Paulson
Commissioner

Harlan L. Kelly, Jr.
General Manager

Consistent with the Final Peninsula Watershed Management Plan (PWMP, 2002) and Board of Supervisors Resolution No. 373-97, the Water Enterprise works to provide education opportunities via recreation improvements on the Peninsula Watershed that are compatible with the need to protect drinking water quality and a wide array of native, and often rare, ecological resources. There are two major regional trail systems that run north/south on the Peninsula Watershed – the Crystal Springs Regional Trail, operated and maintained by San Mateo County Parks; and the Bay Area Ridge Trail (Ridge Trail), operated and maintained by Water Enterprise staff. The existing Fifield/Cahill Ridge Trail Program, overseen by Natural Resources and Lands Management Division, was included in the PWMP Final Environmental Impact Report (FEIR, 2001). These regional trails, and related connectors, provide 31 miles of existing trail access to the Peninsula Watershed.

The Water Enterprise has been working on three new trail projects that were presented in the PWMP (collectively these would provide an additional 11 miles of trail access), plus a fourth that was not included in the PWMP (approximately 5 miles). These are described in more detail below and shown on the attached Peninsula Watershed Trails map. The SFPUC is a member of the Peninsula Working Group (PWG), which includes San Mateo County Parks, the GGNRA, California State Parks, Peninsula Open Space Trust, Midpeninsula Regional Open Space District, and the California Coastal Conservancy. Coordination and outreach on all of these proposals happens in the PWG forum, and also regularly with other interested organizations and individuals, including the Bay Area Ridge Trail Council, Committee for Green Foothills, and the California Native Plant Society. Natural Resources and Lands Management staff are developing the Peninsula Watershed Trails Interpretive Master Plan, which outlines specific education programs delivered to trails users as part of all of the SFPUC's existing and future trail projects.

Bay Area Ridge Trail

The Ridge Trail is a project started in 1987 by the Bay Area Ridge Trail Council (Ridge Trail Council) to create an approximately 550-mile long continuous trail for hikers, mountain bicyclists, and equestrians along the ridgelines overlooking San Francisco Bay. The Ridge Trail currently has approximately 375 miles of trail open and permanently protected for recreational use. The proposed construction of the Southern Skyline Boulevard Ridge Trail Extension (Ridge Trail Extension) would complete approximately 6 miles of new trail on the Peninsula Watershed in San Mateo County between Highway 92 and the GGNRA's Phleger Estate (see Peninsula Watershed Trails map, "Planned extension of Ridge Trail").

The PWMP Final Environmental Impact Report (2001) and Final PWMP (2002) included the Ridge Trail Extension, which would meet the PWMP goal to provide opportunities for compatible recreational uses in the Peninsula Watershed and enhance public education opportunities and awareness of natural resources, water quality, and water supply issues. Similar to the existing Fifield/Cahill Ridge Trail, this would provide an opportunity to educate the general public about the SFPUC's responsibilities as a regional water provider and environmental steward of the Peninsula Watershed.

The proposed Ridge Trail Extension would be operated in coordination with the Fifield/Cahill Ridge Trail, which currently is operated by the SFPUC under a docent-led only access program three days a week. The docent program is limited to three trips per day, and includes hiking, running, mountain biking, and equestrian uses. With the completed construction of the Ridge Trail Extension, the SFPUC staff propose to operate the entire length of the Ridge Trail on the SFPUC Peninsula Watershed (approximately 16 miles).

Ridge Trail Extension Update

The construction of the proposed Ridge Trail Extension and operation of the entire length of the Ridge Trail on the SFPUC Peninsula Watershed is the subject of a Draft Environmental Impact Report scheduled for public review and comment before the end of this calendar year. The SFPUC received a grant from the State Coastal Conservancy (SCC, $185,000) in 2010 to develop detailed plans and engineering designs, and in 2013 was recommended for a SCC grant for construction ($1,000,000). The construction grant also includes planning and design for the 1.5 mile segment of the Ridge Trail on the GGNRA's Phleger Estate, to ensure a continuous and consistent alignment to the south. The certification of the Final EIR is scheduled for early 2020, and construction is anticipated to start in summer 2020. The current engineer's estimate for construction is $14 million. The new Ridge Trail Extension is scheduled to be open by the end of 2021.

Planned North San Andreas Trail Connector

This trail connection will provide 1.25 miles of new trail from San Mateo County's North San Andreas Trail to GGNRA's Sweeney Ridge property at the Sneath Lane gate (see Peninsula Watershed Trails map, "Planned North San Andreas Connector"). The trail would be on SFPUC Peninsula Watershed lands and connect existing trails operated by San Mateo County Parks and GGNRA. The trail will be multi-modal and provide access to hikers, bikers and equestrians. The design was initiated July 2013 and is expected to be completed by Summer 2020. Environmental review and final design would then be initiated, with construction targeted for Summer 2022. This trail connector was described in the PWMP Final EIR (2001) and Final PWMP (2002).

Crystal Springs Regional Trail

In November 2013 the SFPUC approved a Memorandum of Understanding (MOU) with San Mateo County to contribute funding to trail improvements on the Crystal Springs Regional Trail, which is operated and maintained by San Mateo County Parks. The funds were used for the construction of security and watershed fencing for the South of Lower Crystal Springs Dam to Highway 92 segment in 2014. This newly constructed trail segment helps close one of the remaining gaps in what will eventually be a 15 mile continuous trail in the Peninsula Watershed (see Peninsula Watershed Trails map, "Crystal Springs Regional Trail").

Proposed Whiting Ridge Connector

This trail connection was not included in the PWMP Final EIR (2001) or Final PWMP (2002); it was presented in the GGNRA General Management Plan Final Environmental Impact Statement (2014). The Peninsula Open Space Trust and GGNRA have recently acquired additional properties to the west of the SFPUC Peninsula Watershed, and have started to provide public access (e.g., Rancho Corral de Tierra) on these immediately adjacent lands. No construction of trails would be required (as proposed, the trail would use the existing access road), but there would need to be environmental review and potentially an agreement among the GGNRA and SMC Parks regarding operations, maintenance, and management of this trail system. SFPUC staff have begun discussions with staff from these agencies, but the timing and specifics of this project still need to be developed.

Montara Mountain

On August 26, 2019 Water Enterprise staff met with the community members who attended the August 13, 2019 Commission meeting. This meeting allowed Water Enterprise staff to provide additional information related to ongoing and future work at North Peak, and also for the community members to expand on their interests. We agreed at this meeting to develop a conceptual proposal to provide limited access to North Peak only, and to share this proposal with the same community members to collect their feedback. Any proposal would be required to go through the environmental review process, including the California Environmental Quality Act (CEQA). This trail project was not included in the PWMP Final EIR (2001) or Final PWMP (2002).

Water Enterprise staff are scheduled to meet with these community members on October 4, 2019 at North Peak to share a conceptual education and public access proposal at this location. The current road that leads to North Peak on

SFPUC property will not be used by vehicles in the future servicing the Montara Mountain Rainfall Prediction, SFPUC Radio, and existing San Mateo County radio facilities. Instead, a new road is currently being constructed entirely on SFPUC property as provided in the PWMP Final EIR (2001) and Final PWMP (2002) that will provide this access.

The current road could be used by hikers/runners only to access SFPUC property and arrive at the "Potential Vista Point" as seen on the Montara Mountain Trail Access map. This is slightly below the North Peak elevation but does provide the same views towards the east bay (e.g., Mount Diablo) and south down the coast as seen from North Peak. Consistent with the Peninsula Watershed Trails Interpretive Master Plan, the proposal will also include two interpretive panels: one would describe the SFPUC water system, and specifically the role of the Peninsula Watershed in providing our customers with a high quality and reliable water supply; and the other would describe the important, unique, and rare ecological resources that are found along the trail and near the peak. A third interpretive panel might also describe the importance of the facilities at North Peak, and their role in providing communication to public safety staff and improved forecasting to Bay Area water managers and local public agencies (i.e., emergency response to local flooding).

Natural Resources and Lands Management staff have also reached out to Peninsula Working Group members (San Mateo County Parks, the GGNRA, California State Parks, Peninsula Open Space Trust, Midpeninsula Regional Open Space District, and the California Coastal Conservancy) to share these plans and to ensure consistent information about public access is provided to trail users. Trail users need to traverse San Mateo County Parks, State Parks, GGNRA, and American Tower property before arriving at SFPUC property near North Peak (see the inset in the upper right corner of the Montara Mountain Trail Access map). Natural Resources and Lands Management staff have been working with these PWG members to confirm the information and materials provided to the public accurately describe existing access polices of all landowners.

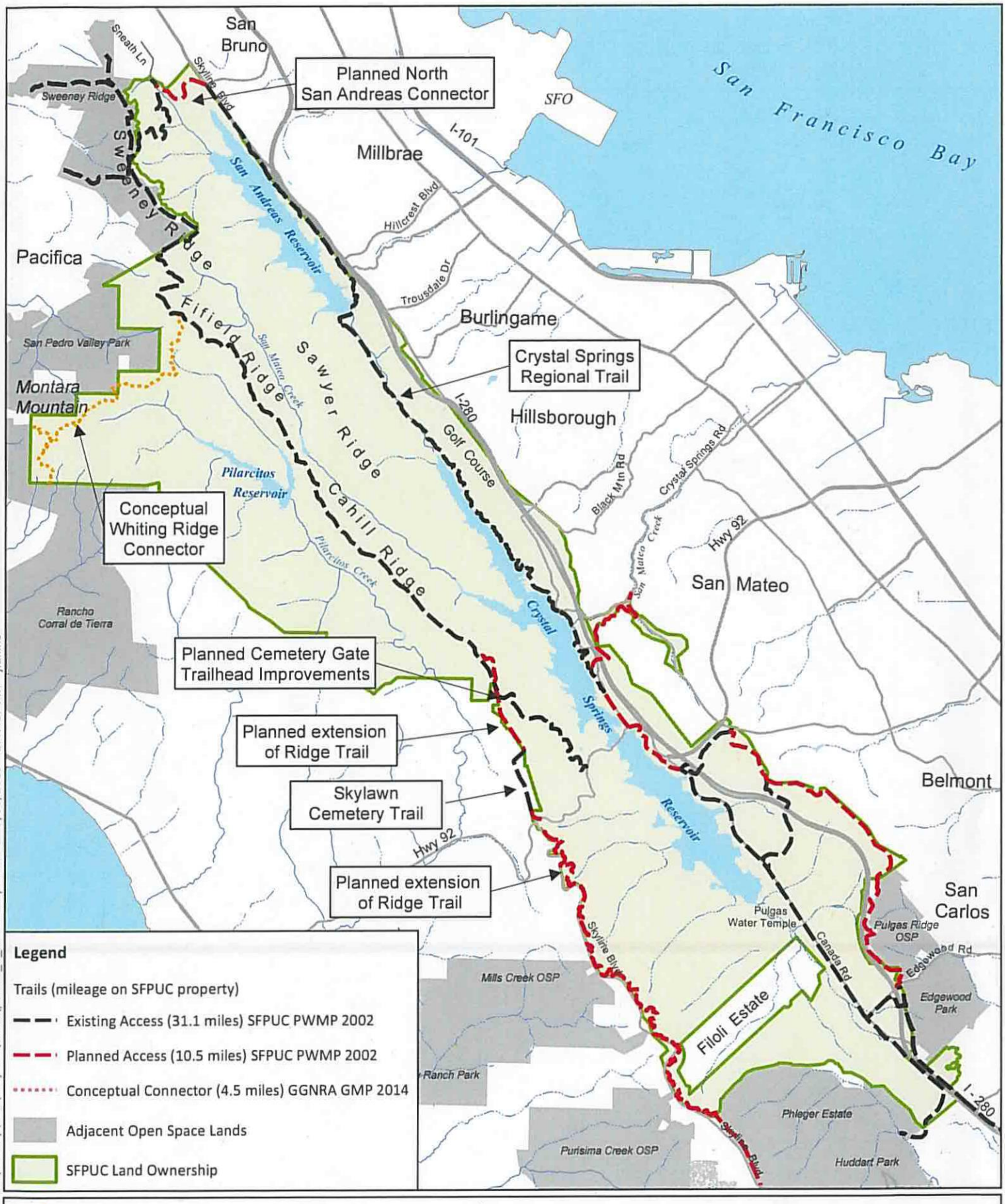
After the October 4, 2019 site visit, Natural Resources and Lands Management staff will continue to refine this conceptual proposal, and provide SF City Planning with a project description to start the environmental review process. SFPUC construction of the new access road and Montara Mountain Rainfall Prediction and Radio Project will continue for the next several months, and it's important for these details to be finalized to confirm the specifics of the "Potential Vista Point" area. How public access is managed at this remote location in the watershed will also need to be part of the project description. In

addition to the interpretive panels, Natural Resource and Lands Management staff are considering a pilot permit program similar to the one included in the Ridge Trail Extension Project. Trail users would go to the SFPUC public website to acquire the permit, and as part of this process receive information about why the SFPUC owns this property and important criteria that guide its management, including protection of drinking water quality and environmental stewardship. Once trail users have this information, they would be provided a permit that they would carry with them and provide upon request when on SFPUC watershed land at this location. This would provide trail users access during operational hours, consistent with the other landowners along the trail, without requiring SFPUC staff to be present. Natural Resources and Lands Management staff would continue to patrol this area, in coordination with the other PWG members with property in the immediate vicinity.

Water Enterprise staff will be available to answer questions at the October 8, 2019 meeting, and will continue to provide regular updates to the Commission as requested.

Attachments

Watershed Trails Map
Montara Mountain Trail Access


Planned North San Andreas Connector
Crystal Springs Regional Trail
Conceptual Whiting Ridge Connector
Planned Cemetery Gate Trailhead Improvements
Planned extension of Ridge Trail
Skylawn Cemetery Trail
Planned extension of Ridge Trail
San Bruno
Millbrae
SFO
San Francisco Bay
Pacifica
Burlingame
Hillsborough
San Mateo
Belmont
San Carlos
Sweeney Ridge
Fifield Ridge
Sawyer Ridge
Cahill Ridge
San Andreas Reservoir
Pilarcitos Reservoir
Crystal Springs Reservoir
Golf Course
San Pedro Valley Park
Montara Mountain
Rancho Corral de Tierra
Mills Creek OSP
Pulgas Water Temple
Pulgas Ridge OSP
Edgewood Park
Filoli Estate
Phleger Estate
Purisima Creek OSP
Huddart Park
I-101
I-280
Hwy 92
Legend
Trails (mileage on SFPUC property)
Existing Access (31.1 miles) SFPUC PWMP 2002
Planned Access (10.5 miles) SFPUC PWMP 2002
Conceptual Connector (4.5 miles) GGNRA GMP 2014
Adjacent Open Space Lands
SFPUC Land Ownership
Hetch Hetchy Regional Water System
Services of the San Francisco Public Utilities Commission
Natural Resources and Lands Management Division
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0
1
2 Miles
Peninsula Watershed
Trails
Author: JGL Date: 9-30-19
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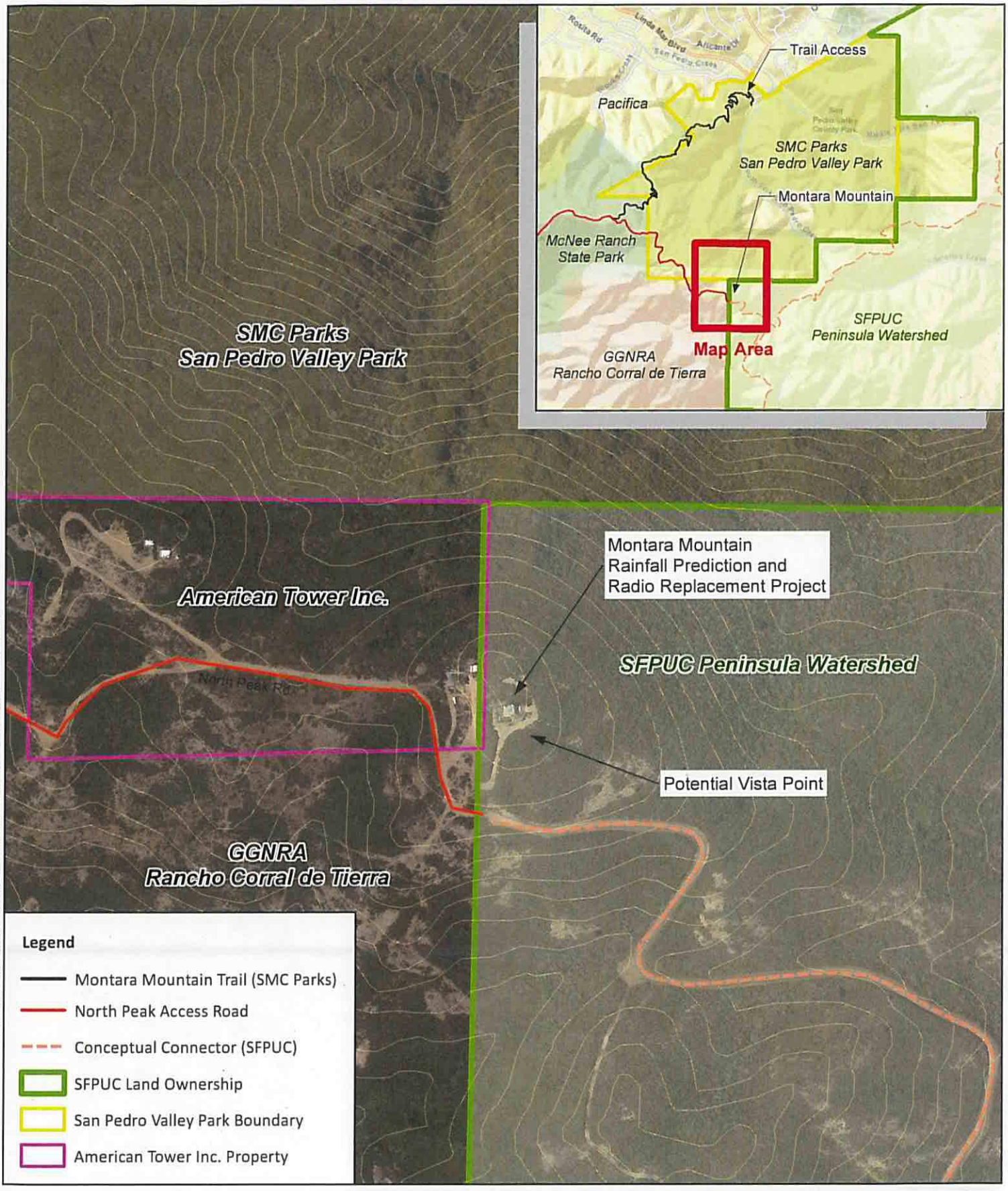

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Hetch Hetchy
Regional Water System

Services of the San Francisco Public Utilities Commission
Natural Resources and Lands Management Division

Author: JGL Date: 9-27-19

N

0 200 400 Feet

Peninsula Watershed

Montara Mountain Trail Access

OFFICE OF THE MAYOR
SAN FRANCISCO

LONDON N. BREED
MAYOR

Notice of Appointment

October 10, 2019

Nicole Sandkulla
Chief Executive Officer/General Manager
Bay Area Water Supply and Conservation Agency
155 Bovet Road, Suite 650
San Mateo, CA 94402

Dear Ms. Sandkulla:

It is my great pleasure to reappoint you to the San Francisco Public Utilities Commission's Citizens' Advisory Committee, representing an regional user, for a second term ending February 25, 2022.

Your leadership as a member of the Committee will allow you to help support the SFPUC's mission to provide the residents of San Francisco with high quality, efficient and reliable water, power and wastewater services in a manner that values environmental and community interests and sustains the resources entrusted to the SFPUC's care.

This appointment will provide you with the opportunity to serve the citizens of San Francisco in a meaningful and lasting manner. Thank you in advance for your service in this important capacity.

If you have any question related to this appointment, please contact my Director of Appointments, Kanishka Cheng, at 415-554-6696.

Sincerely,

London N. Breed
Mayor, City and County of San Francisco

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TELEPHONE: (415) 554-6141

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CALIFORNIA TROUT

FISH · WATER · PEOPLE

October 3, 2019

The Honorable Michael Reynolds, Superintendent
Yosemite National Park
Via Email

Subject: Proposal for boating and public access at Hetch Hetchy

Dear Superintendent Reynolds:

We are writing to follow up on our letter to Secretary Bernhardt and Mayor Breed, dated June 21, 2019, asking that long overdue improvements for public access and recreation be provided in the Hetch Hetchy region of Yosemite National Park.

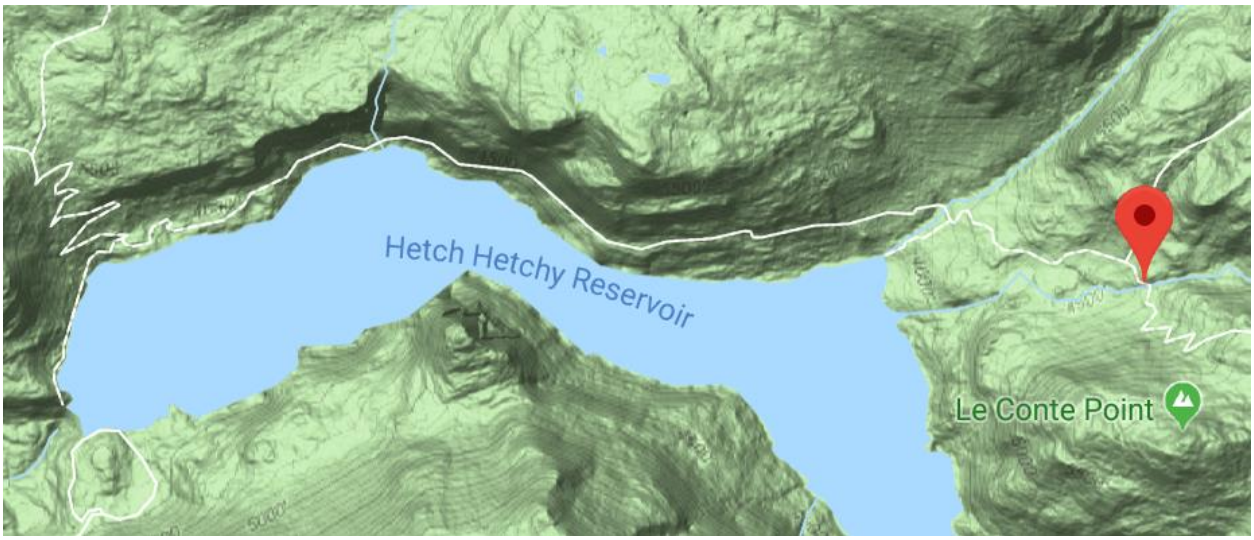
While there are many measures that the National Park Service could pursue, we believe the most practical and beneficial initial step would be to develop a pilot program for an electric-powered ferry, beginning in the spring of 2020.

A ferry could provide tours of the spectacular Hetch Hetchy canyon, where access is not presently possible even by trail, allowing visitors to admire its granite cliffs and waterfalls in their entirety. A ferry could also transport people to trailheads and other points of interest along the shore of the reservoir. Hikers and picnickers could disembark at Rancheria Creek, wander up to Rancheria Falls, and return on another ferry at the end of the day. Rock climbers could scale Hetch Hetchy's granite monoliths. And enthusiastic anglers would be able to fish for trout throughout the reservoir and in the free-flowing Tuolumne River just upstream.

Ferry service should be developed and operated consistent with the mission of the National Park Service to preserve "*unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations*." At present, while the natural and cultural resources above the high-water line of the reservoir may be preserved, there is little opportunity for the enjoyment, education and inspiration inherent in the National Park Service mission. Properly executed, a ferry could provide these public benefits.

It will be essential, of course, to comply with the provisions of the Raker Act (Section 9a) which were designed to protect water quality in the reservoir while assuring that San Francisco defrays any associated costs. We note that water supply reservoirs in California and beyond routinely

allow boating (indeed, in most cases, gasoline-powered boats are allowed). We are confident that San Francisco Public Utilities Commission staff is fully capable of ensuring that all customers continue to receive clean and safe water supplies.



With ferry service to the mouth of Tiltill Creek, the round-trip hike to Rancheria Falls would be only about 2 miles - far more achievable for the walking public than the current 13-mile trip around the reservoir.

The Raker Act assumes, along with its provisions to protect water quality, that the public would have far more opportunities in the Hetch Hetchy area than are available today. These opportunities are also discussed at length in both in the Raker Act's Committee hearings and the Freeman Report (1912), which San Francisco commissioned to lobby Congress for permission to build a dam within Hetch Hetchy Valley. The Freeman report could not be more clear, promising that the Hetch Hetchy region would be used "for park purposes and for water supply purposes", that there would be "no reason to exclude campers and picnickers" and that it would be "absurd" to claim otherwise.

This spirit of inclusion should serve as guidance for how the National Park Service can welcome the public back to Hetch Hetchy in the 21st century. Some of the specific elements suggested a century ago may have made sense at the time but do not adhere to today's sensibilities for America's national parks. For example, the Freeman Report's suggestion of damming Falls Creek so Wapama Falls could run year-round should be rejected. San Francisco's proposal to carve a road into the cliffs on the north side of Hetch Hetchy Reservoir should also be dismissed. And steam-powered ships, as shown in the photographs of San Francisco's Freeman Report, should not be considered.

We recommend an electric ferry for a few reasons. Electric motors make minimal noise and would avoid any chance of polluting the reservoir with gas or oil. Private boats would create congestion on the existing single, narrow boat ramp and could contaminate the reservoir with

invasive species adhered to their hulls. And the National Park Service or a qualified concessionaire could ensure a ferry is wholly safe for all passengers.

Visitors could board the ferry by walking down the existing boat ramp near the O'Shaughnessy Dam on the reservoir's south side. NPS personnel should determine the best way for visitors to disembark at select locations around the reservoir.

Rancheria Falls would no doubt be a popular destination. Visitors could leave the ferry at the mouth of Tiltill Creek for a short hike along the existing trail to the falls. It might be appropriate to install a backcountry toilet at a suitable location. The round trip to Rancheria Falls would be only about 2 miles, far more achievable for the walking public than the 13-mile trip around the reservoir and back.

Fishing the free-flowing Tuolumne River, just above Hetch Hetchy Reservoir, would no doubt be popular as well. Appropriate regulations, such as barbless hooks and/or catch-and-release, should be considered to protect the long-term health of the fishery. In addition, we recommend that only lures or flies, not bait, be allowed due to the potential that invasive species might further alter Yosemite's waterways.

As many as 5,000,000 people per year visit Yosemite National Park, most of whom crowd into its eponymous valley. Less than 1% of that number venture to Hetch Hetchy as access is limited and opportunities for recreation are few. Hetch Hetchy, especially with the reservoir in place, would not compete with Yosemite Valley for a large number of visitors, but the opportunity to explore its canyon and surrounding area by boat would be an attractive alternative.

The Tuolumne River may provide the best trout fishing in Yosemite.

We stand willing to work with the National Park Service, the Department of Interior, the City of San Francisco, and any other parties to improve public access and recreation in the Hetch Hetchy region of Yosemite. We recognize that costs associated with developing a pilot project may exceed associated revenue, and, if necessary, we will try to identify parties that may be able to help pay for the project.

Thank you for considering this request. Please let us know how we can help.

Sincerely,

Spreck Rosekrans
Restore Hetch Hetchy

Michael Wier
California Trout

P.S. We believe a ferry would be the most practical way to improve the access to the Hetch Hetchy canyon that was promised a century ago and that it should be implemented as a pilot project in 2020. Other improvements, however, should be considered as well in due course, including a campground, additional trails, and expanded operating hours. If the ferry proves successful, the National Park Service may want to consider a rental fleet of kayaks and canoes as well.

CC: The Honorable David Bernhardt, Secretary of Interior
The Honorable London Breed, Mayor of San Francisco
The Honorable Wade Crowfoot, California Secretary of Natural Resources

Bay Area rainfall: When's it coming and when should we start to worry?

Dry weather this fall has kept fire season going, fouled the air and left ski resorts scrambling to open

Mercury News | November 11, 2019 | Paul Rogers

With dry conditions over the past two months, and Thanksgiving weekend — the traditional kick-off to ski season — coming up, crews at Alpine Meadows and other resorts near Lake Tahoe have begun making snow. This photo, taken Oct. 29, 2019, shows the Kangaroo Trail at Alpine Meadows. (Photo: Ben Arnst/Squaw Valley Alpine Meadows)

Normally between Oct. 1 and mid-November, if historical averages are any guide, the Bay Area has received nearly 2 inches of rain, and Los Angeles and Fresno each have received about an inch.

But so far this year? None.

To be sure, there was one-hundredth of an inch recorded in San Jose and San Francisco — about the thickness of a few sheets of paper — over the past six weeks. But nearly every city from Sacramento to Silicon Valley to San Diego is showing lots of zeros in the rainfall column for the first two months of California's winter rainy season.

HOW DRY ARE WE?

Normally between Oct. 1 and mid-November, according to historical averages, the Bay Area receives nearly 2 inches of rain. This year's dry weather is raising concerns of a possible drought.

Amount of rainfall October 1 to Nov. 10

City	2019	Historical average	Percent of normal
Fresno	0 inches	0.96 inches	0%
Livermore	0	1.6	0
Los Angeles	0	0.93	0
Mount Shasta City	0.21	3.81	6
Oakland	Trace amount	1.96	0
Redding	0.09	3.34	3
Reno	Trace amount	0.74	0
Sacramento	0	1.53	0
San Diego	0	0.83	0
San Francisco	0.01	1.99	0.01
San Jose	0.01	1.23	0.01
Santa Rosa	0.02	3.5	0.02
Stockton	0	1.34	0

Source: NOAA

BAY AREA NEWS GROUP

Fire risk remains high. The air is gritty. Lake Tahoe ski resorts are scheduled to start opening for the season later this week and are hustling to make snow. And no storms are forecast for at least the next 10 days.

“We’ve been high and dry,” said Matt Mehle, a meteorologist with the National Weather Service in Monterey. “The outlook over the next week or so isn’t good. There’s a chance of some drizzle along the coast, but nothing of note.”

Remember the “Ridiculously Resilient Ridge?” That was a wall of high pressure air that parked off the West Coast for an unusually long time between 2012 and 2016, blocking storms and causing California’s historic drought. When that ridge went away in 2017 and soaking atmospheric river storms, also known as “Pineapple Express” storms, barreled through, the drought was broken.

This fall, a similar ridge of high pressure has been sitting off the West Coast.

Mehle said that long-range computer models show some hope that the ridge may break down in a few weeks. But usually, any forecasts beyond a week or so aren’t particularly reliable.

“Maybe the last week of November,” he said. “We see a pattern change which could usher in some storm systems that could bring some rain to the Bay Area. But confidence on that extended forecast is pretty low.”

How does this dry autumn compare historically?

The amount of rain San Francisco received from this July 1 to Oct. 31 — .12 inches — ranks as the 21st driest such period back to 1850, according to Jan Null, a meteorologist with Golden Gate Weather Services in Saratoga.

Null noted that San Francisco’s all-time driest and all-time wettest seasons started out dry, like this year. The driest was the winter of 1850-1851 with a July-to-October total of 0.33 inches and a final seasonal total of just 7.42 inches.

By comparison, the winter of 1861-1862, after seeing only .02 inches through October, finished with a deluge of 49.27 inches. That winter was so drenching that Leland Stanford, who had just been elected California governor, had to take a row boat through the streets of Sacramento to give his inaugural address.

Because of the legendary floods, the state Legislature and state Supreme Court moved to San Francisco. The Legislature moved back to Sacramento, but the court remains in San Francisco to this day.

Null noted that fall last year was nearly as dry, yet rainfall totals around the state, along with the Sierra snow pack, finished in good shape. Traditionally, California’s wettest months are January, February and March.

“It’s not time to panic yet at all,” he said. “We still have lots of time left in the winter rainy season.”

The good news is that because of significant rain and snow last winter and the winter before, California’s major reservoirs are in pretty good shape.

Shasta Lake, the state's largest reservoir, is 71% full, or 120% of its historical average for this time of year. The second-largest, Oroville, is 56% full, or 93% of normal. And Folsom is 58% full, or 115% of average.

The bad news is that every day with dry weather means another day of fire season.

"Fire season isn't done," said Scott McLean, deputy chief of Cal Fire, the state's primary firefighting agency. "Our staffing remains the same. I know we sound like a broken record, but people need to pay attention. We all need to be prepared."

As of Monday, no major fires were burning around the state, although the Kincade Fire, which burned 77,758 acres in Sonoma County, destroying 374 buildings and causing the evacuation of roughly 188,000 people before being fully contained last Wednesday, was still fresh in the minds of many.

Temperatures should remain about 10 degrees warmer than normal Tuesday, with some cooling Wednesday and Thursday, said Mehle. But humidity levels across Northern California are back up to about 25% to 30% in many places, a big improvement from the 5% to 10% humidity during the Kincade Fire and other fires earlier this month in Southern California.

Most important: The winds have died down.

"Fortunately right now we haven't been experiencing any big wind events," Mehle said, "but fires can still start quickly, and people should be mindful of that."

One group of people watching the weather closely are skiers.

Traditionally, Thanksgiving week is the start of ski season in California. Some resorts, such as Squaw Valley and Alpine Meadows, plan to open this week. But with no snow storms yet, resorts have been cranking up snow-making machines and hoping for the best.

"We're still unsure of what terrain we'll have open by Friday, but we will open," said said Alex Spychalsky, a spokeswoman for Squaw Valley and Alpine Meadows resorts. "It will be great to get back out there. Whether we have one trail open or three trails open, it's always a great time to get the skis back out."

The two resorts near Lake Tahoe have 320 snow-making guns, which draw water from storage ponds and operate mostly at night and during the early morning hours when temperatures are the coldest. Crews have been running the machines for nearly a month and should have at least one lift open at each resort, she said.

Last year after a dry start, Squaw Valley ended up with 719 inches of snow. People skied until July 7. That total — nearly 60 feet — was the third-most snow the resort received in any season back to 1970.

"If we get 400 to 450 inches in a year, we're happy," she said. "Last year we were ecstatic."

# # #

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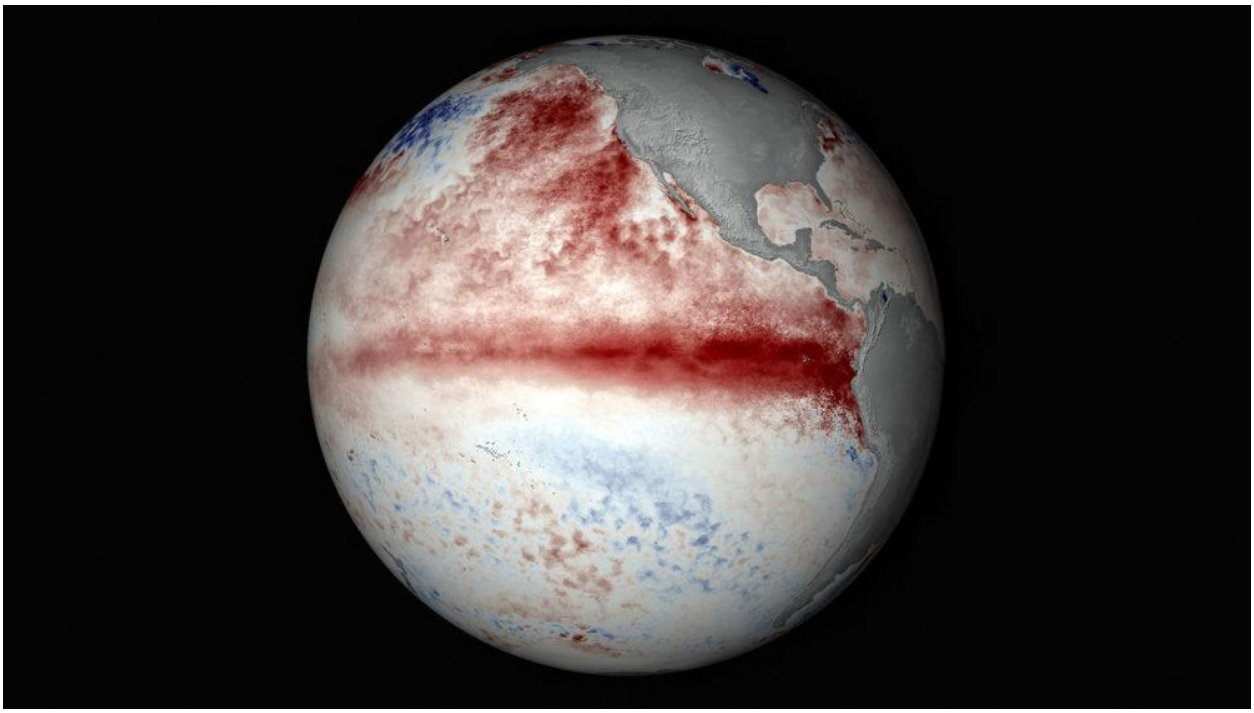
Climate Change is Making El Niños More Intense, Study Finds
Yale Environment 360 | October 23, 2019



Sea surface temperature anomalies in the Pacific Ocean during the 2015 El Niño. NOAA/Stuart Rankin

Climate change is increasing the frequency of extreme El Niño events, leading to intensifying droughts, worsening floods, and shifting hurricane patterns, according to a new study published in the Proceedings of the National Academy of Sciences.

The study, led by scientists in China and the United States, examined data from 33 El Niños dating back to 1901. It found that since the 1970s, El Niños — a natural periodic warming in the Pacific Ocean that can change weather patterns globally — have been forming farther to the west in the Pacific Ocean, where temperatures are warmer. Strong El Niños can cause severe drought in dry climates such as Australia and India, intense flooding in wetter climates such as the Pacific Northwest and Peru, and causes more hurricanes to form in the Pacific and fewer in the Atlantic.

Before 1978, 12 of 14 El Niños formed east of the International Dateline, the study found. Since 1978, all 11 have formed in the central or western Pacific Ocean, a shift of hundreds of miles, the Associated Press reported. There have been three “super” El Niños since the shift — in 1982, 1997, and 2015 — that broke new average temperature records and triggered catastrophic natural disasters. The 1997-1998 El Niño, for example, caused thousands of deaths from severe heat, flooding, drought, and coastal storms, and generated as much as $96 billion in damage, according to the United Nations.

If global temperatures keep rising, El Niños could continue to intensify, with major impacts on societies around the world. “If the observed background changes continue under future anthropogenic forcing [human-induced global warming], more frequent extreme El Niño events will induce profound socioeconomic consequences,” the scientists wrote.

# # #

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With No El Nino, How Does California's Winter Shape Up?
GVWire | October 8, 2019

According to the experts, the Sierra won't see a second straight year of heavy snowfall. (GV Wire)

Back in August, blogger Nat Johnson declared the El Niño of 2019 "officially done."

Johnson isn't just any blogger, either. His day job is with the NOAA Geophysical Fluid Dynamics Laboratory.

The question is, what will winter 2019-2020 look like in California?

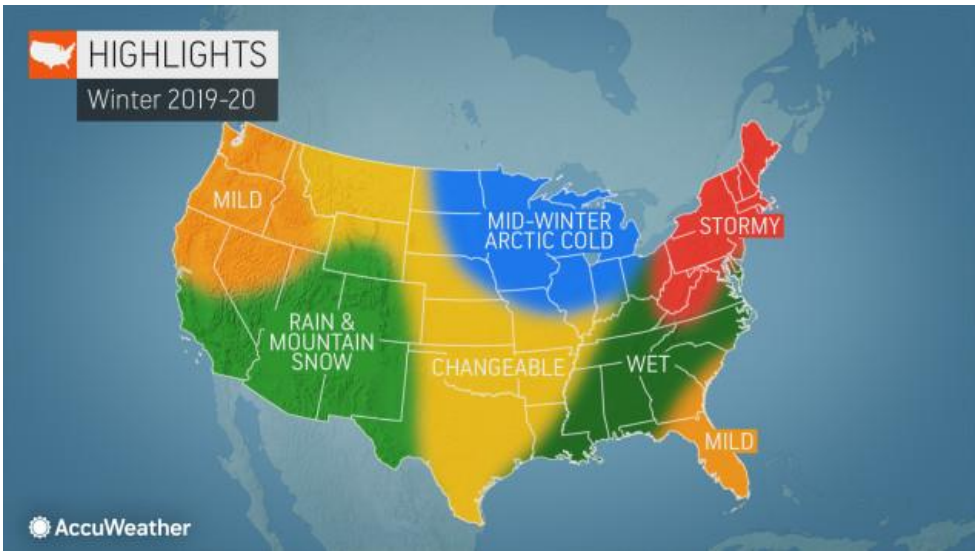
Will we have a second straight year of big snows and periodically heavy rains? Or is California headed for the start of another drought?

AccuWeather's Prediction

AccuWeather's long-range forecast expert, Paul Pastelok, says that "the winter will yield enough precipitation to stave off drought conditions into the spring."

Pastelok adds that the Southwest and California "could also have back-and-forth conditions, between some periods of dry weather and some active weather in the early winter, which is not really typical."

The AccuWeather map below forecasts mild weather for northern California and the northern Central Valley, with ample rain in the remainder of the state.



What Do the Almanacs Say?

Two old standbys — the Farmers' Almanac and the Old Farmer's Almanac — mostly agree on their Golden State winter predictions.

The Old Farmer's Almanac, which was founded in 1792, provides this very specific forecast:

"Winter will be cooler than normal. Rainfall will be below normal in the north and above normal in the south, with below-normal mountain snows. The coolest temperatures will occur in mid- and late December, mid- to late January, early to mid-February, and early and late March.

"The stormiest periods will be in late November, mid- to late December, and early February; from late February into early March; and in mid- and late March. April and May will be cooler than normal, on average, with rainfall below normal in the north and above normal in the south."

The rival Farmers' Almanac, which was founded in 1818, calls for cool temperatures and normal precipitation for the western third of the United States.

# # #

EPA, Bureau of Reclamation advance cooperation on water supply, reuse funding
Water Finance & Management | November 11, 2019 | WFM Staff

The U.S. Environmental Protection Agency (EPA) and the Bureau of Reclamation (Reclamation) last week announced a Memorandum of Understanding (MOU) that advances federal collaboration on funding for water supply and water reuse projects nationwide.

Consistent with the Administration's commitment to infrastructure resiliency, the agencies are collaborating on approaches to effectively and efficiently help ensure that all Americans have access to sustainable supplies of clean water by leveraging the core expertise of each agency.

"With 80 percent of U.S. states anticipating some freshwater shortages in the next decade, diversifying our country's water portfolio is a nationwide priority," said EPA Assistant Administrator for Water David Ross. "Our new MOU with Reclamation will accelerate federal cooperation and support for water supply reliability and water reuse projects to help address this challenge."

"We owe it to the next generation to make the investments necessary to ensure reliable water supplies," said Bureau of Reclamation Commissioner Brenda Burman. "This partnership will help water managers make those investments; the new MOU gives Reclamation and EPA the structure to collaborate together on important water infrastructure projects."

By signing this MOU, the agencies are committing to work together to implement existing water infrastructure financing programs, specifically EPA's Water Infrastructure Financing and Innovation Act (WIFIA) program and Reclamation's Title XVI and Desalination programs.

Reclamation will look for opportunities to leverage funding provided by WIFIA with existing Reclamation funding programs to better support the country's water reuse and recycling projects. EPA and Reclamation also commit to identifying other opportunities to leverage the resources of both agencies to help make each Federal dollar go further.

The MOU is effective immediately and will remain in effect for five years. The MOU meets the statutory requirements section 4301 of America's Water Infrastructure Act of 2018. To read the MOU and for more information about EPA's WIFIA program, visit www.epa.gov/wifia.

Learn more about the Bureau of Reclamation at www.usbr.gov/watersmart/weeg/index.html.

Established by the Water Infrastructure Finance and Innovation Act of 2014, the WIFIA program is a federal loan and guarantee program administered by EPA. WIFIA's aim is to accelerate investment in the nation's water infrastructure by providing long-term and low-cost supplemental credit assistance for regionally and nationally significant projects. EPA's WIFIA program plays an important part in President Trump's infrastructure plan, which calls for expanding project eligibility. The WIFIA program has an active pipeline of pending applications for projects that will result in billions of dollars in water infrastructure investment and thousands of jobs. To date, EPA has issued 14 WIFIA loans totaling more than $3.5 billion in credit assistance to help finance more than $8 billion for water infrastructure projects while creating more than 15,000 jobs.

Reclamation is the largest wholesale water supplier in the United States and the nation's second largest producer of hydroelectric power. Its facilities also provide substantial flood control and benefits to recreation as well as and fish and wildlife. Title XVI of P.L. 102-575, as amended (Title XVI), provides authority for Reclamation's water recycling and reuse program, titled "Title XVI." Through the Title XVI program, Reclamation identifies and investigates opportunities to reclaim and reuse wastewaters and impaired ground and surface water in the 17 Western States and Hawaii. Title XVI includes funding for the planning, design, and construction of water recycling and reuse projects in partnership with local government entities. In 2018, an estimated 431,000 acre-feet of water was recycled through Title XVI projects.

# # #

California Pushed to Revamp Water Plans for Increasingly Wild Weather
Courthouse News Service | November 5, 2019 | Nick Cahill

View of Oroville Dam's main spillway (center) and emergency spillway (top), on Feb. 11, 2017. The large gully to the right of the main spillway was caused by water flowing through its damaged concrete surface. (Photo: William Croyle/California Department of Water Resources – California Department of Water Resources)

SACRAMENTO, Calif. (CN) – Yo-yoing between heat waves, torrential rainfall and raging wildfires that burn through Thanksgiving, the explosive nature of California's weather has been on full display over the last several years. The state's worst drought, one of its wettest winters and both the largest and most destructive wildfires all occurred this decade.

Unpredictability has long been a staple of the Golden State's climate, but scientists warn that warming temperatures will likely lead to shorter, more intense rainy stretches – putting added strain on the state's overworked water infrastructure.

Casting climate change as a direct threat to California's water security, a panel of experts on Tuesday said the state must plan for the "new normal" by modernizing water infrastructure before the next great disaster.

"The volatility just makes it harder to use our multipurpose reservoirs," said Ellen Hanak, director of the Public Policy Institute of California Water Policy Center. "When you've got higher,

spikier runoff, that means you have higher flood risk at the same time you want to be saving water for drought."

As is the case across the country, California's major dams and reservoirs were built decades ago and designed to supply fewer people and protect against a smaller flood risk.

Facing runoff from a series of major winter storms, California narrowly escaped an unimaginable disaster in February 2017 when the spillway at the nation's tallest dam disintegrated and sent nearly 200,000 Northern Californians scrambling. A break in the weather helped state officials eventually gain control of the situation, but it was a wakeup call and repairs ultimately cost taxpayers more than $1 billion.

The near catastrophe at Oroville Dam would have rivaled any disaster in state history, leaving millions homeless and without water from Northern California to Los Angeles.

Though the dam is once again in working condition, experts who participated in the PPIC's water forum Tuesday said other repairs are needed to prepare California for the next big storm. The nonpartisan think tank suggests not just fixing old dams and sinking canals, but diversifying the water grid by creating ways to capture runoff during floods and use it to recharge aquifers.

The PPIC's 20-page report explores how five effects of climate change – warming temperatures, shrinking snowpack, shorter and more intense rainy seasons, volatile precipitation and rising seas – will impact the state's ability to get water to a growing population of 40 million.

No region has felt the sting of California's changing climate more than sparsely populated Lake County, located on the outskirts of the state's famous wine country.

The county that was once occupied by Pomo Native Americans, who hunted in the rolling foothills and fished in Clear Lake for centuries, has been in some official state of emergency for the last eight years. The estimated 65,000 county residents have lived through nearly every sort of natural disaster imaginable, says Lake County administrator Jan Coppinger.

"It started with the drought which of course brought on millions of dead trees and led to massive wildfires," Coppinger told the crowd in downtown Sacramento. "Over 60% of our county has burned; we've lost thousands of homes and water systems even burned down."

Storms that finally moved in from the Pacific Ocean in 2017 may have tamped down drought conditions in Lake County, but they also sent a rush of mud and debris through burn scars and into neighborhoods. The scenario was replayed this past winter as well.

"If you've lived in California over the 10 years, this has been your life," said PPIC researcher Van Butsic of the alternating disasters.

While also prone to wildfires and earthquakes, floods are perhaps the largest hazard facing California's Central Valley.

State, local and federal governments have largely been able to protect the agricultural heartland over the last 100 years, but the risk remains for the over 6 million people now living in the basin.

The last major flood to hit the region was in January 1997, when the San Joaquin River and its tributaries jumped their banks and levees after a series of atmospheric rivers hit California. The

rivers breached levees and several reservoirs spilled over, flooding 250 square miles and over 20,000 homes in the valley.

Tim Ramirez, member of the Central Valley Flood Protection Board, says not enough has been done to shield the valley from another major flood. He added the major flood infrastructure from 1997 remains in place while the region's population has boomed.

"There's not a lot that's different from 22 years ago," Ramirez contends. "When this event happens, we're going to have all the same problems."

In the short term, Ramirez recommends that state and local agencies update evacuation plans and warning systems before the next flood hits. In the long term, dedicating more land to send water from the San Joaquin River and its tributaries during floods could alleviate pressure on dams and levees.

The report, issued before the Legislature resumes in January, calls for the creation of new incentives to spur water districts into implementing flexible management systems and make it easier for them to do things like trade water.

"The state can encourage improved cooperation and alignment among local jurisdictions, which make most frontline management decisions and are often leading innovation," the report states.

# # #

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Newsom must not cave to Trump on Delta water safeguards

Federal findings would enable shipping more water south, threatening native fish already on brink of extinction

Mercury News | October 23, 2019 | Editorial

The Trump administration this week continued its assault on the California environment, this time undermining decade-old protections for the Sacramento-San Joaquin River Delta.

New politically driven environmental findings announced Tuesday are designed to enable the shipping of more water to Southern California farmers, endangering the health of the Delta and threatening native fish that are on the brink of extinction.

The question now is whether Gavin Newsom will respond by standing up for protection of California's waterways with the vigor that he opposes Trump's attack on the state's auto emissions standards. Or will the governor capitulate to the same lobbying pressure from farmers and water agencies that are pushing the president's Delta policies?

It's time for Newsom to demonstrate that he's serious about protecting all aspects of the state's environment.

The Delta is the largest estuary west of the Mississippi, supplying fresh water for 25 million Californians, including about one-third of Bay Area residents. But decades of overpumping to Southern California and the Central Valley threatens the Delta's ability to provide fresh water for current and future generations. Climate change exacerbates the danger.

Ironically, the review of current pumping began during the Obama administration because of concern that fishery protections were not strong enough. Now the Trump administration has flipped the review on its head, using the effort to weaken those protections.

The push is being driven by politics rather than good policy, starting with Trump's insistence on clearing the way for delivery of more water to farmers and his disdain for Delta environmental protections.

The point person is Interior Secretary David Bernhardt, who was a lobbyist and lawyer for the 600,000-acre Central Valley Westlands Water District, which serves farmers who have been fighting for decades for more water from the Delta. Bernhardt personally argued an appeals case challenging salmon protections.

The Trump administration's new "biological opinions," released Tuesday, come from two agencies under Bernhardt's control, U.S. Fish and Wildlife Service and National Marine Fisheries Service.

The opinions claim that pumping more water south will not harm the estuary's Delta smelt, which are on the brink of extinction, and three types of salmon, which are endangered or threatened.

But that's not what experts in those agencies said last summer. In a July 1 assessment, federal scientists found that increasing water exports would harm endangered fish. That report was never released, and the team of scientists were replaced, according to the Los Angeles Times, which obtained the document.

The latest findings, of no potential harm to the fish from increased water exports, was produced by the replacement team.

The state Legislature, anticipating this moment, passed a bill this year that would have locked in for California federal environmental protections that were in place when Trump took office. But Newsom vetoed Senate Bill 1, saying the bill was unnecessary but assuring he would continue fighting against the Trump administration to protect the environment.

Now’s the time for the governor to prove it.

# # #

Federal officials rejigger rules on water deliveries — some say at expense of fish
San Francisco Chronicle | October 23, 2019 | Peter Fimrite

San Joaquin River water is pumped into small canals next to fields at the Patterson Westside Farms to irrigate crops, in Patterson, Calif. on Monday Jan. 27, 2014. The farm supplements the river water with water from the Patterson Irrigation District.Photo: Michael Macor / The Chronicle

The ongoing fight between environmentalists and agriculture over California's scarce water supplies was renewed Tuesday after the federal government issued a comprehensive plan to boost water "flexibility" that opponents claim is a giveaway to farmers tantamount to killing off imperiled fish.

The proposal, contained in an appraisal, or biological opinion, of the state and federal water distribution systems, loosens restrictions on water deliveries proposed in July by the National Marine Fisheries Service to protect chinook salmon, steelhead trout and delta smelt.

Environmental and fishing groups accused government officials of sacrificing protections for the fish — all listed under the Endangered Species Act — so they could boost deliveries from the Sacramento-San Joaquin River Delta to Central Valley farmers and Southern California cities.

"The Trump administration signed off on water operations that will drive salmon, smelt and other iconic species to extinction," said Kim Delfino, California program director for the conservation group Defenders of Wildlife. "These new opinions will be devastating for the bay-delta, its tributaries and the fish that rely upon the delta for their survival."

The plan won't be final until a review is completed in mid-January under the National Environmental Policy Act, but federal officials said fish protections will remain in place.

"We have worked diligently to be protective of fisheries and also protect water supply," said Paul Souza, the regional director of the U.S. Fish and Wildlife Service, which conducted the reviews. "It's important to understand that pumping will be curtailed if there are causes for concern — if fish are in an area of concern, pumping will be reduced."

Ernest Conant, regional director of the U.S Bureau of Reclamation, which manages the federal water system known as the Central Valley Project, said the plan calls for $1.5 billion to be spent over the next 10 years protecting endangered fish, including $14 million to help winter-run chinook salmon. Part of the plan, he said, is to retain more water behind Shasta Dam in Shasta County, the Central Valley Project's largest reservoir, so that salmon would have enough cold water in the Sacramento River to survive during dry years.

Conant said $50 million would be spent on delta smelt, including enhanced monitoring, with boats on the water several times a week. Pumping would be restricted when they are present to prevent the tiny fish from being sucked into the pumps, which has been an ongoing problem. A conservation hatchery would also be established for the smelt, Souza and Conant said.

"We don't have an estimate as to what the additional water supply will be, if any," Conant said Tuesday when questioned about concerns that farmers and Southern California will be getting more water at the expense of the fish. "That will be dependent upon hydrology and the behavior of fish. ... It could well be in some years decreasing," referring to water flows to farmers.

The huge pumps near Tracy used by the State Water Project and federal Central Valley Project to bring delta water to 25 million Californians and irrigate 750,000 acres of cropland have been the subject of years of legal wrangling among fishing interests, environmentalists, farmers and water agencies across the state.

The crux of the issue is the contention by environmentalists that the pumps suck up and kill endangered delta smelt, a silver-colored fish 2 to 3 inches long, uniquely adapted to the delta's shifting currents and brackish water.

Biologists say the nearly complete absence of smelt in recent years is a sign of the overall health of the ecosystem, including chinook salmon, which probably wouldn't still exist if not for hatcheries. As it is, conservationists say, not enough cold water is released from the dams to sustain endangered winter-run chinook or threatened spring-run chinook and steelhead, which spawn in tributaries of the Sacramento River.

Farmers, meanwhile, claim they are losing crops and money during dry years because regulations over the years have favored fish over food.

The latest dispute is over a decision to redo a biological opinion submitted in July that determined that pumping increases would, in fact, jeopardize not only fish in the the delta but also endangered killer whales, which eat salmon.

That finding of jeopardy, which would have required more severe restrictions on pumping, was suddenly pulled, and the new opinion, released Tuesday, removed the jeopardy finding.

Souza denied Tuesday that the report was revised because President Trump and Interior Secretary David Bernhardt, a former water lobbyist who has previously challenged fish protections, ordered him to maximize water deliveries to farmers.

John McManus, the executive director of the Golden Gate Salmon Association, a fishing industry advocacy group, doesn't buy it. He said Bernhardt did it to benefit his former employer, the Westlands Water District, which represents agricultural interests that have long pushed for larger water deliveries.

"They decided to take more Northern California water that is needed for salmon and give it to a small handful of almond and pistachio growers in the very dry western San Joaquin Valley," McManus said. "It's fair to say that Interior Secretary David Bernhardt moved directly from being a lobbyist and attorney for the Westlands Water District to being the chief architect of the Trump administration's effort to destroy the California salmon industry."

Westlands officials said they were still reviewing the biological opinion and declined to comment.

McManus said President George W. Bush's administration made the equally controversial decision to loosen environmental protections in the early 2000s. That was followed in 2008 and 2009 by the collapse of fall-run chinook salmon population, forcing a fishing ban off the coasts of California and Oregon.

The last biological opinion, issued in 2009 in response to the collapse, dramatically cut water exports in an effort to protect salmon and other imperiled fish, including green sturgeon, steelhead, longfin and delta smelt. The documents released Tuesday would replace those protections.

A lawsuit challenging the biological opinion is likely to be filed, conservation groups said.

# # #

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Biological opinions for long-term operations of the Central Valley Project and the State Water Project released
Maven's Notebook | October 22, 2019


Aerial view looking South along White Slough, part of the Sacramento-San Joaquin River Delta (Photo by DWR)

Paul Souza (USGWS), Barry Thom (NOAA Fisheries) and Ernest Conant (Reclamation) discuss the new biological opinions in a press call

The long awaited biological opinions have been released. Earlier this morning, Paul Souza, Regional Director for the US Fish and Wildlife Service; Barry Thom, NOAA Fisheries Regional Administrator; and Ernest Conant, Director of the Mid Pacific Region of the Bureau of Reclamation hosted a media call to discuss the new biological opinions.

Here's what they had to say. Following coverage of the media call, you will find links to the biological opinions and fact sheets. Here are reactions from water agencies, stakeholders, and elected officials.

"Back in August of 2016 the Bureau of Reclamation and the California Department of Water Resources jointly requested the reinitiation of Endangered Species Act consultation," said Erin Curtis, Assistant Regional Director, External Affairs for US Fish and Wildlife Service. "The Fish and Wildlife Service accepted the reinitiation request on August 3rd of 2016. The purpose of this call this morning is to provide information regarding the release of the Fish and Wildlife Service and National Marine Fisheries Services biological opinion. As a result of that consultation, each regional director will provide a brief statement."

PAUL SOUZA, Regional Director for US Fish and Wildlife Service

"We're here to announce the completion of the two federal agency biological opinions on this project. There is one from my agency, the U S Fish and Wildlife Service, and another from our counterpart, the National Marine Fisheries service. I really want to thank all of our teams for their unbelievable work over the past several months. They've just done a terrific job and all three of our organizations in concert with the Department of Water Resources and the state of

California have been working to negotiate protections for fish. We have worked hard to protect our fisheries and also find flexibility for water supply compatible with fish protection.

We know that water is the lifeblood of the environment in California. These two projects also provide water for 25 million Californians, including some of the richest farmland anywhere in the world. They provide water for some of our greatest cities like Los Angeles. These biological opinions and the Bureau of Reclamation's proposed actions reflect our collective efforts to protect our fish and meet the needs of these 25 million Californians.

We know that fish get the headlines a lot, but it's important to recognize these projects provide water for other important parts of the environment such as our national wildlife refuges and our wetlands. These are critically important for migratory birds. Together the Fish and Wildlife Service, National Marine Fisheries Service, and with the Department of Water Resources help have made significant improvements for fisheries since the original proposed action from the Bureau of Reclamation. I'd like to highlight several of them today.

It's important to know that the final proposed action was just accomplished last week, so we've been in real time negotiations from many, many months seeking to make sure we've got appropriate protections in place for fisheries. As a result, both of our organizations were able to reach no jeopardy and no adverse modification conclusions.

Now turning to some of the important modifications, I'll start with Delta operations. This has long been a cause for concern about fish being pulled into the pumps and also restrictions on pumping for water supply. We've been able to create a much smarter approach that focuses on real time management. We have tremendous new science now that we didn't have a decade ago. For example, we have an important effort called the enhanced Delta smelt monitoring program. We've got boats on the water several times a week. We know that the fish are in an area by the pumps and Reclamation has agreed to curtail pumping in that event. We also have more than 10 years of information about salmon being addressed by the pumps and Reclamation has agreed to pumping restrictions. If we see a cause for concern, our collective goal is to ensure that this operation is as or more protective as the last 10 years.

Moving to Lake Shasta, cold water management is extraordinarily important for winter run spawning Chinook. We have the Bureau of Reclamation's agreement to take actions that would hold Lake Shasta higher on average on May 1st – a greater cold water pool than we have in the last 10 years. We have a science based process where our team would get together and advise Reclamation on how to make best use of that cold water. Again, they'll have more cold water to support winter run spawning than we did in the last 10 years.

We also have made investments to expand the geographic distribution of salmon. For the last two years we've conducted a reintroduction effort of salmon to Battle Creek, which is a tributary of the Sacramento River. Reclamation, has agreed to $14 million of additional investment over the next 10 years. That will allow us to complete that work. We're seeing this come back already. We think we're going to see a lot more next year and this is going to allow us to expand the geographic distribution in a very significant way.

We recognize that Delta smelts are extraordinarily rare. A couple of years ago we convened the scientific forum to talk about the need for additional captive propagation and there's universal consensus in the scientific community of the need to expand our Delta smelt captive propagation. Reclamation has agreed to a significant investment with the state of California in a

conservation hatchery that will allow us to grow hundreds of thousands of fish per year and then conduct experiments to get them back into the Delta and hopefully recover this important species.

We also have a commitment to science that's clear and throughout the proposed action. In years four and eight of the 10 year plan, Reclamation agreed to conduct an independent scientific review of all operations so that we can take stock of our progress and also improve if there are changes that are necessary. There are several other independent peer review requirements as well throughout the document where there are causes for concern.

I'd like to put these biological opinions in context. We provide these opinions to Reclamation. Reclamation now will use them as it conducts its National Environmental Policy Act review. We expect that to be completed in January. The state of California has separate and important requirements for environmental review. They intend to have a public process that we'll be doing soon in that regard and we stand prepared to help the state in whatever ways that we can as it moves forward.

Finally, I'll make the point that we continue to support the voluntary settlement agreements. We appreciate the state's leadership in that regard and if those could come to fruition, we would see another significant investment in conservation in California.

BARRY THOM, NOAA Fisheries Regional Director

First of all, I want to thank the Bureau of Reclamation and the Department of Water Resources for working with us over the past nine months since they gave us a proposed action, and the innumerable questions and comments, and working through the proposed actions so that we better understood the effects as well as being able to make changes to that proposed action as we worked through that consultation effort. I also want to thank our NOAA fishery staff. We've put a tremendous amount of staff resources into this consultation – probably more than any other consultation I know I've been involved with. There were a lot of strict timelines and resources and staff time and people sacrificed a lot to get to where we are today and I just want to commend that effort.

It has been an amazing effort overall as NOAA fisheries worked through the consultation. While there are many projects and effects that we have looked at as we went through the consultation, there were four main areas where we had been focused on. Paul mentioned a couple of those, both the operation of Shasta reservoir and water temperature management focused on winter run Chinook salmon in the system, the Delta pumping piece and a couple of others. The Bureau of Reclamation has highlighted areas where they have made changes to help address some of those risks. We identified that the temperature management is a key component. The Bureau has agreed to improve temperature management especially in the good water years to help protect winter run salmon similar to the, the good runs we're having right now that had been protected by good adequate water temperature. They also have in the dry and drought year times both non flow and flow actions that they'll take in those years to help mitigate and offset some of that risk.

When it comes to pumping in the Delta, that has been a concern. BOR has committed to keep the pumping and fish impacts in the Delta at or below the levels we saw in the previous biological opinion. They have also committed to increased steelhead monitoring for fish coming out of the San Joaquin. That's been a critical area for our work and looking at its steelhead

coming out of the San Joaquin River and how we can better protect those fish moving forward. Couple of other areas like operation of the Delta, cross channel Gates and looking at how their real-time management would be consistent with what we previously saw for protections as well as low winter flows in the Sacramento river.

There is a tradeoff in having to hold back flows to make sure we have adequate flows for winter run, spawning and incubation; at the same time that potentially has impacts in the fall and winter for flows. Looking at the modeling, they were able to assure us that those was what stayed the same or better than what they were in the previous biological opinion. They've also highlighted some habitat restoration and other activities to help offset some of those effects as well.

So as we worked through that, the National Marine Fisheries Service was able to come to a conclusion that the proposed action as we worked through this entire consultation would not jeopardize the species under NOAA Fisheries jurisdiction. Moving forward, we recognize there are effects from the project, but that the Bureau has put forth those safeguards to minimize and constrain those impacts over the life of the opinion.

ERNEST CONANT, Regional Director of the Mid-Pacific Region of the Bureau of Reclamation

As you know, Reclamation operates the Central Valley Project and the California Department of Water Resources operates the state water project combined. The two projects provide water to over 25 million Californians and millions of acres of some of the most productive farmland in the world. These projects also helped support important commercial and recreational fisheries, wildlife refuges, and significant recreational opportunities and ensure that many rare and unique species have adequate available water.

For the past 10 years, the CVP and SWP have operated to standards outlined in a set of 2008 and 2009 biological opinions. A lot has changed in a decade. The state, Reclamation and our respective contractors have invested significant resources to advance the science and technology used to inform our operations and the impacts that they may have on species. In January, we released a proposed action infused with new scientific information and asked Fish and Wildlife Service and the National Marine Fisheries Service to provide their opinions on the proposed operation. The three agencies in cooperation with DWR have worked tirelessly over the last few months to adapt Reclamation's proposed operations in a way that strikes that balance between providing water for farms and communities and protecting the environment. They went through unprecedented collaboration in the scientific review.

We have a plan that is much better for fish, farms, and communities than our current operations. The proposed plan includes an estimated $1.5 billion investment to support endangered fish over the next 10 years. It Includes operations that will yield bigger cold water pool and better cold water management at our largest reservoir at Shasta near Redding. It includes smarter Delta operations through real time adaptive management to greater management oversight of Delta pumping operations informed by updated science. It calls for significant investments in hatcheries to include approximately $50 million for a conservation hatchery in the Delta to assist in the recovery of Delta smelt and other species.

It includes a $14 million investment by Reclamation that will accelerate work underway at battle Creek and the program to reintroduce winter run salmon and the Sacramento river and its

tributaries. It will include the commitment to use the newest science and latest scientific thinking to ensure Reclamation's updated operations are benefiting fish.

On behalf of Reclamation, I want to express my appreciation to Paul and Barry for their leadership and the hard work undertaken these last few months by our multiple disciplinary multiple agency team of experts. Today, we have a proposed operation that is better for the environment and better for farms and communities."

# # #

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Trump administration releases plan to deliver more water to Valley
The Sun | October 22, 2019 | Alex Tavlian

Oct. 22, 2019: 10:45 a.m.: Looking to ease a decade-long restriction on pumping water south from the Sacramento–San Joaquin Delta into the San Joaquin Valley, Federal authorities released new biological opinions governing the Central Valley Project on Tuesday.

Drafted by the U.S. Fish and Wildlife Service and National Marine Fisheries Service along with the Bureau of Reclamation, the new governing documents arrived one year after a presidential memorandum from President Donald Trump expedited the review of Central Valley Project operations and environmental standards.

A key change for Valley farms, which could translate to greatly increased water delivery, comes from the new methods of operating the Delta itself.

The U.S. Bureau of Reclamation will end rigid calendar-based restrictions on Delta pumping, which served as the standard operations under the 2008/2009 biological opinions, the agency announced during a conference call Tuesday.

“We’ve been able to create a much smarter approach that focuses on real-time management,” Paul Souza, regional director for U.S. Fish and Wildlife told reporters. “We have tremendous new science that we didn’t have a decade ago.”

In its place, the agencies will engage in real-time monitoring of threatened fish populations in the Delta by boat and triggers in order to adjust pumping as needed.

The agency did note that it will still reduce pumping during spawning and migration of endangered fish species.

“The biological opinions being replaced were based on an arbitrary, calendar-based approach, and have not delivered the successful recovery of salmon and Delta smelt populations,” said Mike Wade, executive director of the California Farm Water Coalition.

Fish and Wildlife’s Souza noted a key factor in increasing flexibility to pump water under the new biological opinions was to ensure protection of fish was at or above the level created by the last set of biological opinions.

California Republicans in the House, led by House Minority Leader Kevin McCarthy (R–Bakersfield) and Rep. Devin Nunes (R–Tulare), took a victory lap on a long-sought policy change to improve water delivery for the San Joaquin Valley.

“For years, communities across California have been denied water, while protected fish species have also struggled due to decade-old regulations based on even older science and data,” a statement from the California Republicans read. “Yesterday’s actions by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service to replace these failed regulations with new biological opinions based on the latest science and data is a welcome step in the right direction.”

“It is our hope that the implementation of these new regulations will bring better protections for listed fish species and the environment, as well as increased flexibility regarding CVP and SWP

operations to help ensure our constituents receive the water they are entitled to or contract and pay for."

Other key details

The new operations plan for the Delta also includes a bevy of other environmental measures affecting fish populations:

A 10-year, $1.5 billion investment to "support endangered fish species."

Increased cold-water pool for Sacramento River winter-run Chinook salmon in Lake Shasta along with a 4-tiered cold water management plan for the species.

Funding a conservation hatchery in the Sacramento-San Joaquin Delta to aid in recovering Delta smelt and other threatened or endangered fish species.

Playing the allocation game

Under the prior regime of opinions, Valley farmers were often left playing a guessing game as to when and how much water would be allocated by Reclamation under the Central Valley Project.

Reclamation regional director Ernest Conant said that 2020 water allocations would be made utilizing the standards outlined in the newly-issued biological opinions.

However, he preached caution and added that Reclamation's initial water allocations – typically announced in mid-February – would continue to be conservative and increase depending on conditions.

This tracks with the allocations made in 2019, a well-above average year in hydrologic terms.

Reclamation's first allocation for agricultural users in the south-of-Delta region was 35 percent of their contracted amount.

By mid-June, following five allocation updates, that figure ballooned to 75 percent.

Oct. 21, 2019, 10 p.m.: A long, contentious chapter in California's Water Wars is set to close.

In its stead, a new, likely equally contentious chapter is likely to begin. And, as always seems to be the case, the setting is the San Joaquin Valley.

Federal officials are likely to offer a preview of what's to come on Tuesday, but that preview arrives after a yearlong slog behind the cloak of the Federal bureaucracy.

One year ago in Phoenix, President Donald Trump signed off on a memorandum of executive action pushing two Federal agencies, the Department of Interior and Department of Commerce to begin reconsidering the biological opinions that serve as the underpinning of California's current water delivery via the Sacramento-San Joaquin Delta.

For those who don't speak water, the biological opinions at play here are critical documents that determine the impact pumping water may, or may not, have on certain species of fish.

These fish species include the infamous two-inch delta smelt.

Currently, the State Water Project and Central Valley Project are managed under biological opinions issued in 2008 and 2009.

The State Water Project is administered by California's Department of Water Resources while the Central Valley Project is operated by the Bureau of Reclamation.

Trump's memorandum, in short, required new biological opinions to be issued by the end of 2019 utilizing up-to-date scientific methods and standards to determine the impact of operating the Central Valley Project on endangered species.

Tuesday, the three agencies tasked with updating the biological opinions – the Bureau of Reclamation, U.S. Department of Fish and Wildlife, and National Oceanic and Atmospheric Administration Fisheries – are expected to unveil the new biological opinions in some form.

California's preemptive strike

For environmental groups, any tweak to the biological opinions governing the CVP spells disaster.

During the past legislative session in the California State Legislature, environmentalists earned a moral victory with the passage of Senate Bill 1, which would tie California's water delivery standards to the Federal biological opinions on the books as of Jan. 19, 2017.

The bill – labelled as a pre-emptive move to counter the Trump administration – was met with its fair share of detractors, including four Democratic Congressmen from the Golden State and Sen. Dianne Feinstein.

Ultimately, Gov. Gavin Newsom sided with opponents and vetoed the measure, arguing that the bill did little to protect the environment and hampered California's ability to utilize up-to-date science.

Moving forward

Late Monday, representatives from the three Federal agencies published an commentary in CALMatters discussing the future of water management for the Central Valley Project and State Water Project.

To the casual observer, it's a teaser for the new biological opinions still to-be-released.

For the San Joaquin Valley, a critical element of any new plan for the two water projects is pumping operations from the Delta down south to fertile farmland.

One barrier that has led to vastly curtailed pumping during the past decade is the threat of having fish trapped in the Delta pumps. Moving forward, there appear to be new methods that will be employed, so say the Feds.

"…[The] Bureau of Reclamation and Department of Water Resources have agreed to real-time Delta pumping operations based on new science and performance metrics to avoid fish getting trapped at the pumps," the Op-Ed from the department heads reads.

In the Op-Ed, they note that the new operations plan will be at least as protective if not more so than prior strategies implemented by the Bureau of Reclamation and Department of Water Resources.

What additional promises lie ahead will only be determined when Federal authorities go public with their plans on Tuesday.

# # #

Trump rewrites Delta rules to pump more California water to Valley. Will Newsom fight him?

Sacramento Bee | October 22, 2019 | Dale Kasler

President Donald Trump's administration rolled out an aggressive plan Tuesday to ship more water from the Delta to farmers in the San Joaquin Valley, a move that's certain to trigger lawsuits by environmentalists concerned about endangered fish species.

The move, fulfilling vows Trump made as a candidate and as president, potentially sets up another confrontation with California officials. State officials have previously warned that Trump's plan would hurt the fish that ply the Delta — and force the state to cut back its own water deliveries through the Delta to make up for the feds' actions.

Gov. Gavin Newsom's administration declined to offer an immediate judgment on the Trump administration's plan. Lisa Lien-Mager, a spokeswoman for the California Natural Resources Agency, said: "We will evaluate the federal government's proposal, but will continue to push back if it does not reflect our values."

The administration's plan consists of hundreds of pages of technical "biological opinions" from scientists at the U.S. Fish and Wildlife Service and National Marine Fisheries Service that will serve as a blueprint for how water will be funneled through the Sacramento-San Joaquin Delta — and how much will be pumped south to Valley farmers. The new rules wouldn't take effect until January at the earliest.

The administration insisted its plan, while designed to deliver more water to the Valley, will protect Delta smelt, Chinook salmon and other fish that are listed under the Endangered Species Act.

The plan "will not jeopardize threatened or endangered species or adversely modify their critical habitat," the administration announced.

Under the current system, which has been in place for a decade, the state and federal pumping stations in the south Delta sometimes have to be shut off to safeguard fish, allowing water to run out to sea. Trump administration officials said the existing rules rely on rigid and outdated scientific standards that limit pumping operations without really helping fish, whose numbers have declined dramatically in recent years.

Federal officials said they can't estimate how much additional water their plan will generate for south-of-Delta water agencies. But they promised to strike a balance between human and environmental needs.

"We have a plan that is much better for fish, farms and communities," said Ernest Conant, regional director of the U.S. Bureau of Reclamation, which runs the federal government's Delta pumping stations near Tracy.

Among other things, the fisheries agencies already "have boats on the water several times a week" to make sure nearly-extinct smelt and other fish aren't in harm's way, said Paul Souza, regional director of the Fish and Wildlife Service. The plan also lays out a strategy for storing more cold water in Shasta Lake, which will help the salmon population as it's released into the Sacramento River.

Trump's plan calls for an estimated $1.5 billion for habitat restoration projects, enhanced fish hatcheries and other programs to prop up fish populations. Conant said funding would come from the state and federal governments in roughly equal amounts.

Critics in the environmental community, however, said fish populations will suffer even more as additional water is moved south and fish get sucked into the pumps.

"It looks like this administration is trying to shut us down again — permanently," said John McManus, president of the Golden State Salmon Association, which represents commercial and recreational fishermen. Defenders of Wildlife said it plans to take the administration to court to block the decision.

In August, The Sacramento Bee and other media outlets reported that after federal scientists concluded that the plan would bring the salmon closer to extinction, their superiors ordered them to redo their study to downplay the impact on fish.

But federal officials rejected any suggestions Tuesday that the final version reflected pressure from above. Souza said the plan was the work of "career conservation professionals."

Gov. Newsom vs. Trump

The release of the biological opinions could put Gov. Gavin Newsom in an awkward spot. His administration has shown disdain for practically every Trump initiative, and pledged originally to fight Trump's Delta plan, saying the state's "commitment to environmental values is unsurpassed."

The Delta plan creates other potential headaches for the state. The State Water Project and the federal government's Central Valley Project both move water through the Delta to their respective customers — mainly Valley farmers for the feds and millions of urban Southern Californians for the state.

If the feds push more water through the pumps, the state could have to leave more water in the Delta to comply with state environmental laws, meaning there would be less water available for the State Water Project.

Yet it wasn't immediately clear whether Newsom would try to kill the Trump plan. The Democratic governor has tried to forge compromises with Valley farmers on water issues. In September he infuriated environmentalists by vetoing SB 1, a bill designed to negate every environmental policy proposed by Trump. His reasoning: SB 1 was so rigid that it would have killed a delicate truce between environmentalists and agriculture on reallocating the state's major rivers.

Trump has been adamant about his desire to help the Valley, a Republican stronghold that is chronically scrambling for water. His Interior secretary, David Bernhardt, is a former lobbyist for Westlands Water District — the Valley's largest agricultural water user.

Just about a year ago, he signed a presidential memorandum directing agencies to speed up their review of rules governing the movement of water throughout California.

"I hope you'll enjoy the water you have," he told a group of Republican Valley congressmen as he signed the memorandum.

During his lone 2016 campaign appearance in Fresno, he belittled environmental rules that “protect a certain kind of 3-inch fish,” a reference to the nearly-extinct fish.

Farm groups applauded the new Delta plan. “This is the dawn of a new science-based approach to water and ecosystem management,” said Mike Wade of the California Farm Water Coalition. “We are anxious to put these new policies into practice and expect to see a positive response for water users and the environment in the years to come.”

Congressional Republicans from California also chimed in. The new plan will “help ensure our constituents receive the water they are entitled to or contract and pay for,” said a group of seven congressmen, including Devin Nunes, Tom McClintock and House Minority Leader Kevin McCarthy of Bakersfield, in a joint statement.

Congressional Democrats — including U.S. Sen. Dianne Feinstein, considered a leader on water issues — said they would take a wait-and-see approach.

# # #

Emily Cadei of the McClatchy Washington bureau contributed to this story.

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Trump Water Rules Erode Protection for Endangered Salmon
KQED | October 22, 2019 | Lauren Sommer

The Sacramento-San Joaquin Delta provides drinking water for two-thirds of Californians and three million acres of farmland. (Ken James / California Department of Water Resources)

The Trump Administration announced today that its new water plan would not kill off endangered salmon, contradicting federal biologists who found the plan would drive endangered salmon closer to extinction.

The Administration has been promising Central Valley farmers more water, but would not say in a press conference today whether the new plan will deliver on that campaign promise. Ernest Conant, regional director for the Bureau of Reclamation, says the plan will have to be in place for awhile before he could say whether it will give more water to farmers.

“It could very well in certain years decrease it,” he said.

The administration’s new water rules control irrigation for millions of acres of farmland in the country’s biggest agricultural economy, drinking water for two-thirds of Californians from Silicon Valley to San Diego, and the fate of endangered salmon and other fish.

An analysis completed by NOAA Fisheries biologists in July found the administration’s plan jeopardized the future of endangered fish. Under federal law, the biologists are then required to put limits on it, like restricting how much water can be pumped to farms from the state’s rivers.

Instead, the administration removed those biologists from the project and brought in other staff to rewrite their decision.

“We’ve been able to create a much smarter approach that focuses on real-time management,” said Paul Souza, U.S. Fish and Wildlife Service Pacific Southwest regional director. “Our commitment is that we will be as or more protective than we have been in the last 10 years.”

The water pumping rules are integral to the majority of California, since they govern a crucial water source: the Sacramento-San Joaquin Delta.

The water is also crucial to the survival of endangered salmon and threatened delta smelt, whose numbers have plummeted. Chinook salmon have lost as much as 90 percent of their historic river spawning grounds due to dam construction. As their numbers have gone down, so have endangered killer whales in the Pacific, which feed on the salmon while the fish are at sea.

The administration's latest plan creates new hatcheries to breed fish and relies on real-time monitoring to track the location of threatened fish. Administration officials say they plan to slow pumping when fish are nearby.

Environmental and fishing groups say the decision is scientifically unsound and shows political interference. Prior to becoming Interior Department secretary, David Bernhardt was a lobbyist for Westlands Water District, a major agricultural district in the Central Valley.

"The servile Interior Department has hijacked and subverted the scientific process," said Noah Oppenheim, executive director of the Pacific Coast Federation of Fishermen's Associations in a statement. "Fishing jobs are being sacrificed to benefit the corporate agriculture lobby, pure and simple."

What are these water rules?

The rules, known as “biological opinions,” generally have put environmental safeguards on the vast network of dams and pumping plants in California. At least two-thirds of Californians use water from this system, which goes through the delta. But it’s also meant dramatically altering the ecosystem.

Since salmon are born in rivers and migrate through the delta to reach the ocean, the rules have generally done two things. First, they slow speed of the massive pumps in the south delta, in order to protect fish from being drawn into the pumps. Second, they ensure salmon eggs in the Sacramento River aren’t killed by hot temperatures -- that requires conserving water behind Shasta Dam so it can be released in the summer to keep the river cool.

Central Valley politicians and agricultural interests have long fought these rules, which reduce their water supply in some years.

When the Bureau of Reclamation, which delivers water to the Central Valley, proposed pumping more water from delta, it then fell to federal wildlife agencies to review that decision and write up what are called biological opinions. The agencies must put limits on the water pumping if they find the rules would harm endangered species. In this case, NOAA biologists did find that, but before their biological opinions were released in July, the Trump administration replaced the biologists with new staff to redo the analysis.

Fast-Tracking the Science

In October 2018, President Trump ordered that the water rules be written faster than ever before.

“We will have it done very, very quickly,” Trump said to members of the California GOP congressional delegation last October, as he signed an executive order. “I hope you enjoy the water that you’re going to have.”

According to emails obtained last winter by KQED, NOAA Fisheries scientists were concerned they didn’t have the resources to analyze the plan.

In July, those scientists found that the increased water pumping would “jeopardize” the existence of salmon and other species. Before that document was released, the Trump Administration brought in a new team of federal attorneys and decision makers to work on the rules, removing the biologists who had previously worked on it.

In the version released today, the Trump Administration found their plan would not jeopardize the existence of salmon or delta smelt.

What Are the Changes in the New Plan?

The Trump Administration says it will run its water-pumping operations based on real-time monitoring of fish populations, slowing pumping to avoid harming them when they’re near water infrastructure. Because of that, it can’t say how much water will reach farmers in the Central Valley.

“It’ll be some time before we operate in this new plan and be in a position to actually determine definitively whether and to what extent the new plan actually increases water supply,” said Ernest Conant, regional director for the Bureau of Reclamation. “It could very well in certain years decrease it.”

Environmental groups say monitoring the fish provides an inadequate look at where they are, because it’s difficult to track them when there are so few left.

“The new biological opinions eliminate the existing guardrails that limit real-time pumping, and simultaneously increase the number of salmon and other endangered species that can be killed,” said Doug Obegi of the Natural Resources Defense Council.

The administration says it will also share the cost for $1.5 billion in restoration and habitat projects. It plans to support a hatchery to breed delta smelt, a species on the brink of extinction and restore creeks vital to salmon.

What’s next?

The new rules could go into effect early next year, affecting the water deliveries for cities and farms during the spring and summer. But fishing and environmental groups are likely to sue, charging the rules don’t go far enough to avoid extinction of endangered species. Depending on what a judge decides, the rules could be tied up in court for years.

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California fights Trump on everything — except water
Politico | October 21, 2019 | Debra Kahn

Central Valley farmers are looking forward to the imminent federal release of new biological opinions, which dictate how much water can be exported from the state's two main rivers and their tributaries.

MANTECA — California is providing health care to undocumented immigrants while President Donald Trump wants to build a border wall, and Gov. Gavin Newsom circumvented the White House with a side deal on auto emissions standards.

But when it comes to water, Trump and California are closer than you might think.

About 90 minutes from the deep blue coast, the predictable political fault lines stop at the Central Valley, home to the state's $70 billion agricultural industry.

Environmental laws, droughts and urban growth have led to a three-decade decline in farm water and stoked an acidic political logjam visible to anyone who's driven down Interstate 5, the backbone of the state's highway system. Billboards accuse House Speaker Nancy Pelosi of ushering in a "Congress-created dust bowl" and declare "No water = no jobs" through the arid, 450-mile-long valley.

Trump is now poised to deliver on a 2016 promise to send more water to the region. His administration today issued major changes that relax endangered species protections for salmon and Delta smelt, a 3- to 4-inch fish that has long served as a punching bag for Central Valley leaders.

Newsom normally revels in rebuking Trump, but the governor shocked environmentalists last month with the speed with which he essentially sided with the president by blocking legislation that could have stopped Trump's endangered species rollbacks.

While the Democratic governor has held press conferences bashing Trump within hours of the administration's past moves on immigration and emissions, Newsom officials struck a far more cautious tone Tuesday. The governor didn't mention the announcement on Twitter, and California Natural Resources Agency spokesperson Lisa Lien-Mager said in a statement: "We will evaluate the federal government’s proposal, but will continue to push back if it does not reflect our values.”

"Clearly this governor is making a play for the Central Valley to be nice to agriculture, and I think they're playing him like a fiddle," said one longtime environmental advocate who spoke on condition of anonymity to avoid political repercussions.

Newsom hasn't been the only California Democrat siding with farmers. Sen. Dianne Feinstein (D-Calif.) and the House Democrats' Central Valley contingent took the rare step of coming out against the state environmental legislation before Newsom vetoed it.

Rep. Josh Harder, a Democrat who defeated former Rep. Jeff Denham (R) last year in a toss-up district, was part of the congressional effort to soften the bill that would have potentially blocked Trump's environmental rollbacks. At a recent town hall in Manteca, Harder had no problem lambasting the Trump administration over the auto emissions fight and other green issues, declaring that "California is in a war with the Trump administration over environmental standards and vice versa."

Asked about his stance on water, though, Harder was more circumspect. "My biggest job is reminding people that California is more than San Francisco and Los Angeles, and nowhere else is that more true than on water issues," he told POLITICO in an interview.

"The water politics that I'd like to get away from, that I think most people in our community would like to get away from, is a zero-sum mentality where an environmentalist or fish has to lose in order for a farmer to benefit, and vice versa," Harder said.

That stance makes sense in the Central Valley, according to one longtime area politician. "Trump is trying to move more water; a Democrat should be cautiously supporting the movement of water, but wary of old fights like fish vs. farms," said former state Sen. Dean Florez, a Democrat from Shafter, on the southern end of the valley.

Indeed, Central Valley farmers are looking forward to additional water as a result of the new "biological opinions."

"There's a lot of things that Trump does that make sense, okay?" said Kole Upton, a second-generation almond, pistachio and corn farmer in Chowchilla, located in the center of the state. "If he was more tactful about it and didn't rub the Democrats' nose in it, he'd probably get more help."

Democrats from the region Tuesday were measured and did not condemn Trump's plan for California's main water-delivery system. Harder and other Central Valley Democrats, along with Feinstein, said they will examine the changes and conceded that the science underpinning the Obama-era rules was “more than a decade old and needed to be updated, especially given climate change.”

California’s Central Valley Republican contingent, led by House Minority Leader Kevin McCarthy, cheered the new rules, calling them “a welcome step in the right direction."

The changes potentially set up a conflict between federal and state water contractors by allowing the Bureau of Reclamation to operate its side of the system differently. Given California's zero-sum water situation, it would open up an entirely new front in the state's perpetual water wars, which are currently at a simmer thanks to recent wet winters.

"It's looming as another facet of the battle between Trump versus California, but it's more nuanced than vehicle emissions standards or homelessness or any number of issues," said Rick Frank, an environmental law professor at the University of California, Davis and former state deputy attorney general. "Water politics and water law are all more nuanced."

The federal government's biological opinions dictate how much water can be exported from the state's two main rivers, the Sacramento and San Joaquin, and their tributaries.

Normally, California certifies that the opinions meet state endangered species protections, which are slightly different, and the projects operate as one. The two sides of the system, linked by shared canals, reservoirs and pumping plants, are essentially conjoined twins that share key anatomical features; they have to operate in a coordinated fashion.

Senate President Pro Tem Toni Atkins thought to head off the conflict by empowering the state to quash the biological opinions. Senate Bill 1 would have specified that the California Endangered Species Act takes precedence over federal law, presumably forcing the Bureau to operate under state endangered species law.

Democrats elsewhere in California warn that the new biological opinions were marred by political influence. They point to the influence of Interior Secretary David Bernhardt, who used to work as a lobbyist for Westlands Water District, the largest customer of the federally run Central Valley Project.

"I'm very disappointed that all these folks appear to be just fine with the environmental baseline getting yanked backwards," said Rep. Jared Huffman, a Democrat who represents a long, rural swath of Northern California coast. "They're either silent or complicit in the federal rollback of protections for salmon and now have prevented us from putting a really important backstop in place."

How Newsom responds to the biological opinions will be telling. Environmentalists are fast losing faith in the governor, whom they view as ultimately motivated by a future presidential run.

"It's going from leaning left to leaning right, and I think it has to do with his political ambitions," said the longtime environmental advocate. "When he runs for president and he wants to demonstrate to flyover country that he was friendly to agriculture."

Newsom justified vetoing SB 1 in part by arguing that it didn't provide the state any new authority, which confounded environmental groups.

"Based on everything he said publicly, I really don’t think the governor fully understood what was in the bill," said Kathryn Phillips, director of Sierra Club California. "Either that or he was trying to mislead the public about what was in the bill. In either case, we ended up with a veto that results in not giving the state a key tool it could use to fight the Trump administration’s efforts to manipulate science to satisfy a small but powerful platoon of water contractors and big farming interests.”

Given the likelihood of legal challenges from all sides that could take years to resolve — a suit against the original 2004 biological opinion for smelt is still working its way through the courts — the episode may wind up transcending today's political fault lines altogether.

"Experience says there are no deadlines in water. Everything gets pushed back. They set these artificial deadlines and everything gets pushed back and the solution of all this is probably going to take years," said Jeffrey Mount, a think tank fellow with the Public Policy Institute of California.

"Administrations come and go," he added. "Federal administrations come and go. One might follow the Chinese proverb: 'If you wait by the river long enough, the body of your enemy will float by.'"

# # #

A new approach for managing California's water and improving the environment
CalMatters | October 21, 2019 | Guest Commentary

By Paul Souza, Barry Thom, and Ernest Conant, Special to CalMatters

The San Joaquin-Sacramento Delta provides much of the water used by California farmers and cities. But it also is habitat for salmon and smelt that are endangered by water pumping. (Photo courtesy of U.S. Fish & Wildlife Service)

Water is at the center of California's economic and environmental health. The need to maintain reliable water supply for California's farms, families and cities while protecting the environment has been at the forefront of our minds as we have worked to review and finalize a new operations plan for the federal Central Valley Project and the State Water Project.

Together, these projects provide water for 25 million Californians and millions of acres of some of the most productive farmland in the world.

The projects impact but also protect important commercial and recreational fisheries, wildlife refuges, and rare species.

Our three federal agencies have been developing and reviewing the proposed new operations for the Central Valley Project and State Water Project, and their effects on imperiled species, with the goal of ensuring they provide flexibility and water supply while also protecting the environment.

As a result, the U.S. Bureau of Reclamation, in coordination with the California Department of Water Resources, has made several changes that address our goals to use the best available science, collaborate with partners, protect fisheries, and optimize water supply.

The plan includes a new approach to the challenging issue of cold water management at Shasta Reservoir, which is critical for spawning winter run Chinook salmon.

With these new approaches, modeling shows that more cold water should be available in Lake Shasta to help successful egg incubation.

The Bureau of Reclamation has proposed a new system of operating in a flexible way based on storage and has incorporated a new commitment to performance objectives and scientific peer review. Collectively, these new approaches will improve the likelihood that drought effects on winter-run Chinook will be lessened.

In addition, the Bureau of Reclamation and Department of Water Resources have agreed to real-time Delta pumping operations based on new science and performance metrics to avoid fish getting trapped at the pumps.

This regime includes curtailing pumping when fish are at risk. The Bureau of Reclamation's commitment is that fisheries protections through Delta operations will be at least as protective or more so than previous strategies.

Further, the plan builds in $1.5 billion from the federal and state water projects to enhance science, restore habitat, and conserve hatcheries. These investments include millions of dollars for a conservation hatchery in the Delta that will assist the recovery of the Delta smelt and other species of concern.

Hatcheries have had an important long-standing role in fisheries protection in our country, and this action will help us meet our conservation goals in the San Francisco Bay and Delta. Our hatchery actions will occur in tandem with augmenting the food web and habitat restoration to improve the condition of these species in the wild.

The plan also expands efforts underway with Coleman National Fish Hatchery near Red Bluff and Livingston Stone hatchery in Redding to jumpstart the reintroduction of imperiled winter-run Chinook salmon populations into Battle Creek in Red Bluff.

This includes a commitment from the Bureau of Reclamation to spend $14 million to accelerate the work being done at Battle Creek to reintroduce salmon. We also are committed to our partnership with commercial and recreational fisheries organizations to use creative approaches for improving the health of salmon populations through our hatchery efforts.

Given the importance of salmon fisheries to Californians, our organizations have worked diligently to add strong safeguards with the goal of improving salmon since the difficult drought years of the last decade.

Two of the last water years have been above average hydrologically, and these conditions, in concert with project operations, are showing evidence that populations will improve.

Our estimates suggest the number of winter-run spawning is the highest in at least a decade. Early reports suggest that fall-run returns will be high as well.

Thanks to the diligent work of our dedicated staff, the U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration concluded that the proposed operations will not jeopardize threatened or endangered species or adversely modify their critical habitat.

The plan provides the foundation for a more flexible operation that will allow us to achieve multiple goals. It also complements efforts underway by California to finalize voluntary agreements with water users.

In partnership, we can advance conservation efforts that are critical to this great state's economy and vitality.

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They wrote this commentary for CalMatters.

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California Water Czar Seeks Resource Collaboration, Not Combat
Bloomberg Enviroment | October 8, 2019

E. Joaquin Esquivel, chairman of the California State Water Resources Control Board.

For E. Joaquin Esquivel, California has made great strides in fighting climate change and transitioning to a cleaner energy sector.

Now, he said, it's water's turn.

"Water, I think, is ready for that moment," said Esquivel, the chairman of the California State Water Resources Control Board who took over from longtime chair Felicia Marcus in February.

The board has a broad mandate to oversee water resources and drinking water for the protection of the environment, public health, and other uses. That includes managing water rights and dealing with rural water issues, the latter of which is the topic of an Oct. 8 webinar on which Esquivel is speaking.

Esquivel, 37, was named chairman by Gov. Gavin Newsom (D) in February, two months after the board ordered changes to water management in the Sacramento-San Joaquin River Delta that angered agriculture interests, who said it would mean more water for fish and less for people.

Newsom at the time said Esquivel was the person to balance the state's myriad water needs, from providing water to cities, to farms, and for the environment.

"We need a portfolio approach to building water infrastructure and meeting long-term demands," Newsom said.

In his time as chairman, Esquivel has traveled much of the state and to Washington, meeting with local, state, and federal players about the Salton Sea, cross-border contamination from Mexico, sustainability, agricultural needs, drought planning, and using technology to better manage water resources.

He also led the board when it established a rule to better protect wetlands and establish a safe and affordable drinking water program that would provide $1.3 billion over 10 years for water for nearly 1 million residents whose supplies are contaminated.

“Joaquin has both the opportunity, and I think the charge, from Governor Newsom to recraft the conversation between parties traditionally in conflict,” said Dave Puglia, executive vice president of Western Growers, an association that advocates for family farmers in California, Arizona, Colorado, and New Mexico. “I think the governor found the right person for a really tough task.”

Numerous Issues

Aside from the drinking water fund, the water czar has a lot to oversee.

A multiyear study to find the source of contamination from per- and polyfluoroalkyl substances, or PFAS, is underway. Reusing water, ensuring cannabis cultivation doesn’t harm drinking water or wildlife, and regulating groundwater use are also part of his charge. A controversial plan to build two water delivery tunnels is now back on the table, but slimmed down.

The water board’s parent agency, the California Environmental Protection Agency, also has been charged with working with the Natural Resources Agency and Department of Food and Agriculture to plan for water needs and resiliency efforts for the 21st century.

“The complexities of the issues are pretty astronomical,” Esquivel said. “Climate change will make more difficult the ability to deliver clean and affordable drinking water.”

Public Service Career

Much of Esquivel’s career has been in public service and politics. He was born and raised in Southern California’s Coachella Valley, where water scarcity and air pollution problems persist. Esquivel earned a bachelor’s degree in English from the University of California, Santa Barbara.

He spent two years in the early 2000s as a center youth manager for Gay Associated Youth in Palm Desert and then went to work as an unpaid intern for former Sen. Barbara Boxer (D-Calif.) in Washington.

The office staff liked him so much that the next paid job that came open was his. The English major became the systems administrator, overseeing technology and email initiatives.

“I was not a tech giant and Joaquin had this amazing faculty for learning and understanding everything,” Boxer said. “He was so smart and so good we started to give him different issues.”

Over his eight years with the senator, water policy and tribal issues were added to his duties. Esquivel left Boxer’s office in 2015 to become assistant secretary for federal water policy for the California Natural Resources Agency. He was appointed to the Water Resources Control Board in 2017.

‘He’s a Friendly Guy’

Esquivel has a partisan background, but he’s open-minded, approachable, and pragmatic, Puglia said.

“That means a lot in a state where we’ve had plenty of water conflict and still do,” he said. Puglia is also vice chairman of the Public Policy Institute of California’s Water Policy Center Advisory Council, of which Esquivel is a member.

Farmers and water regulators don't always get along in California. State and federal authorities oversee water allocations and storage through a complex system of dams, reservoirs, wetlands, rivers, conveyance tunnels, and hydropower facilities.

Two-thirds of the precipitation falls in the northern part of the state, but two-thirds of the population lives in the dryer south. People and crops need water, and so does the ecosystem to support fish, wildlife, and habitat. Agriculture likely will have to fallow, or abandon, 500,000 acres of farm and ranch land as part of state orders to protect groundwater aquifers following California's 2011 to 2015 drought.

"I think he's interested in what people have to say," California Farm Water Coalition Executive Director Mike Wade said. "He's a friendly guy. He's accessible."

More Technology Use

Esquivel, who in his spare time likes to code programs for his home utilities and even for his fish tank, wants to foster more use of technology at the water board, to make the agency more efficient and able to respond to current conditions, including weather.

"I think he recognizes that there's fast, cheaper, smarter ways of getting some of these projects done rather than the water quality control plan that was adopted in December," Wade said.

Wade said it hopes Esquivel will be able to make changes, "but the water board is more than just the chairman. Getting big change is difficult. It moves at the speed of government."

Esquivel doesn't flinch at acknowledging the board could do things better and pay attention to other issues.

"We're not always good at understanding complex systems," he said during a meeting earlier this year.

For him, it's time for the water-wars mindset to end.

"The story of western water is the taking and the fighting," Esquivel said. "The reality is it's sharing. That's the real story—the collaboration of water."

# # #

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Chinook Salmon Flocking to Revitalized San Joaquin River
Courthouse News | October 8, 2019 | Nick Cahill

The San Joaquin River outside Fresno, California. (Nick Cahill/CNS)

FRESNO, Calif. (CN) – A staggering number of Chinook salmon are returning to a California river that hasn't sustained salmon for decades due to agricultural and urban demands, giving biologists hope that threatened fish are finally spawning in their native grounds without human help.

Officials working on a restoration program announced Tuesday that they have counted a record number of spring-run Chinook salmon fish nests (redds) so far this fall on a stretch of the San Joaquin River near Fresno. Program staff has discovered over 160 redds with several weeks to go, toppling the total of 40 recorded in 2018.

Not only have the number of redds increased, biologists say many of them appear to have been fashioned by fish that weren't hatchery raised or part of the billion-dollar program – meaning salmon were able to swim from the Pacific Ocean and through dams on their own.

"The volume of returns is a complete surprise," said Pat Ferguson in a statement, a program fish biologist with the California Department of Fish & Wildlife.

Biologists say the quadrupled number of redds is exciting considering they have only released 37 adult female salmon this year to breed in the river below Friant Dam. There are other signs that natural or "volitionally passed" salmon have returned to the river: Biologists have found untagged spring-run carcasses in recent weeks.

"The majority of the fish that we're seeing in the river spawning right now don't appear to have tags," said Lori Smith, a program fish biologist with the US Fish & Wildlife Service.

Smith said it is possible that the salmon lost their tags during their 370-mile journey back to the river, but genetic testing will ultimately confirm if they were hatchery bred or not.

Tuesday's announcement is the second major milestone for the restoration program this year, as in April spring-run Chinook adults returned to the river for the first time in 65 years. The hatchery salmon returned from the ocean on their own in the spring but had to be transported by researchers to bypass a series of dams and diversion canals.

Biologists believe an abnormally wet rainy season may have helped some of the fish return to their ancient spawning grounds on their own.

"We appear to be seeing spring-run Chinook able to make it up into the restoration area on their own to spawn," said Donald Portz, program manager. "It's likely springtime high flows provided an opportunity for fish to get over obstacles that would normally limit their ability to migrate," he said.

Salmon and other species disappeared from California's second largest river in the 1940s following the opening of Friant Dam. Today, parts of the river often go dry during certain times of the year and other sections have manmade barriers that prevent salmon from reaching their spawning beds.

Because of a nearly two-decade-long lawsuit fought by the Natural Resources Defense Council, things are changing on the heavily altered San Joaquin. A settlement with the federal government reached in 2006 set goals of restoring native fish populations to "good condition" without overtly damaging water suppliers' take of the river. The state and federal government plan to spend over $1 billion to restore flows, wetlands and fish to the river.

Doug Obegi, lawyer with the council, said the increased redds are encouraging and a "sign that the river is ready for fish" in high-water years like 2018-19.

"It's great to see salmon returning after so many decades, and it's a reminder that when we add water to our rivers, they will return," Obegi said in a phone interview. "It's a little bit like the 'Field of Dreams;' if you build it, they will come."

Obegi added the next major steps for the program are finishing a bypass that will allow salmon to swim upstream in low water years and improved fish screens near smaller dams and water intakes.

"We were starting from probably one of the most degraded states and yet it's showing that in just a few years of work, we are seeing the river come back to life," Obegi said.

# # #

California as an Example for Managing Urban Water in Drought Periods
Meeting of the Minds | October 7, 2019

California's drought-prone climate, diverse and decentralized landscape of urban water suppliers, and complex water system make it something of a laboratory for testing ways to manage water scarcity. The state's urban water suppliers have become particularly adept at managing drought, and this sector has become a leader in water use efficiency, recycling, supply diversification, and integrated management.

But the 2012–16 drought revealed that California's urban areas must continue innovating to ensure water systems are resilient to climate change. Unusually severe, this drought included the driest four-year stretch in 120 years of record keeping. Record-high temperatures and record-low precipitation reduced water stored in mountain snowpack and intensified drought conditions in other ways—making it more like droughts of the future that are expected to result from a changing climate. It pushed numerous native fish species to the brink of extinction, which disrupted water supply from some sources and raised conflict over water used to support habitat and species. It resulted in unusually large drops in groundwater levels in some regions. And it prompted the state to implement statewide rationing of urban water use—an unprecedented and controversial intervention with potentially wide ranging consequences for how future droughts may be managed.

The PPIC Water Policy Center reviewed how California's urban water suppliers responded to this and other recent droughts and examined the state's evolving role in urban drought management. We surveyed 173 urban water suppliers from across the state, and met with local suppliers and state water officials. The resulting report, Building Drought Resilience in California's Cities and Suburbs, recommended actions to increase urban drought resilience. The lessons learned from this research have relevance for other urban areas facing drought.

Prolonged droughts can disrupt service, harm customers, and weaken utility finances, and few water suppliers come through the worst droughts unaffected. But most of California's urban suppliers were better prepared this time due to preparations made during earlier droughts—including investing heavily to diversify supplies with new surface and underground storage, interconnections with neighboring suppliers, recycled wastewater, and water trading agreements, as well as freeing up supplies by reducing indoor water use (see Figure 1).

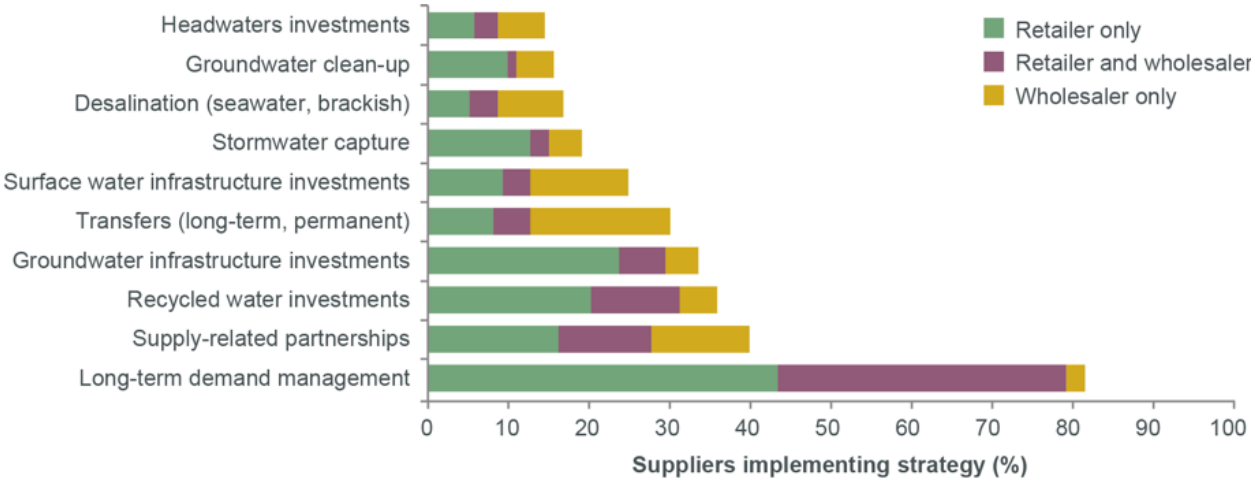

Figure 1: Local suppliers implemented a variety of reliability strategies before the drought.

Mandatory Rationing: A Blunt Instrument

In past droughts, mandatory rationing decisions were made by local authorities while the state focused on supporting better local drought planning and greater water system flexibility, such as through water trading. But in 2015, the state; concerned that urban water suppliers were not prepared to weather a more prolonged drought, imposed a conservation mandate to reduce water use by an average of 25 percent. By some measures, the mandate was a great success. Californians cut water use by 24 percent from June 2015 to February 2016, compared to the same months in 2013; more than double the savings achieved under a voluntary program in 2014. And the urban economy remained robust, growing faster than the national average.

But the state conservation mandate was a blunt instrument. Respondents to our survey of water suppliers noted that it limited the usefulness of strategies such as trading and drought reserves because it required water suppliers to reduce consumption even if they could augment their supply. The following comments from survey respondents reflect these concerns:

“Our city had invested $10 million in water banking facilities for the specific purpose of providing water during a drought. However, under the state’s mandate, any water used from the banking facilities would have been counted as ‘consumption’…. Since we were mandated to reduce consumption, we could not take advantage of the supplies in which we had previously invested.”

“The state conservation target did not encourage agencies to use supplies specifically developed for drought. There was no benefit, and in fact, there was a disincentive to using banked groundwater supplies and facilities that had been invested in specifically for drought situations.”

In our view, the mandate also reflected a lack of awareness of most urban suppliers’ willingness and ability to make further cuts in water use where and when they were needed. As we documented in our report, most urban water suppliers were implementing their drought contingency plans in 2014 and were on track to achieve the demand reductions called for in those plans. For the most part, the level of demand reduction varied in direct proportion to the severity of regional supply conditions, indicating that cuts in water use were being made where they were most needed. But this information was not filtering up to the state, which was basing its assumptions primarily on highly aggregated data and summary statistics that did not reflect what was actually occurring on the ground. As a result, the mandate generated discord between the state and local water suppliers. And it muddied the waters in terms of state and local roles and responsibilities going forward. If these issues remain unaddressed, it could undermine effective planning and response to future droughts.

In response to local suppliers’ concerns and following somewhat better rains in early 2016, the state authorized utilities to opt out of the state mandate by “self-certifying” that they had adequate supplies to weather at least three more years of drought without mandatory rationing. Eighty-three percent of suppliers chose this option. This change, too, was controversial. Conservation advocates raised concerns that switching back to local control would undermine the water savings achieved under the state mandate. Water suppliers, meanwhile, emphasized that while they are committed to the state’s long-term conservation goals, some easing of restrictions was appropriate in communities with adequate supplies.

Ways Forward

We find that two key factors are important for improving urban drought preparation and response. They point to a strategy to better manage water, and not just during drought.

Second, there are two components to drought resilience strategies: developing water supply reserves and managing short-term demands. California's urban sector had invested vast sums to diversify supply and storage since the last major drought in the late 1980s and early 1990s. But the state mandate focused exclusively on managing demand, essentially ignoring the difference these investments made to local supply conditions.

As a result, most water suppliers surveyed for this study said the rationing requirement was excessive given their water supply conditions at the time. Communities were required to cut use even if they had invested in supplies specifically developed for drought situations, such as banked groundwater. Managers noted that uncertainty about future state policy could discourage such investments, which are a pillar of drought preparedness funded principally by local ratepayers.

Coordinated approaches are preferred for building urban drought resilience. Over the long term, a "trust but verify" policy can be more effective than the "better safe than sorry" approach of the mandate because the former encourages local suppliers to continue investing in diversified supplies. A good model is the stress-test approach the state adopted toward the end of the drought, which allowed local utilities to drop mandated conservation if they could demonstrate that they had drought-resilient supplies to last three more years. Had this system been in place at the start of the drought it is unlikely the state would have adopted the conservation mandate. Instead, it could have directed resources and technical assistance to those urban suppliers that were facing especially challenging supply risks.

In the wake of the drought, the state has adopted measures to improve information sharing, including a system for urban suppliers to provide regular updates on their supply situations. To encourage all agencies to prepare for more extreme droughts, urban water management planning documents must now address how suppliers would manage longer droughts.

Other lessons learned that can apply to other regions seeking to managing water shortages include:

Fostering water system flexibility and integration.

Urban utilities should seek to build cost-effective supply portfolios that are robust to prolonged droughts, including being able to store water for dry times, develop drought-resilient supplies (for example, recycled water), and interconnect with neighboring utilities to create supply redundancies and pathways for delivery of emergency water. Cooperative regional approaches can enable joint investments and the ability to more easily coordinate responses as a drought unfolds. Regional water sharing agreements also increase flexibility to respond to droughts in ways that lessen the costs of shortages. Although urban water suppliers have the primary responsibility for planning and funding supply portfolios, states often have key regulatory roles that help define what is possible. Removing barriers to water trading and non-traditional supplies can help urban water suppliers weather shortages. Urban agencies in farming regions can also do more to enable recharge of underground basins, for example, by partnering with nearby agricultural districts or water banks.

Improving water suppliers' fiscal resilience.

Fiscal vulnerability of water suppliers was widespread in California's latest drought, causing more than 60 percent of all suppliers to experience declines in their net financial positions. For those in the business of selling water, the drop in water use during drought can bring financial strains, and rates often have to adjust to cover fixed costs. We recommend that as soon as a utility knows it will have to ask customers for drought savings, it should inform them about how that could affect rates. Some communities found that drought surcharges worked well. The key is to have a plan, communicate in advance, and engage the public in understanding the issue of balancing revenues and costs.

Balancing long-term water use efficiency and drought resilience.

In California, a large fraction of drought reserves in urban areas comes from water applied to landscapes during normal hydrologic conditions. During droughts, this water can be repurposed to more essential uses and help mitigate economic losses. Policies focused on squeezing water out of urban landscapes may worsen drought resilience unless accompanied by storage or exchange arrangements so that the water can be called upon when drought strikes. If instead water savings are simply used to support future growth, drought resilience will suffer. As water managers look to make long-term gains in water use efficiency, they must recognize that reducing water used by urban landscapes will make it harder to cut water use quickly during future droughts. Utilities can address these trade-offs by explicitly considering them in their drought planning; for instance, by allocating some long-term savings to a reliability reserve. States can help by developing model shortage contingency plans or cases studies under different mixes of urban water use, and update planning guidelines to address the implications of demand hardening on drought response. Long term, making supply resilience a way of life must go hand in hand with making conservation a way of life.

Droughts test water management systems and expose their weaknesses, and are significant events for urban water suppliers and the communities they serve. Even for states that are less drought-prone than California, these kinds of strategies and policy approaches can help urban areas prepare for a future with a warmer, more volatile climate.

# # #

By Ellen Hanak, Director of the PPIC Water Policy Center, and David Mitchell, CoFounder & Principal at M.Cubed

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New Laws Address Safe Drinking Water, Groundwater Recharge, River Health
Public Policy Institute of California | October 22, 2019 | Gokce Sencan

It's been an eventful year for California water policy. A milestone law to address the state's drinking water challenges, which was signed by Governor Newsom earlier this year, established a $1.3 billion Safe and Affordable Drinking Water Fund. In line with its broader policy focus on climate resilience, the administration is also creating a Water Resilience Portfolio Initiative, a collaborative effort by various state agencies to ensure water resilience in the face of a changing climate. A number of bills recently signed into law build on the progress made in this area. Here are some highlights:

Safe drinking water: Continuing the forward momentum of the drinking water fund, two new laws tackle water quality and supply, especially in rural, disadvantaged communities. Assembly Bill (AB) 508 authorizes the State Water Board to order water system consolidations in communities with domestic wells that consistently fail to provide safe drinking water. The bill also requires the board to ensure the consolidation is financially and technically possible, and to compensate for financial losses experienced by the water system that takes over the small system. And Senate Bill (SB) 513 authorizes the State Water Board to provide immediate relief for households whose wells have gone dry due to droughts or other disasters.

Groundwater recharge: A new law will also make it easier for water users to bring their groundwater basins into balance—another key to long-term water resilience. AB 658 seeks to enable more recharge of depleted basins, one of the most promising approaches for addressing groundwater overdraft. The bill streamlines the permitting process for groundwater sustainability agencies (GSAs) and other local agencies to divert surface water for groundwater recharge. This tool is timely for the GSAs; those in the most overdrafted basins are now finalizing plans to manage their basins under the Sustainable Groundwater Management Act.

Health of rivers, lakes, and streams: Challenges with freshwater quantity and quality for ecosystems were addressed by two new laws. SB 19 addresses a key data gap that makes it harder to manage water for ecosystems, especially during droughts. California currently lacks stream gages—which help monitor water levels—on half of the rivers and streams that support critical habitats. The bill requires the Department of Water Resources and the State Water Board to develop a plan to modernize and expand the state's stream gage network. And to address a growing water quality threat, AB 834 establishes a program to mitigate harmful algal blooms in California's rivers, lakes, and estuaries, which pose a health threat to people and animals. The program will assess and monitor algal blooms, and publish the incidents and the resulting action online.

There is no one-size-fits-all solution for California's complex water challenges. This legislative cycle brought a range of solutions, from those with a broad scope, like data collection, to more targeted tools to address groundwater recharge and dry wells. Both types of approaches are needed to strengthen existing policies and take our water management forward.

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Groundwater Recharge Projects Get Boost Under AB 658

New California Law to Help Achieve SGMA Requirements

Best, Best and Krieger, LLP | October 16, 2019 |

Assembly Bill 658, signed into law last week, creates new temporary diversion permits allowing for excess surface water capture during high-flow events. Permits automatically expire after 180 days, unless renewed. The law is designed, in part, to encourage groundwater recharge projects that could assist groundwater sustainability agencies and other local agencies to achieve groundwater sustainability requirements under the Sustainable Groundwater Management Act, known as SGMA.

AB 658 establishes two new or modified types of permits that the State Water Resources Control Board may issue: temporary permits for diversion to underground storage and temporary urgency permits. It also authorizes the Board to issue temporary change orders for existing permits and licenses, including for underground storage.

Under the new law, groundwater sustainability or local agencies may apply to the Board for a temporary permit for diversion to underground storage. This is provided that the diversion is for the beneficial use of achieving the agency's groundwater sustainability goal under SGMA. The applying agency does not need to have an existing permit or license to divert surface water to obtain a temporary diversion permit. Similarly, any person with an "urgent need" may apply to the Board for a temporary urgency permit to divert excess surface waters.

Before issuing a temporary permit to divert water to underground storage, the Board must make five general findings:

1. the diversion is to underground storage for the beneficial use of achieving a groundwater sustainability agency's goal under SGMA,
2. the diversion will not interfere with other lawful water users' rights, including a user's ability to meet water quality objectives,
3. the diversion does not unreasonably affect fish, wildlife or other instream beneficial uses,
4. the diversion is in the public interest and
5. the diversion will comply with any existing groundwater sustainability plan, interim plan or alternative plan that may apply to the groundwater basin where the diverted water will be stored.

Any proposed diversion may not exceed the claims of downstream users, and instream flow requirements and water quality objectives will need to be met downstream of the diversion. Notably, extraction of stored groundwater under the permit must be accounted for and reported pursuant to an existing groundwater sustainability plan, interim plan, alternative plan or conditions imposed by the Board under the permit.

In applying for a permit, an agency must satisfy several criteria, including:

- completing environmental review required by the California Environmental Quality Act, unless an exemption applies,
- consulting with the Department of Fish and Wildlife at least 30 days before submitting the application,
- performing a water availability analysis and
- providing an accounting method for storage and extraction under the permit.

AB 658 provides groundwater sustainability agencies and local agencies with added flexibility in groundwater sustainability planning, and options and risks should be carefully considered.

# # #

For more information about this new law and how it may impact your agency, contact the author of this Legal Alert listed at the right in the firm's Environmental Law & Natural Resources practice group or your BB&K attorney.

Please feel free to share this Legal Alert or subscribe by clicking here. Follow us on Facebook @BestBestKrieger and on Twitter @BBKlaw.

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New California Law Creates Path to Water Industry Jobs for Vets
Water News Network | October 16, 2019

State legislators, water industry leaders, veteran advocates and business and community organizations gathered at the Veterans Museum in Balboa Park Oct. 16 to celebrate Gov. Gavin Newsom's signing of AB 1588 by Assemblymembers Todd Gloria (San Diego) and Adam Gray (Merced). The law creates a path to water industry jobs for military veterans. Photo: Water Authority

State legislation co-sponsored by the San Diego County Water Authority and the Otay Water District has been signed into law, making it possible for veterans to receive credit for their military education and experience when applying for civilian water and wastewater system operator certifications in California.

State legislators, water industry leaders, veteran advocates and business and community organizations gathered at the Veterans Museum in Balboa Park today to celebrate Gov. Gavin Newsom's signing of Assembly Bill 1588.

The bill was introduced in the state legislature by Assemblymembers Todd Gloria (San Diego) and Adam Gray (Merced), and co-authored by several state legislators, including Assemblymember Tasha Boerner Horvath (Oceanside).

The Water Authority and the Otay Water District co-sponsored the bill to increase the number of military veterans entering the civilian water and wastewater industry at a time when many Baby Boomers are retiring.

'Silver Tsunami' of retirements in water industry

"The new law helps our communities two ways – by lowering employment barriers for our veterans and sustaining our vital water and wastewater services for the next generation," said

Water Authority Board Secretary Christy Guerin. “This was a victory for San Diego and the whole state – a successful, bipartisan effort that will help maintain our economy and quality of life.”

The Water Authority and its 24 member agencies have created a regional workforce development task force to address the “Silver Tsunami” of retirees. The task force reported that there are approximately 4,500 water and wastewater positions in the San Diego region – and more than 1,400 of those workers are expected to reach retirement age by 2024. Statewide, there are approximately 6,000 active certified wastewater treatment plant operators and approximately 35,000 drinking water treatment and distribution operators.

Several states help veterans navigate the civilian water system operator certification process and allow veterans to apply equivalency standards to credit military experiences toward state or industry certifications in water and wastewater treatment and distribution. However, no similar approach existed in California.

State legislation introduced by San Diego Assemblymember Todd Gloria (far right) and Merced Assemblymember Adam Gray creates a path to water and wastewater industry jobs for military veterans. AB 1588, signed into law by Gov. Newsom, was co-sponsored by the San Diego County Water Authority and the Otay Water District. (L-to-R in photo: Mark Balmert, Executive Director, SDMAC, Jose Martinez, Assistant Chief Water Operations, Otay Water District, Christy

Guerin, Board Secretary, San Diego County Water Authority, and Assemblymember Gloria). Photo: Water Authority

Creating bridges to water industry jobs

“What we are missing, and what this bill addresses, is a pathway in which we honor the experience of our veterans and allow that experience to qualify them for a career path in our civilian water systems,” said Assemblymember Todd Gloria. “Thanks to Governor Newsom, that pathway now exists. California will now properly credit the service of our veterans and enable them to secure good-paying jobs here in our water system. In this time – when the importance of clean water and good paying jobs is undeniable – let’s create bridges not barriers.”

AB 1588 provides a pathway for military veterans to apply their advanced skills and experience toward state and industry-supplied certifications in the water and wastewater treatment and distribution operator fields. Additionally, it ensures that advanced water treatment operators and distribution system operators of potable reuse and recycled water facilities have a career advancement path as certified water and/or wastewater treatment plant operators.

“San Diego County is home to more than 240,000 veterans with skills that benefit our region in numerous ways,” said Assemblymember Tasha Boerner Horvath of Encinitas, a co-author of the bill. “With this legislation, we are building stronger communities that can remain home to servicemembers after they take off the uniform and transition into civilian life.”

Veterans continue public service in water industry

Assistant Chief of Water Operations at the Otay Water District Jose Martinez is a veteran who initiated the idea of the bill and has thrived in the civilian water industry. “As someone who had the pleasure to serve alongside the members of the military responsible for the safe and reliable operation of water and wastewater systems, I observed firsthand their education, experience and dedication,” he said.

“Now, as a water manager responsible for providing safe and reliable water and wastewater services to the public, I championed this bill to provide a path for veterans to receive the certification credit they have earned after years of service. This will ensure that the water sector continues to recruit from the biggest and best talent pools to provide the highest level of service to everyone.”

# # #

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Opinion: How shutting off power makes it harder to fight fires

The public safety paradox: No power equals no water, and no water means real problems

Mercury News | October 29, 2019 | Martin A. Kropelnicki

(Karl Mondon/Bay Area News Group) Water supplies are critical for fighting fires. But, at a certain point, no power equals no water,

The widespread power shutoffs by electric utilities to prevent wildfires have ushered in a new era for Californians — a scenario all too real for millions of people who reside in high-risk fire areas. While these recent shutoffs are well-intentioned, we should apply some lessons learned from them to minimize the public safety, economic and societal impacts on our state and communities.

We understand the need for shutting off power to prevent wildfires, but the very point of cutting power could affect a critical tool to fight fires: water. That's not only ironic but potentially catastrophic.

Water utilities such as California Water Service rely on electricity to provide water for everyday and emergency needs. If a water utility experiences a sudden outage — or goes without electricity in a wide area or for a prolonged period — its ability to provide water service could be reduced or interrupted. Cal Water has gone to great lengths to decrease this risk — including purchasing more than 60 portable emergency generators for the 2 million customers we serve from Westlake to Willows to supplement the permanent generators we've already been installing over recent decades, staging these generators at critical sites, making sure there is

plenty of fuel available to run them, and having personnel prepared to support a multi-day event around the clock.

At a certain point, however, no power equals no water, and no water means real problems, not just for water utilities but also for other critical service providers such as hospitals, law enforcement and communications carrier infrastructure.

We fully recognize the economic and emotional toll the power shutoffs have on everyone affected. Schools cancel classes. Day cares close. Businesses shut down, resulting in lost revenue and lost wages for employees. Groceries are spoiled because of lack of refrigeration. There are many, many unintended consequences that need to be factored in, carefully planned for and ultimately accounted for.

From a public policy standpoint, critical service providers need a more reliable structure than the current Public Safety Power Shutoff system provides. Right now, all power in designated areas is shut off without prioritizing.

That needs to change.

We need a more precise and prioritized system for the way power shutoffs are implemented. We need updated guidelines to keep the power running to critical service providers and water utilities, such as Cal Water, because if a fire breaks out, we're going to need water to put it out.

On behalf of the 2 million people we are honored to serve, we look forward to seeing structural changes that will ensure we have the power we need to provide water, especially when it's needed the most by our state's firefighters.

# # #

Martin A. Kropelnicki is president and chief executive officer of California Water Service, the state's second-largest water utility and the largest regulated water utility west of the Mississippi River. The utility, which serves about 2 million people through 486,900 service connections in the state, from Chico in the north to the Palos Verdes Peninsula in the south, has provided water service in California since 1926.

PHOTO: FRACTA

In 2011, The San Francisco Public Utilities Commission evaluated the risks of in-city water distribution lines as part of a larger effort to prioritize main replacements before breaks happen.

Using Artificial Intelligence to Influence Water Infrastructure

Prioritizing pipe replacement before breaks happen

THE SAN FRANCISCO Public Utilities Commission (SFPUC) is the third largest municipal utility in California, serving 2.7 million residential, commercial and industrial customers in four Bay Area counties. Approximately 1,240 miles of distribution pipe deliver water to the residents within San Francisco.

These pipes are comprised of buried cast iron (61 percent), ductile iron (29 percent) and steel (10 percent), with 184 miles of cast iron pipe being more than 100 years old and another 386 miles of cast iron pipe being 75–100 years old.

In 2011, SFPUC evaluated the risks of in-city water distribution lines as part of a larger effort to prioritize main replacements before breaks happen. As part of this effort, SFPUC developed total risk scores for all of its San Francisco distribution pipes. This scoring resulted in approximately 25 percent of the system (about 310 miles) being identified for a priority replacement goal of 15 miles per year. The assessment criteria for this model are "priority" pipelines, hydraulic improvements, operational improvements, recent main breaks, seismic backbone and other replacement projects in the area.

Stemming from the evaluation, SFPUC began a capital improvement program that strives to annually replace several miles of its aging water distribution mains at a rate of 15 miles per year. Even with this increase, however, the replacement need for aging pipes kept continuing to grow.

As a result, SFPUC has been

actively seeking more innovative ways to efficiently maximize its funding by using proactive strategies to identify, prioritize and extend the life of pipes that, while old, may not need a timely replacement.

USING MACHINE LEARNING TO SUPPLEMENT EXISTING PIPE REPLACEMENT METHODOLOGY

In 2016, Fracta began developing a cloud-based software-as-a-service (SaaS) using artificial intelligence (AI) and Machine Learning to assess the condition of drinking water mains to help large utilities better assess pipe replacement decisions and allocate funding.

The Fracta solution calculates and visualizes the Likelihood of Failure (LOF) for every water pipe segment in a utility. This LOF score represents the mathematical probability of pipe failure. Recently, Fracta expanded its solution to assess the Consequence of Failure (COF), which determines the severity of a failure and quantifies the direct and indirect costs of water main failures.

When LOF and COF are calculated, they're then placed in the Business Risk Analysis (BRE) formula:

LOF (%) x COF ($) = BRE ($)

BRE is calculated in terms of direct and indirect costs.

To support its capital improvement program, SFPUC allowed Fracta to use its distribution data and collaborated with engineers and scientists from Fracta to develop a large, data-driven method to further support pipe replacement decisions.

SUPPORTING REPLACEMENT EFFORTS FOR SFPUC

In 2017, Fracta modeled SFPUC's 1,240 miles of drinking water pipes in San Francisco and subsequently commercialized its Pipeline Condition Assessment model in 2017. In 2018, SFPUC incorporated Fracta's LOF output as additional assessment criteria and is now using Fracta as a supplemental tool for selecting which pipes to replace. This is applied in cases of "borderline" pipes, where SFPUC's existing risk score does not provide clear direction on a pipe's need for immediate replacement.

After taking into account the difficulties of facilitating construction projects in a dense urban environment, SFPUC currently achieves a replacement rate of 10–13 miles of pipe per year. This is a large improvement over the previous replacement rate of 3–5 miles per year.

However, even with these improvements, the original goal of replacing 15 miles per year is not sufficient to keep up with the aging that occurs with the utility's water mains. Fracta helps SFPUC to prioritize replacement. These efforts have been successful, as they strategically defer aging lines that can be deferred while focusing on lines that need replacement.

OPTIMIZING DECISIONS – REDUCING BREAKS

In an effort to select and prioritize projects, SFPUC continues to supplement its current methodology with AI and Machine learning to better assess and predict a pipeline's LOF.

For example, using AI and Machine Learning, SFPUC can predict pipe failures on pipes that have never failed before. Meaning, if a pipe had a failure on one block, the Fracta solution can predict if pipelines in the area will have a failure within the next five years based on that failure, pipe characteristics and pipe surrounding characteristics (soil, density, etc.).

PHOTO: FRACTA

The Fracta solution calculates and visualizes the Likelihood of Failure (LOF) for every water pipe segment in a utility.

SFPUC planners have seamlessly incorporated this additional SaaS source of information in the way they prioritize pipeline replacement.

Fracta's solution can also be connected to other important software applications used by water utilities, including enterprise asset management (EAM), computerized maintenance management systems (CMMS) and hydraulic modeling.

For utilities that don't have a robust dataset on historical leaks and breaks, the utility can use the Fracta model to assist in getting a baseline of predictions of failures based on the distribution system information and other characteristics of the area where the utility is located. As the utility collects more data and supplies it to the Fracta model, the failure predictions will improve.

Fracta can complete LOF, COF and BRE assessments for an entire water main distribution system in 4 to 8 weeks. The results can then be visualized and new data can be uploaded and modeled several times per year. This enables near-real-time assessment of the system.

ADDING VALUE

Machine Learning supports a new way of aligning maintenance, repair and replacement strategies. This tool enables fast, accurate and cost-effective water main repair, rehabilitation and replacement decisions. These decisions better allocate capital expenditures and reduce operating expenses.

With this process, planners increase the reliability of the San Francisco distribution system. This, in turn, saves ratepayer resources from having to respond to avoidable main breaks and ensures customers continue to receive reliable, high-quality water from their taps. WE

***Doug Hatler** is chief revenue officer at Fracta Inc.*

Taking on Tough Challenges at the State Water Board
Public Policy Institute of California | October 29, 2019 | Lori Pottinger

The State Water Board is central to addressing many of California's major water challenges, including protecting water quality for drinking and for the environment, addressing drought and water conservation, and managing the allocation of surface water. We talked to Sean Maguire, a civil engineer who was appointed to the board by former governor Brown in December 2018, about priority issues.

PPIC: What are the big challenges the board is grappling with right now?

Sean Maguire: At the top of our list is the Bay Delta water quality control plan. The plan, which covers the Sacramento–San Joaquin watershed and Delta, must ensure a reliable water supply and protect the basin's fisheries and ecosystems. We're working through a process that is very complex and has a lot of moving pieces—and right now it's unclear if we're on track to meet all of these goals. But it's exciting to think there is a stakeholder-devised solution at hand—the voluntary agreement process—which would set out a plan to manage multiple rivers in a coordinated way, coupled with large-scale habitat restoration and science programs. There is still a long ways to go, but I have hope that voluntary agreements will prove to be the best path forward.

At the same time, we're preparing for climate change. It's clear that going forward we have to be incredibly efficient in our water management. The last drought resulted in legislation to establish indoor and outdoor water use efficiency targets and to require urban suppliers to develop stronger drought contingency plans. Many small water systems rely on a single source—most often groundwater—and we're helping them find opportunities to connect to larger communities and identify new supplies. This is where water portfolios can help build resilience to drought and get us ready for a changing climate.

And finally, the most exciting news is the establishment of the Safe and Affordable Drinking Water Fund earlier this year. California has 7,000 water systems and hundreds of thousands of residents using domestic wells—a situation that presents a lot of challenges because many struggle to meet drinking water standards. The fund is a high priority for us, and we're

committed to coming up with a plan and policies to implement it, while also working on projects that can get started right away.

PPIC: Talk about contamination challenges.

SG: Water contamination is a huge challenge for the whole state. There are so many different sources, and many contaminants of emerging concern. The board is at the beginning of tackling PFAS contamination. This is a class of “forever chemicals” used in a wide range of products—for example, nonstick coatings, water repellants, take-out containers, and fire retardants. We’re moving quickly to better understand the risk by requiring testing wells in close to possible source sites (such as defense facilities, landfills, and airports), and also requiring those facilities to test local groundwater. We are also working to understand the human health effects, which will take some time.

PPIC: What gives you hope?

SG: In the past year, there’s been incredible collaboration surrounding really controversial water issues that have lingered for decades. I’m very hopeful about the stakeholder-informed solutions that are arising out of these processes. In addition to the Bay Delta process, we now have a strong wetlands policy—a collaborative solution that was a decade in the making. We have another stakeholder plan to address legacy pollution from farming and other discharges in the Central Valley. I hope we can repeat this type of collaboration with other issues and in other watersheds across the state. I have a lot of hope for the groundwater sustainability plans that are being developed now in the state’s overdrafted basins. And I believe the governor’s upcoming water resilience portfolio will give us a roadmap to help California prepare for the climate changes to come.

The state has a lot of complex water problems, and we can’t untangle them all with one brilliant policy change. But we’re making progress on many difficult issues, and I’m committed to keeping up the momentum.

# # #

The World Can Make More Water From the Sea, but at What Cost?
New York Times | October 22, 2019 | Henry Fountain

The main desalination plant at King Abdullah University of Science and Technology in Thuwal, Saudi Arabia.

THUWAL, Saudi Arabia — Desalinated seawater is the lifeblood of Saudi Arabia, no more so than at King Abdullah University of Science and Technology, an international research center that rose from the dry, empty desert a decade ago.

Produced from water from the adjacent Red Sea that is forced through salt-separating membranes, it is piped into the campus's gleaming lab buildings and the shops, restaurants and cookie-cutter homes of the surrounding planned neighborhoods. It irrigates the palm trees that line the immaculate streets and the grass field at the 5,000-seat sports stadium. Even the community swimming pools are filled with hundreds of thousands of gallons of it.

Desalination provides all of the university's fresh water, nearly five million gallons a day. But that amount is just a tiny fraction of Saudi Arabia's total production. Beyond the walls and security checkpoints of the university, desalinated water makes up about half of the fresh water supply in this nation of 33 million people, one of the most water-starved on Earth.

Worldwide, desalination is increasingly seen as one possible answer to problems of water quantity and quality that will worsen with global population growth and the extreme heat and prolonged drought linked to climate change.

"It is a partial solution to water scarcity," said Manzoor Qadir, an environmental scientist with the Water and Human Development Program of United Nations University. "This industry is going to grow. In the next five to 10 years, you'll see more and more desalination plants."

Saudi Arabia and other countries in the Middle East and North Africa are at the center of this growth, with large new desalination projects planned or being built. Renewable water supplies in most of these countries already fall well below the United Nations definition of absolute water scarcity, which is about 350 gallons per person per day, and a 2017 report from the World Bank suggests that climate change will be the biggest factor increasing the pressure on water supplies in the future.

Yet the question remains where else desalination will grow. “In low income countries, almost nothing is happening,” Dr. Qadir said.

The primary reason is cost. Desalination remains expensive, as it requires enormous amounts of energy. To make it more affordable and accessible, researchers around the world are studying how to improve desalination processes, devising more effective and durable membranes, for example, to produce more water per unit of energy, and better ways to deal with the highly concentrated brine that remains.

Electric water pressure pumps and reverse-osmosis membrane tubes at the Sawaco Desalination Plant in Jeddah, Saudi Arabia.

A sheaf of reverse-osmosis membranes, unfurled to show the layers that separate salt from water.

There are no water distribution pipes in this part of Jeddah, so the desalinated water is distributed by truck.

Currently, desalination is largely limited to more affluent countries, especially those with ample fossil fuels and access to seawater (although brackish water inland can be desalinated, too). In addition to the Middle East and North Africa, desalination has made inroads in water-stressed parts of the United States, notably California, and other countries including Spain, Australia and China.

There are environmental costs to desalination as well: in the emissions of greenhouse gases from the large amount of energy used, and in the disposal of the brine, which in addition to being extremely salty is laced with toxic treatment chemicals.

Despite a practically limitless supply of seawater, desalinated water still accounts for about 1 percent of the world's fresh water.

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Even in Saudi Arabia, where vast oil reserves (and the wealth that comes from them) have made the country the world's desalination leader, responsible for about one-fifth of global production, there is a realization that the process must be made more affordable and sustainable. At the university here, engineers are aiming to do just that.

"We are trying to develop new processes, to consume less energy and be more environmentally friendly," said Noreddine Ghaffour, a researcher in the Water Desalination and Reuse Center at the university, which is universally known as Kaust.

As the center's name implies, there is also a realization that treating and reusing wastewater can help decrease stress on water supplies. "Any place you are doing desalination you should also be doing water reuse," said Paul Buijs, who serves as the contact between researchers and industry at the center.

Kaust's golf course, the only greenery not irrigated with desalinated water. Instead, the grass is maintained using treated wastewater.

Grass at the Kaust athletic stadium. The sprinklers use desalinated water.

A community swimming pool adjacent to the Red Sea.

Outside the main Kaust desalination plant, which uses a technology called reverse osmosis, four huge tanks full of sand filter impurities from the seawater as it arrives through a pipeline. Inside, the scream of pumps is deafening as the water is forced at up to 70 times atmospheric pressure into several hundred steel tubes, each stuffed like a sausage with spiral-wound membranes.

The microscopic pores in the membranes allow water molecules through but leave salt and most other impurities behind. Fresh water comes out of plastic pipes at the end of each tube.

Worldwide, almost all new desalination plants use reverse osmosis, which was introduced half a century ago. Over the decades, engineers have made the process much more efficient, and significantly reduced costs, through the development of bigger plants and better membranes and energy-recovery methods.

“The introduction of membranes in desalination was extremely disruptive,” Mr. Buijs said. “Yet it has taken from the 1970s to now to reach a maximum daily capacity of around a million cubic meters per day,” or about 250 million gallons, at the largest plants.

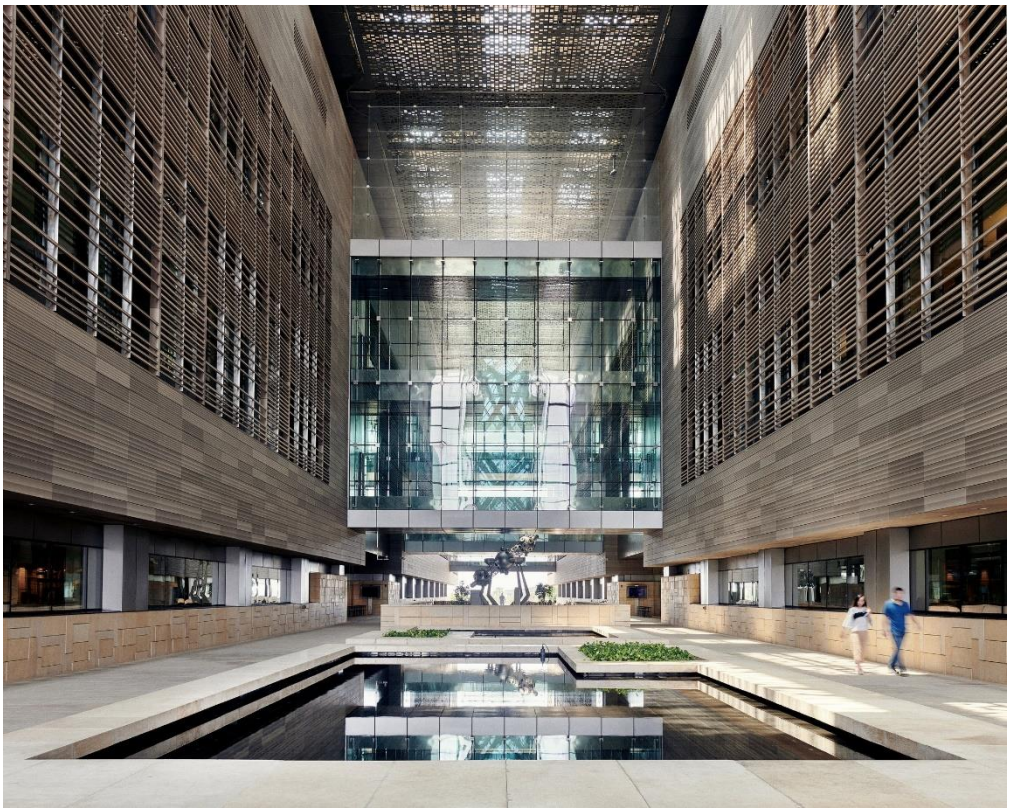
“That is huge,” he said, “but each step of 10 times bigger is roughly taking 15 to 20 years.”

There are also thermodynamic limits to how much more efficient plants can be made.

Although membrane plants use a lot of electricity, mostly for the pumps, that energy can be from any source, including solar, wind or other renewable forms.

The Saudi government has committed itself to expanding renewable energy as part of its plan to reduce dependence on oil and diversify the economy by 2030. But elements of the plan, which relies heavily on foreign investment, have been put in doubt because of the international backlash following the assassination of a dissident Saudi writer, Jamal Khashoggi, a year ago.

Sand filters at the main Kaust plant. Seawater is pumped through these pipes into the large sand-filled tanks in back, where the sand filters out impurities that could destroy the reverse-osmosis membranes.



The lobby of the Kaust Physical Science and Engineering Division. The water in the pool is desalinated.

Lime silos outside the Kaust facility holding chemicals used to treat the water after it is desalinated.

Efforts to combine renewable energy and desalination are still in their early stages. One issue is the intermittent nature of most types of renewable power; a desalination plant would still need conventional sources of power at night or when winds are slight.

Thomas Altmann, vice president for technology with ACWA Power, which develops, owns and operates desalination and power plants worldwide, said that plants that operate on renewable power 24 hours a day remained a goal.

Yet Saudi Arabia and other countries still have many desalination plants that use older thermal technologies that rely completely on fossil fuels. Simply put, these plants boil seawater and condense the resulting steam, which is fresh water.

Thermal plants are usually located next to fossil fuel-burning power plants, and use the excess heat from electricity generation to flash the seawater to vapor. They use tremendous amounts of energy — in 2009, the Saudi minister for water and electricity estimated that one-quarter of all the oil and gas produced in the country was used to generate electricity and produce fresh water.

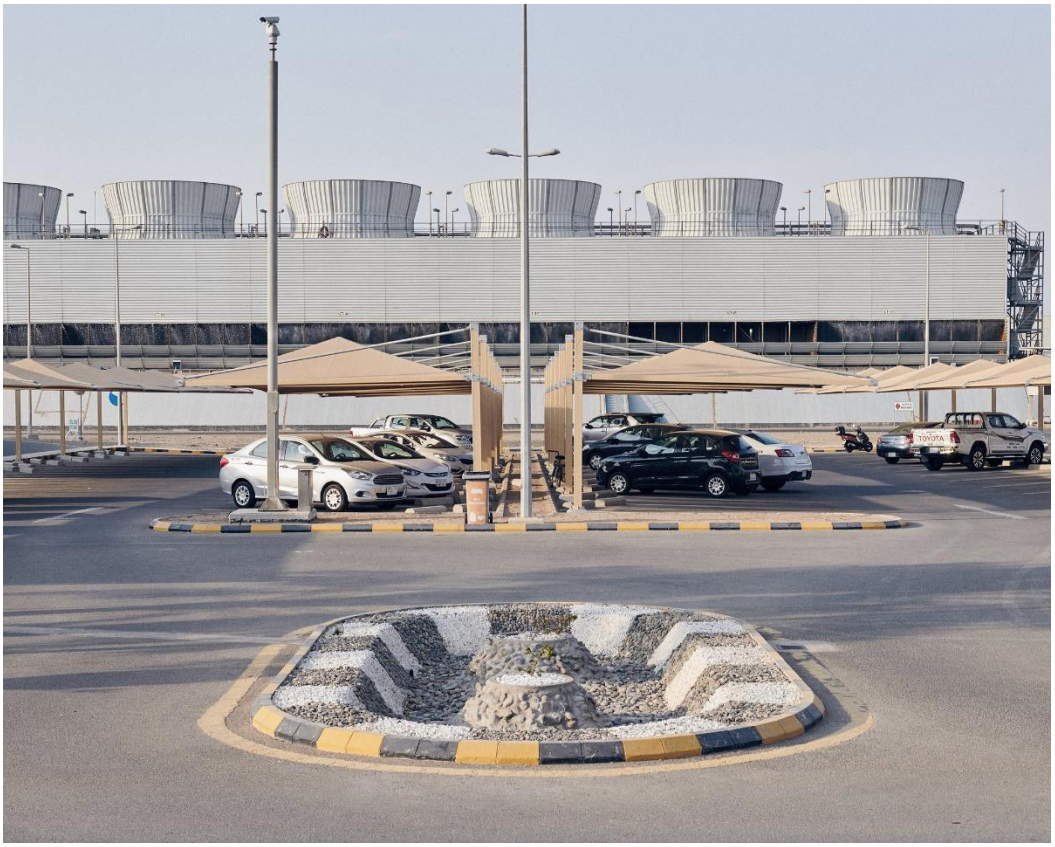
And gallon for gallon, thermal plants are currently much more expensive to operate than membrane plants. But since some thermal plants have at least a quarter of a century of life left in them, researchers at Kaust are working on ways to make them more efficient.

A small pilot plant in one of the research buildings uses solar energy to heat the water directly. The project, run by Muhammad Wakil Shahzad, a research scientist, also broadens the operating temperature range, effectively producing much more fresh water than a conventional thermal design.

Dr. Shahzad and others are designing a scaled-up version of the system for an existing Red Sea desalination plant. “We are at the point where we have to look into out-of-the-box solutions to achieve sustainable water production for future supplies,” he said.

The small pilot plant, which uses solar energy to heat the water for desalination.

A solar-powered pilot desalination project facility at Kaust.



The Kaust desalination plant's parking lot. Cooling towers in the back, too, use desalinated water.

Regardless of the method used, all plants produce concentrated brine as a waste product. Dr. Qadir of United Nations University was an author of a recent study showing that brine volumes are greater than most industry estimates — on average, a gallon and a half for every gallon of fresh water produced.

The most widespread current practice is to pump the brine back into the sea. But the extremely salty water can harm seagrasses and fish larvae, and can create oxygen-deprived layers in the water that can harm or kill other marine creatures.

The industry argues that if done correctly, locating outlet pipes properly and equipping them with diffusers and other devices to immediately dilute the brine, most, if not all, of those problems can be avoided.

Another approach is to try to do something with the brine other than throwing it away.

“We do believe that brine is not just for discharge,” said Nikolay Voutchkov, a technical adviser to the Saline Water Conversion Corp., a government corporation that is the largest producer of desalinated water in the world, responsible for three-fourths of Saudi Arabia’s production. “That’s what we do with it today. But it is actually a very valuable source of minerals.”

At the company’s research institute on the Persian Gulf coast, scientists are studying ways to extract some of those minerals. Obvious targets are calcium and magnesium, which occur naturally in seawater and remain in the brine through the desalination process. Yet for health reasons and to reduce corrosion in distribution pipes, the minerals must be added back to the desalinated water.

The current way to do this is by buying them elsewhere. But why not harvest the calcium and magnesium from the brine instead?

“Have the chemicals needed for remineralization of the water extracted from the water itself,” Mr. Voutchkov said. “That’s our goal.”

A road through an undeveloped section of Kaust, which has a security wall on its perimeter.

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# # #

Court ruling pauses Cal Am desal plant project
Monterey Herald | October 11, 2019 | Monterey Herald

SALINAS — A Monterey County Superior Court judge has called a halt to work on the California American Water desalination plant project, at least temporarily, while a California Coastal Commission appeal challenging the project's source wells is pending.

Noting the "uncertainty" around availability of source water for the project, Judge Lydia Villarreal on Tuesday issued a "brief stay" on the operation of the county's approval of the desal plant permit and prohibited Cal Am from "engaging in any physical construction of the desalination plant and from making any further changes to the land."

The order will remain in effect until Nov. 19, when the court has set a hearing to consider the Coastal Commission's anticipated decision on Cal Am's appeal of the Marina city Planning Commission's denial of a coastal development permit for the desal project, including the slant feeder wells at the CEMEX sand mining plant. The court would then decide whether to lift the stay or allow it to continue.

The Coastal Commission is currently expected to consider the Cal Am appeal at its Nov. 14 session in Half Moon Bay.

In issuing the order in response to a lawsuit filed by the Marina Coast Water District in August seeking to halt the desal project, Villarreal emphasized the questions around the project's proposed source water and found that the brief stay "would not be against the public interest" because Cal Am does not appear to be facing "imminent reductions in its withdrawals from the Carmel River."

"The court finds a brief stay is appropriate in light of the current uncertainty around whether there is even a source of water for the desalination plant," the court order read, noting that although Cal Am had argued that a stay would prevent the Monterey Peninsula's water provider from meeting annual milestones in the state's Carmel River pumping cutback order, that company officials had acknowledged the company had already met this year's milestone requiring the start of desal project construction.

Cal Am officials have said the start of construction of a conveyance pipeline designed to deliver desal water to Peninsula customers meets the Sept. 30 milestone, which if missed could have resulted in the loss of 1,000 acre-feet of river water allocation and potential penalties.

Cal Am will still be allowed to continue seeking permit approvals for the desal project during the stay, according to the order.

Cal Am spokeswoman Catherine Stedman confirmed the court-ordered stay will "not affect our customers' water supply" since the river cutback order milestone has been met and said the company is currently "working through permit pre-construction items on the desal site" and will continue other prep work.

"We will continue to do everything we can, through permitting work and other activities, to move this project forward," Stedman said. "We hope for a positive outcome at the Coastal Commission, which is only a month away, and if that occurs would expect lifting of the temporary stay shortly thereafter."

Stedman did not say whether the state water board had officially agreed Cal Am met the milestone with the pipeline construction.

In the order, Villarreal also denied a preliminary injunction against the desal project.

Marina Coast argued in its lawsuit against the county and Cal Am that county officials had improperly ignored new groundwater impact information related to the desal project and failed to consider a viable and even preferable recycled water alternative, and asked the court to order the county to rescind its project permit approval until it had complied with the state's environmental review laws, as well as its own planning and zoning code.

Marina Mayor Bruce Delgado said it "seemed prudent to ensure (desal plant) project approval before spending public (dollars) to build it." While the city didn't join the Marina Coast lawsuit, city officials joined district officials in opposing the desal plant project before the county board and urged the supervisors to at least wait until after the Coastal Commission decided to consider the project.

The county board narrowly approved the desal plant permit by a 3-2 vote on July 15 on appeal — filed by Marina Coast and Public Water Now — after the county Planning Commission also narrowly approved the project in April.

Since August, Coastal Commission staff and Cal Am officials have been in communication over a number of issues the commission has asked to be resolved before Cal Am's desal project application can be considered complete, which would precede a public hearing tentatively set for Nov. 14.

Those issues include:

- Cal Am's access to a Marina Coast pipeline for the desal project, which Cal Am argues it has a decade-old agreement in place with the district to use but Marina Coast has argued doesn't have adequate capacity.
- The company's water rights to draw desal plant feeder water from the CEMEX site shoreline slant wells tapping brackish water from the seawater-intruded and overdrafted Salinas Valley basin, which Cal Am argues it can use to develop into a potable supply because the water is not currently suitable for other uses, while others including Marina Coast have argued Cal Am's plans will harm their groundwater supply.
- Water demand calculations to justify the need for the desal plant production capacity including new water usage data and projected demand, which Cal Am argues has already been addressed by the state Public Utilities Commission although the Monterey Peninsula Water Management District recently released a report suggesting the Peninsula might not need desal water until 2043 or even later if a proposed Pure Water Monterey recycled water expansion project is completed.
- The status of various other local project-related permits and approvals, and legal interests, details on the project's off-shore components including an existing outfall and required modifications, and information regarding biological resources and coastal hazards.

Cal Am has provided a series of responses to the commission staff request over the past month and a half, and Stedman said company officials' impression is they are still on track for the Nov. 14 hearing.

# # #

Quake threat looms over Anderson Dam project

Valley Water moves up projected dam groundbreaking to 2021

Morgan Hill Times | October 10, 2019 | Barry Holtzclaw -

The prospect of another typical winter rainy season—the third in a row—combined with continued anxiety about the long-dormant Calaveras and Hayward faults has public water experts accelerating their efforts to improve the capacity and stability of Santa Clara County's biggest body of water, the Anderson Reservoir.

The Santa Clara Valley Water District, which now calls itself Valley Water, says it hopes to break ground on a five-year, $550 million project to upgrade the earthquake safety of the Anderson Dam in 2021. The popular recreation lake would be drained for at least five years during the project.

New seismic data in 2018 prompted the district, which owns the reservoir, to revise and expand its plans for the Anderson Seismic Retrofit, boosting the cost and timetable for the project. The new data from the seismic study require a complete reconstruction of the nearly 70-year-old earthen dam, according to the district.

Authorities had concluded 10 years ago that the current structure could collapse in a major earthquake. Since then, several new neighborhoods have been built in the large dam's morning shadow.

Geotechnical and cultural studies at the dam began this summer. Valley Water said this month it is moving forward on the project design for the Anderson Dam Seismic Retrofit Project.

The design work is undergoing a series of independent reviews and staff is working to complete a draft Environmental Impact Report for public review. The project is one of Valley Water's largest capital projects to date and has been designated "a critical public safety project."

"Valley Water is committed to ensuring the best design for maximum protection and is aiming to break ground in 2021," according to a spokesperson.

New geologic investigations in areas around the dam had resulted in the discovery of "previously unidentified seismic deficiencies," according to the water district report:

The upstream embankment is "susceptible to liquefaction" during a "maximum considered earthquake," an earthquake that is expected to occur once in approximately 2,500 years, or a 2 percent chance every 50 years.

The special materials placed between the reservoir's clay core and the rock fill were determined to be inadequate to prevent failure in the event of a "fault offset," leading to seepage and erosion through the bedrock foundation beneath Anderson Dam during a major earthquake.

Even before these new findings, concerns about earthquake safety prompted the district in January 2017 to lower the reservoir's water surface elevation limit an additional 10 feet. Anderson Reservoir is currently limited to about 52 percent of its capacity because of the seismic concerns.

"The retrofit project, which was originally planned to include large upstream and downstream buttresses, has been modified to a nearly complete replacement of Anderson Dam in place,"

district staff said in the latest report. The project will return the reservoir to its original storage capacity.

The 235-foot-high earthen dam measures 1,430 feet long by 900 feet wide and sits along the Coyote Creek Fault on Coyote Road, east of Morgan Hill. The reservoir itself is situated parallel to the Calaveras Fault, which runs from Hollister to Milpitas. It holds over 90,000 acre feet of water when full, more than the other nine reservoirs in the county combined.

The more immediate threat east of Morgan Hill continues to be not the dam but Coyote Creek below it. While the reduced capacity of the reservoir will extend through 2020, the district once considered using special floating pumps to reduce flood risks by pumping the water out of the reservoir over the spillway. In February 2017, the reservoir burst over the emergency spillway after a series of torrential storms, over the banks of Coyote Creek into a South San Jose neighborhood. Those floods forced 14,000 people from their homes, leaving $100 million in damage.

The district concluded that “installing pumps on the dam or in the reservoir added risk and hazards to the operation of the dam,” and dropped the plan.

Anderson Dam creates Anderson Reservoir, which stores local rainfall runoff and “imported” water from the Central Valley.

The reservoir is an important water source for treatment plants and the recharge of the groundwater basin. Besides restoring drinking water supplies, the upgrade also supports compliance with environmental regulations. The district’s regular reservoir releases ensure that downstream habitat has healthy flows and temperatures to sustain wildlife.

A breach of Anderson Dam at full capacity could have catastrophic consequences, including inundation of surrounding land more than 30 miles northwest to San Francisco Bay, and more than 40 miles southeast to Monterey Bay.

The new dam, when completed, will provide “a permanent fix to the risks identified by the seismic study,” according to Valley Water.

The Safe, Clean Water and Natural Flood Protection Program, which Santa Clara County voters approved in November 2012, will fund about $65 million of the project’s cost. The remaining costs will be funded by groundwater rates. Upon completion of the project, the average household in the area of the county roughly north of Metcalf Road in Coyote Valley can expect an increase of $6.25 per month in their water rates. Households in the area south of Metcalf Road can expect to see an increase of about $3.50 per month.

The project will require the use of heavy equipment, which may generate traffic in multiple shifts.

Residents living near Anderson Dam east of Morgan Hill can anticipate other impacts due to lighting, noise and dust.

# # #

For information, visit www.valleywater.org/anderson-dam-project.

A California county has some of the purest tap water in the US. Here's how it filters out sewage and chemicals so effectively.

Business Insider | October 7, 2019 | Aria Bendix

Orange County, California. Facebook/Pirate Coast Paddle Boarding

Whenever I visit my hometown of Orange County, California, I get to sip some of the purest drinking water in the US.

The quality is sometimes hard to spot, since many drinking-water contaminants are odorless, tasteless, and invisible to the human eye. Even in cities where the water is contaminated with lead, residents have reported that their taps are crystal clear.

But in Orange County, the water is actually as clean as it looks.

It wasn't always that way. In his new book, "Troubled Water," the activist Seth Siegel explains how Orange County's taps went from having too much saltwater to spouting the purest drinking water in the US.

Saltwater was seeping into Orange County's freshwater supply

Orange County is just 35 miles from Los Angeles, but it relies on a different water system to serve its nearly 3.2 million residents. About a decade ago, that system begin churning out the most pristine water the country had ever seen.

From about the 1930s to the 1970s, farmers overpumped water through Orange County's underground aquifers, the bodies of porous rock that act as a natural filtration system. The process allowed seawater to seep into the county's freshwater supply — something known as saltwater intrusion — and threatened to expose residents to excess sodium in their taps.

Though scientists are still studying the health effects of too much sodium in drinking water, early research suggests it could lead to hypertension and chronic kidney disease.

Orange County prevented this scenario by getting people to drink recycled water instead.

Now, Orange County tap water starts out as sewage

The Groundwater Replenishment System in Fountain Valley, California, converts Orange County's sewage water into drinking water. Mary Knox Merrill/The Christian Science Monitor/Getty Images

In 2008 the county unveiled a Groundwater Replenishment System, which purifies wastewater from the local sewage system and turns it into clean drinking water.

Many cities have struggled to implement such a system because of pushback from local residents who aren't keen on drinking water that originated in their toilets. But more than 4 million Americans — including residents of Dallas, Phoenix, and Atlanta — now get at least some of their drinking water from treated sewage.

But Orange County's process is unique because it filters for inorganic contaminants — things like pesticides and industrial chemicals that are hard to detect in water and may still be allowed under federal law.

The US Environmental Protection Agency has drinking-water regulations for more than 90 contaminants, but Siegel said more than 100,000 chemicals and pharmaceutical compounds escaped regulation.

"What makes Orange County so special is they say: 'OK, fine, the federal rules are X. We don't really care. We're going to go so far beyond those rules that we're going to make the purest water flow we can possibly have,'" he told Business Insider.

Water gets filtered through invisible holes and zapped with UV light

Orange County's filtration process begins like most "toilet to tap" systems in the US. Household sewage arrives at local wastewater treatment facilities, where it's filtered by screens. Then friendly bacteria are added to get rid of lingering organic material (i.e., human waste).

Most communities allow this treated water to be discharged into public waterways, but Orange County's process doesn't stop there.

Next, the water heads to the Groundwater Replenishment System, where it passes through another set of filters with holes so tiny that they're invisible to the human eye. Mike Wehner, the assistant general manager at the Orange County Water District, told Siegel the holes were one one-hundred fiftieth the width of a human hair.

Orange County's underground filtration system removes particles, bacteria, and viruses from pretreated sewage water and pumps them through stainless steel pipes. Mary Knox Merrill/The Christian Science Monitor/Getty Images

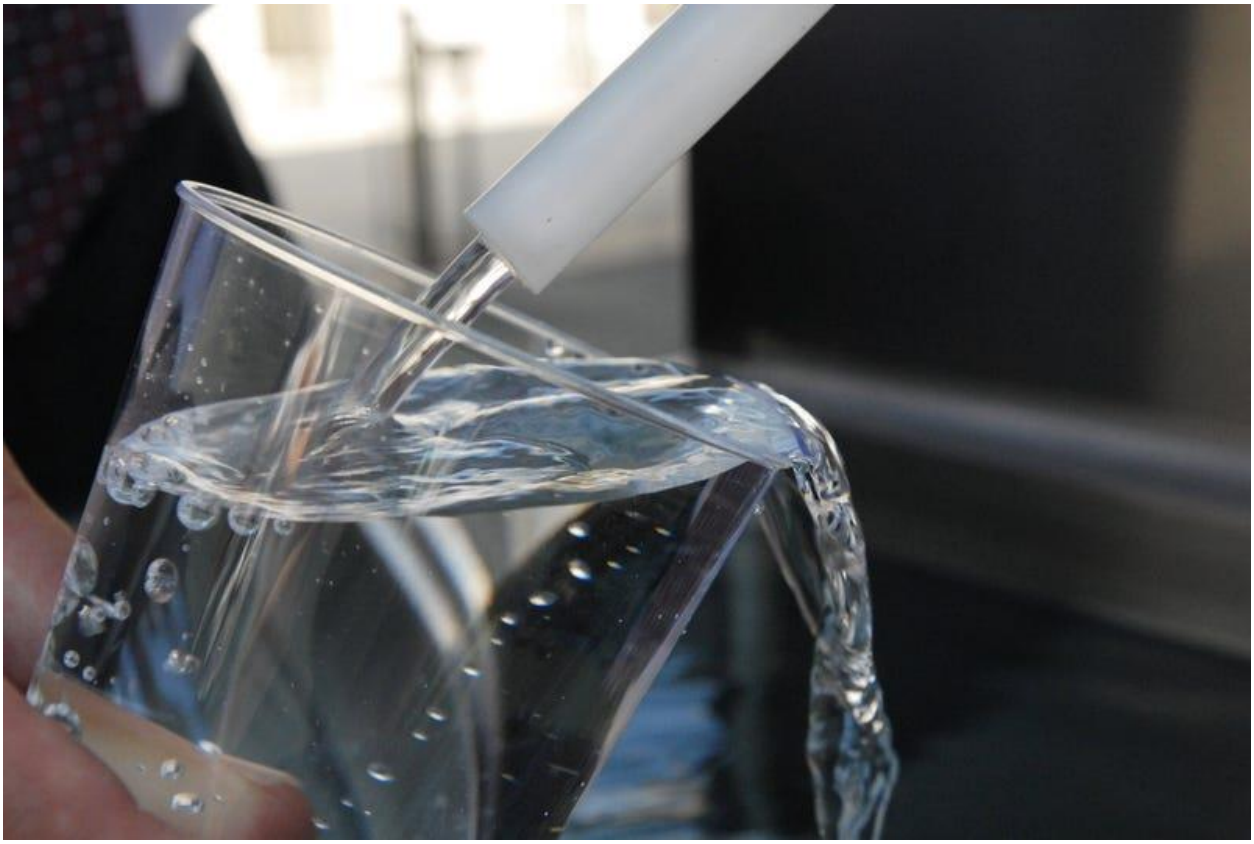
From there, the water goes through reverse osmosis, a process that extracts salt, minerals, chemicals, and pharmaceutical compounds.

The water that emerges is free of minerals, so it's slightly acidic, which means it can corrode local pipes. So the county adds crushed limestone back into the water supply to neutralize the pH. From there, it disinfects the water by zapping it with ultraviolet light. This is meant to ensure that not a single molecule of waste can survive.

"It's not fair to say that a contaminant could never possibly be in Orange County's water," Siegel said. But the community's taps, he added, are "as pure as pure can be."

The process could be replicated all over the country

Orange County's "toilet to tap" system was expensive — about $480 million to get off the ground. But Siegel argues in his book that almost any city can replicate the process for less.



Water from the Groundwater Replenishment System in Fountain Valley. Mary Knox Merrill/The Christian Science Monitor/Getty Images

In many poor communities, he said, water fees aren't actually used to improve the local water system by investing in water infrastructure and technology. Most of these fees, he said, go toward the municipal budget.

"Flint actually had the highest water fees in the United States when the crisis broke," Siegel said. "What they did wrong was they diverted money from water fees to the general budget."

Based on his conversation with Wehner, Siegel estimates that having water as pure as Orange County's would cost communities an extra $33 a person a year. (That's after repaying any loans used to build the system and not including state and federal subsidies.)

As filtration technologies become more advanced, he said, that cost could drop lower.

"Now that Orange County has led the way and spent fortunes of money to figure it out, everybody can adopt more or less the Orange County system at not a phenomenal expense," Siegel said. "Why isn't everyone doing it? The answer is: because nobody's pushing them to."

# # #

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This Bay Area city owns more taxable land than anyone in Santa Clara County, and it's not San Jose

San Francisco owns more assessed acreage in Santa Clara County than anyone else

Mercury News | November 4, 2019 | Leonardo Castañeda

The Calaveras Reservoir is owned by the San Francisco Public Utilities Commission and sits on the border between Alameda and Santa Clara counties. (Randy Vazquez/Bay Area News Group)

The largest landowner — by taxable acreage — in Santa Clara County isn't one of the many multi-billion dollar technology companies or developers that otherwise dominate Silicon Valley. It's not even Stanford University, which controls $19.7 billion worth of property — almost three times more than anyone else.

No, the largest land baron in the valley is our neighbor to the north, the city and county of San Francisco. More specifically, it's the San Francisco Public Utilities Commission, which is responsible for delivering water to 2.7 million residents and businesses in the Bay Area.

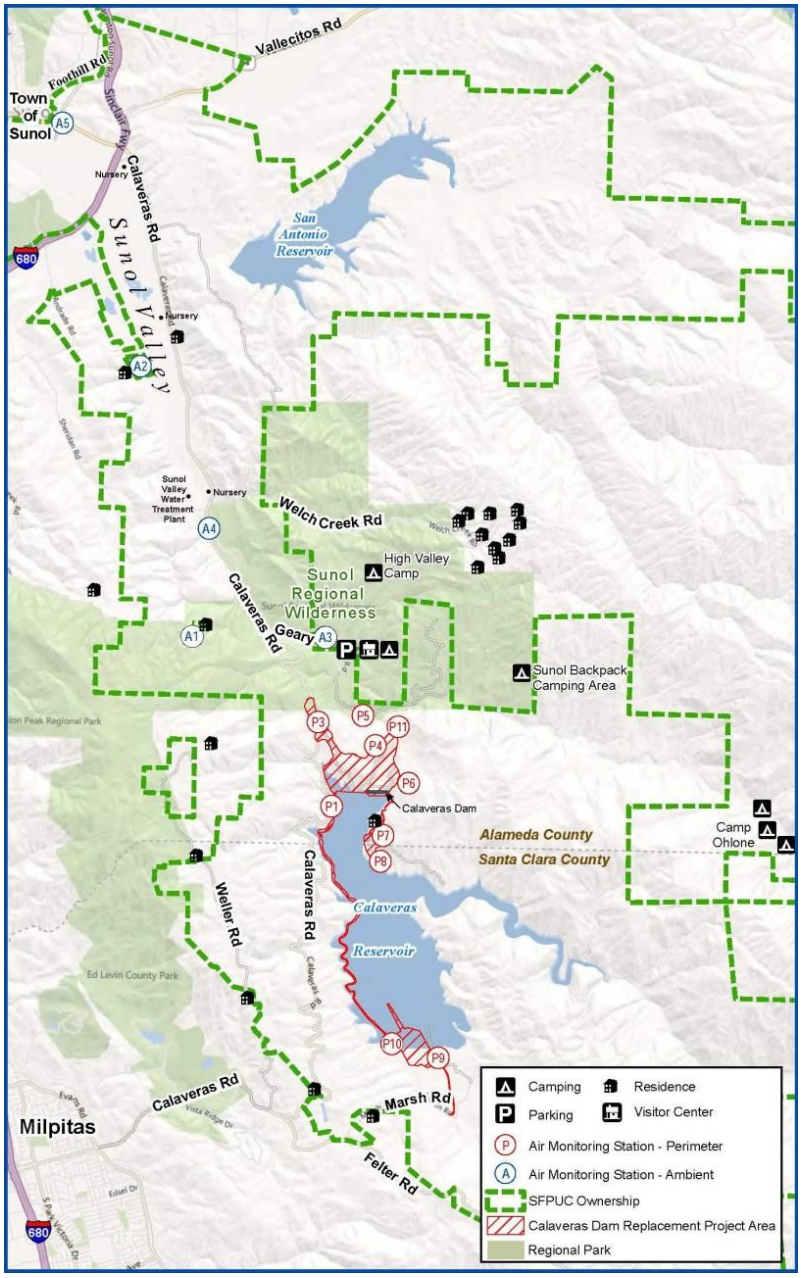
San Francisco's water utility owns the Calaveras Reservoir and a large swath of the Alameda watershed — about 3,800 taxable acres all told, based on an analysis of data from the Santa Clara County assessor's office. That's more, by size, than anyone else in the county — although the assessed value of that land is way down the list at $15.6 million.

But it's a distinction that comes with a caveat. Other government agencies, including local and state park departments, own even more land in Santa Clara County than San Francisco does, but their land doesn't have an assessed value because it's used for public purposes. In many

cases, the assessor's office doesn't even maintain records of the square footage of those holdings.

And in fact, most of the SFPUC's land in the county is owned tax-free as well — the agency says its total ownership is 14,001 acres. It is assessed on the 3,800-acre portion only because it leases that land out to private interests, mostly ranchers.

The Santa Clara County holdings are only a portion of the utility's water portfolio, said Steve Ritchie, assistant general manager for water at the commission, and the city and county of San Francisco uses just about a third of that total. The rest goes to customers in cities such as San Jose, Milpitas and Sunnyvale. About 94 percent of Palo Alto's water and 68 percent of Stanford's water comes from the agency, which also owns large reservoirs in Alameda and San Mateo counties.



San Francisco's ownership of the Calaveras Reservoir dates back to the 1870s, when the privately-owned Spring Valley Water Company began buying up ranchland in the Alameda watershed with an eye towards a future dam and reservoir.

"They started looking at this watershed and saying, 'Good place for a dam and we need to be able to develop this,' " Ritchie said. "And they did over time."

That vision was completed in 1925 but not before an earlier version of the dam collapsed during construction in 1918. In 1930, San Francisco purchased the water company and its reservoir.

The green dotted line shows the land owned by the San Francisco Public Utilities Commission. Courtesy of SFPUC

The dam, which is technically just over the border in Alameda County, was replaced earlier this year — an eight-year and $823 million project during which workers moved 12 million cubic

yards of earth and rock and uncovered more than 1,500 fossils of ancient whales, sharks and more.

The reservoir and water system shouldn't be thought of in terms of cities and counties, Ritchie said, but rather as a regional service, paid for and managed for everyone who benefits from it.

"It's a community asset," he said. "San Francisco was the name on the letterhead, but it's the Bay Area's water supply."

The agency recently purchased the 787-acre Wool Ranch in Alameda County, and Ritchie said it's keeping an eye on the 51,000-acre N3 Cattle Co. ranch near Livermore. By owning watershed land, the agency can protect the water quality in the streams and other runoff that feed its reservoirs.

"Some of it's in this watershed," Ritchie said of the N3 ranch. "Are we going to partner with people and maybe buy a piece of that? Maybe."

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East Bay water district considers buying giant cattle ranch that straddles four counties
Leaders say the purchase would help protect water quality for centuries

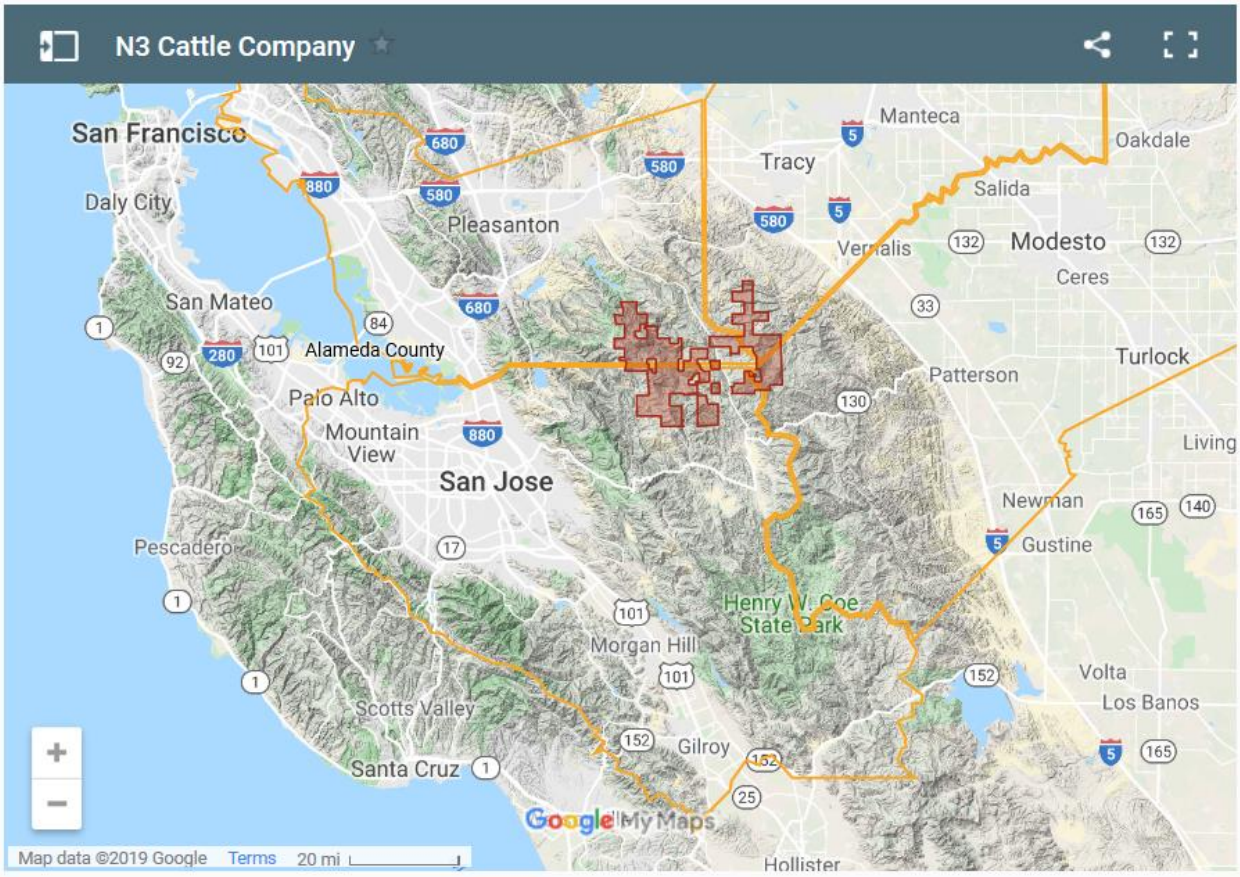
Mercury News | October 14, 2019 | Joseph Geha

The Alameda County Water District is considering shelling out $72 million for a fourth-generation, 50,500-acre cattle ranch — touted as the largest potential land sale in the state — to preserve water quality, officials say.

Much of the property lies in watersheds that feed into critical water supply facilities for millions of Bay Area residents, including Lake Del Valle, Calaveras Reservoir and Alameda Creek.

While no final decisions have been made, district officials and experts say the rare opportunity to buy such a wide swath of undeveloped upstream land — and preclude any future development that could degrade potable water — must be seriously weighed.

The N3 Cattle Co. ranch is roughly the size of Fremont. It's located east of Fremont, Milpitas and San Jose, south of Livermore, and stretches into parts of Alameda, Santa Clara, San Joaquin and Stanislaus counties.



The fourth-generation ranching family that owns the property put it on the market in July for the first time in 85 years.

“This beautiful and expansive California property spans 50,500 acres through four counties, making it the largest land offering in the State of California,” says the website of California Outdoor Properties, a private brokerage firm managing the land sale.

The district — which provides water to about 350,000 people in Fremont, Newark and Union City — has the “financial wherewithal” to buy the ranch by itself, possibly by issuing bonds, tapping reserves, raising water rates or a combination of those means, general manager Robert Shaver said in an interview Monday.

But it’s also talking with other agencies about possibly partnering to make the purchase, among them the San Francisco Public Utilities Commission, which owns the Calaveras Reservoir, the Nature Conservancy, The Trust for Public Land, and the East Bay Regional Park District, Shaver said.

“On one hand, when you’re a water agency, you’re always concerned about the protection of water quality and water supply, and from those vantage points, this property potentially could check some of those boxes,” Shaver said.

“But on the other hand, they’re asking $72 million, and the district has a number of other objectives that it’s also trying to achieve, and there could be some operations and maintenance costs as well,” he added.

Those objectives include paying down about $120 million in employee pension and benefit debts, as well as maintaining and improving hundreds of miles of water mains.

To help pay for those rising costs and debt, the district has raised water rates nearly every year over the past two decades, including a 25 percent hike for 2017 and 2018. The district also raised fixed service charges for residential customers by about 354 percent between 2010 and 2018, according to an analysis of the district’s financial reports by this news organization.

“So in a perfect world, if it didn’t cost anything, you might say, ‘Yeah, there’s not a lot of downside,’ but there is a cost, and that’s one of the issues the board is also thinking about as well,” Shaver said.

The district board is scheduled to hold a special public workshop Thursday at 4 p.m. to discuss the possibility of acquiring the land.

Meanwhile, it already has received a vote of support from the Alameda Creek Alliance, a local watershed protection group that wants to see the open space preserved.

“If the land was purchased by someone other than an agency with some kind of public interest mission, it could be subdivided and split up into developments,” Jeff Miller, the alliance’s director, said Monday.

Although Shaver and other water officials acknowledge that the chances of someone developing the remote property may be slim, Miller said officials shouldn’t chance it.

“Once it’s gone it’s gone, so I think the opportunity to protect it in perpetuity should be seized,” he said.

“It’s also going to protect a lot of habitat for a lot of native wildlife. It’s going to protect a lot of streams, and potentially there’s some talk about whether it could be opened up for public access. It could be a pretty amazing regional amenity,” Miller added.

Jay Lund, director of the Center for Watershed Sciences at UC Davis, said it’s too early to tell if this is the right move for the district, or a coalition of agencies, but taking a hard look at the opportunity is the “prudent” thing to do.

“If you have a big piece of land coming on the market in your watershed, and you’re worried about what it might do in the future, it might be prudent to find a way to be involved in having a better outcome,” he said.

“But if they want all the money to come from the ratepayers, and they want the district to manage it forever in the future,” Lund added, “then that becomes a liability and a burden for a water district, and that’s a lot harder to justify.”

“We all have limited budgets,” Steve Ritchie, assistant general manager of the San Francisco Public Utilities Commission, said Monday about the possible land buy.

“Even though we could do it, (ACWD) could do it, is that the best use of your overall money?” he said.

“But that chunk of land is very intriguing for everybody. When you see 50,000 acres like that, it’s like, ‘Wow, that’s interesting.’ ”

# # #

The Alameda County Water District board workshop will be held Thursday, Oct. 17, at 4 p.m. in the multi-purpose room at district headquarters, located at 43885 S. Grimmer Blvd., in Fremont.

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The Largest Land Sale in California
Bay Nature | September 30, 2019 | Eric Simons

A view of the N3 Ranch. (Photo courtesy California Outdoor Properties)

You get almost as much a sense of the ecological value of the N3 Ranch property, 50,000 East Bay acres listed for sale for $72 million in early July, from looking at a map as you do from the spectacular drone footage the owners released with the listing.

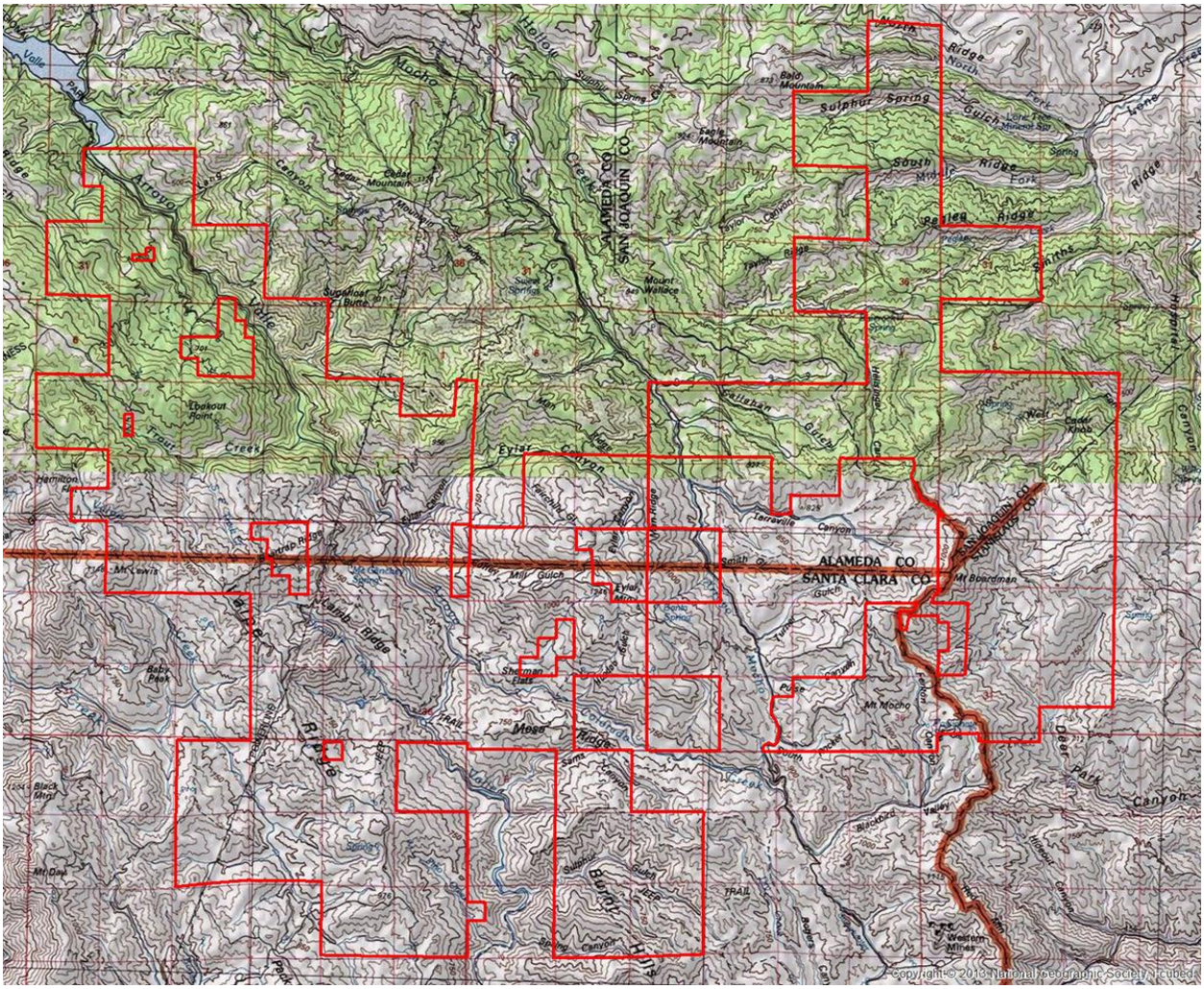
In a regional conservation era defined by linkages and corridors, N3 connects huge swaths of protected lands. The largest property currently for sale in the state, it runs east-west from Corral Hollow near Tracy to the East Bay Regional Park District's Del Valle reservoir. It runs north-south past the San Francisco Public Utilities Commission's Calaveras and San Antonio reservoirs, and the EBRPD's Sunol and Ohlone Regional Wilderness. It wraps up past the east side of Mission Peak. It nearly connects the unique habitats of Mount Diablo State Park to the unique habitats of Henry Coe State Park. It fills in a major chunk of a greenbelt stretching from the Delta to Gilroy.

"Less water, less fragmentation, fewer paved roads, more biodiversity," said Save Mount Diablo Land Conservation Director Seth Adams. "I don't even have to go onto this property to know it's rough, rugged, incredibly diverse, and huge."

Adams kept returning to the size of the property. It's more than twice as big as Mount Diablo State Park. It's bigger than the city of San Francisco. It's the nexus of four different counties, with 20,000 acres in Santa Clara, 8,000 acres in Alameda, 7,000 acres in Stanislaus, and 5,000 acres in San Joaquin.

It would be a botanical wonderland back there, says Nomad Ecology botanist Heath Bartosh, who has spent decades surveying plant habitats in the East Bay. "Undoubtedly," Bartosh said, "there are things that are undescribed, or bolstering other populations [of rare plants]."

Bartosh talked animatedly of the discoveries the first botanist to thoroughly survey the N3 property might make if a conservation-minded owner can acquire the property. He anticipates new species, new county records, and new records of plants known previously only from the Sierra Nevada. Because N3, like Mount Diablo or Henry Coe, sits at the confluence of the inner coast range and valley and foothill habitats, it would likely have numerous mixing zones with uniquely evolved local populations.



A topographical map of the N3 ranch, with the ranch boundaries outlined in red. (Map courtesy California Outdoor Properties)

It also hasn't been thoroughly surveyed by a serious scientist since botanical legend Helen Sharsmith visited between 1934-1937. Sharsmith found 761 species of vascular plants in the region and wrote a journal article based on her travels called "Flora of the Mount Hamilton Range of California." Modern botanists say there are roughly 3,000 species of vascular plants in the California Floristic Province, meaning that something like 25 percent of California's internationally renowned plant life might be found in just this relatively small area around Mount Hamilton.

Sharsmith noted in her introduction that the only botanist who'd thoroughly surveyed the area before her was William Brewer in 1862, and that the result of his expedition was the type specimens of three plants named after himself. (Brewer's jewelflower, Streptanthus Breweri, Brewer's monardella, Monardella breweri, and Brewer's clarkia, Clarkia breweri.) Brewer also collected the type specimen for the desert lantern (Oenothera deltoides ssp. cognata). Sharsmith also wrote that while the western edges of the Hamilton Range had largely been overrun by invasive pasture grasses and weeds, many of the eastern edges remained, at that time, minimally affected.

The N3 property includes at least two peaks taller than Mount Diablo. It has numerous creeks and seasonal arroyos, some of which make up the upper watershed for the SFPUC's two

reservoirs. It has rolling oak woodlands, bay-laurel forests, and open meadows. It holds serpentine grasslands, which tend to harbor some of California's rarest endemic plants.

The ranch has been owned by the same family since Sharsmith surveyed it, and has been both a working cattle ranch and private hunting ground, with 14 hunting cabins for hunters to pursue tule elk and black-tailed deer.

A view of the N3 Ranch. (Photo courtesy California Outdoor Properties)

Rancher Clara Vickers purchased the first pieces of N3 in the 1930s and 1940s. Born on an Arizona cattle ranch in the late 1880s, Vickers moved with her father — a land, cattle, and oil speculator — to California after a drought affected the family's ranches in Arizona. In the early 1900s the family bought Santa Rosa Island, the second-largest of the Channel Islands. (The family sold Santa Rosa to the National Parks Service for $30 million in 1986.) Vickers turned her attention to N3 in the 1930s. Her son, Roy Edgar "Ted" Naftzger, Jr. — a Stanford grad, sport fisherman, and coin collector — expanded the ranch through the 1950s and 1960s. Naftzger, Jr. died in 2007. His daughters, who live in Los Angeles, decided to sell after their mother died in 2015.

"It's a big property, not just acreage wise, there's big mountains, canyons, meadows," said Todd Renfrew, the listing agent at California Outdoor Properties. "The land itself looks like it did 2,000 years ago."

Before the Vickers-Naftzger family arrived, N3 fell on the eastern edge of Chochenyo-speaking Ohlone territory. When the Mexican government secularized the California missions in the 1830s, hundreds or perhaps thousands of Ohlone returned to the greater Livermore and Pleasanton area, and established a large community in Pleasanton as well as smaller communities around Arroyo del Mocho — parts of which are now on the N3 property — and in parts of what are now the East Bay Regional Park District and SFPUC watershed land. A partial Census in 1900 shows 20 Ohlone living in Murray Township, the site in Alameda County of the future N3 ranch.

Between 1851-1852 the remaining Bay Area Ohlone signed treaties with government representatives that granted them access to 8.5 million acres of land in central California to cede 64 million acres to the United States. But the Senate never ratified any of the treaties — and in the late 1920s, just before the Naftzger family turned to Northern California in search of

new ranchland, the Bay Area Ohlone, until then recognized as a sovereign tribe called the Verona Band of Alameda County by the U.S. government, were stripped of their tribal status. Without formal organizational power, the communities in Pleasanton and Livermore drifted apart as individual families sought work elsewhere in the Bay Area. Many joined the Army to fight in World War I and II. The 500 enrolled members of the Muwekma Ohlone today have no tribal land and as of 2019 have had their petition to regain federal recognition rejected by the Bureau of Indian Affairs.

“On this ranch, there are probably a multitude of ancestral heritage sites that of course the tribe will never have access to,” says San Jose State emeritus anthropology lecturer Alan Leventhal, who has worked with the Muwekma Ohlone for nearly 40 years. “That’s the politics of erasure which the tribe has faced since 1927. If you don’t mention their contributions or their history or their heritage, they’re not considered stakeholders.”

N3 likely won’t be developed, everyone agrees. The terrain is too steep, there’s no water, and the owners and realtor say they don’t want to sell to a developer. The ranch is enrolled in the Williamson Act, meaning it receives tax breaks for keeping it agricultural. But the owners and realtor do say they want to sell it as a single property, not in pieces. They’re willing to wait, Renfrew said, for the right offer. Land sales can take months if not years.

Conservation agencies large and small have expressed interest. Mostly off the record, they describe N3 as both a critical conservation purchase and a tough price tag. At $72 million, it’s a steep initial cost. But that’s just for starters: maintenance of the land would be difficult. It’s a rugged property with hundreds of miles of fire roads and fences to clean up and maintain. It would have to be surveyed, and stewarded, even though most parts of it are inaccessible.

So they’ve all taken a look, and are balancing the value of the land with the value of money.

“A chance to protect a critical juncture area at this scale doesn’t happen very often,” Save Mount Diablo’s Adams said. “Diablo Range conservation is the next big California conservation story. This is the critical piece.”

It’s possible too that the ranch simply stays private. It makes an ideal trophy purchase for someone with $70 million to spend attaching their name to a ranch. Renfrew, the listing agent, said he’s received a number of calls about the ranch as an investment property. Just park your money in East Bay land and let it sit.

Whether it’s a consortium of land trusts, or a new private owner, or something unforeseen, it’ll likely be a while.

“Large ranches, they take time to sell,” Renfrew said. “It’s usually a year or two.”

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Correction: A previous version of this story had the incorrect title for Seth Adams. He is the land conservation director at Save Mount Diablo.

Less water, more green
Irrigation and Green Industry | October 22, 2019 | Mary Elizabeth Williams-Villano

There are many ways you can help your clients reduce the amount of water they use, and their landscapes will be better for it.

Photo: Enviroscape LA

Here's a fun fact about water:Nothing on this planet lives without it; not plants, not animals, not bugs and certainly not us humans. We Homo sapiens can give up a lot of things — smoking, bacon burgers, gambling — but there's no giving up water.

And the supply of water is something we just can't take for granted anymore. All the experts say that clean, potable water is going to be in shorter supply in the future. We must find ways to use it more efficiently and recycle it as much as possible.

Clients of landscape and irrigation contractors often ask them for help in saving water. At the same time, clients also want their landscapes kept lush and green. The contractor must figure out just how much water can be cut without stressing the turf and the plants. In severe drought situations, this matter becomes much more serious.

There are many techniques and tools available to contractors to decrease water use without killing off every green thing in a landscape. Some of them you may already be using; others you may not have tried yet. Here are some of them.

Make sure you have good soil and mow high

For Mike Garcia, permaculture expert and landscape contractor and owner of Enviroscape LA, Redondo Beach, California, water conservation all starts with the soil. “If you have healthy soil, full of mycorrhizae and lots of good bugs like microbes and earthworms, you won’t need nearly as much water,” he says. If you’re putting a lot of synthetics or petroleum-based fertil-izers on soil to make up for what it lacks, Wilson says you’ll only need a fraction of the water you’d normally use. If soil is deficient, adding compost or biochar will help build it up.

Photo: Enviroscape LA

Just changing mowing height can save water, according to another permaculture expert, Bill Wilson, co-owner and lead teacher at Midwest Permaculture, Stelle, Illinois, a school that offers weeklong 72-hour intensives for landscape architects, contractors and anyone else who wants to learn about this approach to landscaping.

“If you use a variety of grass that looks good at 4 inches and keep it at that height, when it rains, less water runs off the property and more of it soaks in. Lawns become fresher and greener and require a lot less irrigation than if they’re kept at 2 inches.”

The water savings comes with an extra bonus: better soil. “Keeping grass longer builds a lawn’s topsoil and adds organic matter to it,” says Wilson. He says this happens even if you don’t mulch-mow, leaving the clippings in place — but if you do, even better.

Mulching also has a big role to play in saving water and protecting soil. “Putting down mulch serves a couple of different purposes,” says landscape designer Donna Dowson, owner of Dowson Design, Sacramento, California. “Besides making everything look clean, neat and finished, it protects the soil and helps reduce weeds. Bare soil loses a lot of water to evaporation, and mulch really slows that down.”

Her mulch of choice is wood chips. As they break down over time, they become organic material for the soil. And as Garcia also pointed out, the more organic your soil is, the more water it retains.

Practicing permaculture

We can't talk about saving water without mentioning permaculture, a growing movement within both landscaping and agriculture. While it includes aspects of organic landscaping, which eschews chemical inputs such as fertilizer, herbicides and pesticides, it goes way beyond that. Conservation of resources, especially water, is a big part of it.

What is permaculture? The definition differs slightly depending on which practitioner you talk to. "It's seeing the world through the eyes of nature," says permaculture expert and landscape contractor Mike Garcia, owner of Enviroscape LA, Redondo Beach, California. "It has three foundational principles: earth care, human care and future care, meaning that we leave the Earth a better place for our children."

This is not just some West Coast trend. Bill and Becky Wilson own Midwest Permaculture in Stelle, Illinois, a school where landscape architects, contractors and all sorts of people from all over the country come to take weeklong 72-hour intensive training in the principles of permaculture.

"Permaculture is an umbrella word for all things sustainable; it's shorthand for 'permanent culture,'" explains Bill Wilson. "It's looking at all the things we do and figuring out how we can do them in such a way that we can live a life that's truly abundant."

Techniques like soil conditioning, rainwater harvesting, turf replacement, digging rain gardens and planting natives are all permaculture practices. Growing edible landscapes is another big one.

Garcia mentions a recent visit he made to a client where he spotted a man's big, healthy hydrangea plant. "Typically, those take a ton of water. I asked him how much he waters it, and he told me, 'Almost never, it lives on rainwater.' I said, 'You're kidding! You must be into permaculture.' It turns out that he is, in a big way."

As is Garcia. He believes so strongly in permaculture and water conservation that he filled in his own swimming pool and made a garden out of it. Of course, you don't have to be as gung-ho as Garcia is to use some permaculture practices on the landscapes you tend. If you do, they'll be better off for it.

Perform an irrigation audit

Doing a formal irrigation system performance audit, the procedure that involves laying out catch cans and doing mathematical calculations to determine a system's distribution uniformity, will reveal a system's inadequacies. One audit of a large condo development in Minnesota showed that out of the facility's 7,800 total sprinkler heads, 28%, or 2,208 of them, were broken. When over a quarter of your sprinklers aren't working right, it certainly can waste a lot of water, especially on such a large scale.

Although performing an irrigation system audit is invaluable, a simple irrigation inspection can also be revealing. You can pick up a lot of clues by simply turning on a system and walking the

site scanning for obvious issues — things like clogged, broken or misting heads; wet walls and walkways; and water running into the street.

Change out old components and add new ones

You can dramatically decrease the amount of water used in a landscape by adding smart controllers and soil moisture and rain sensors.

You can also choose different components to deliver water through the system. Simply substituting more efficient Environmental Protection Agency WaterSense-rated nozzles for older or conventional sprays and rotors can cut water use by 30% or more.

Toro says its Precision series of nozzles can save 16,000 gallons of water per zone per year.

Rotary nozzles like Hunter's MP Rotator and other similar rotary sprinklers made by different manufacturers deliver multiple, distinct streams of water. "The way a rotator works, with multiple streams of water coming out in bigger droplets, is all the water that comes out of it ends up on the landscape instead of in the air," says Kelsey Jacquard, senior product manager, Hunter Industries, San Marcos, California. These sprinklers also have low precipitation rates.

All of the major sprinkler manufacturers have branded water-conservation nozzles. "In the industry, generally speaking, a water-conserving nozzle is one with a precipitation rate of 1 inch per hour or less," says Chris Davey, product marketing manager, residential and commercial irrigation at The Toro Company's irrigation division, Riverside, California. Some put down even less than that, one-half inch per hour.

Drip and low-volume microsprays and bubblers irrigate in terms of gallons per hour, where conventional sprays and rotors do it in gallons per minute. Drip and point-source irrigation deposits water directly to a plant's roots, with little lost to evaporation. This type of irrigation is ideal for planter beds.

Use pressure-regulating sprinklers and check valves

If you've ever visited a county fair or a theme park on a hot day, you've probably seen the "misting stations" set up to keep visitors cool. But a sprinkler system that produces mist is just wasting water. "As pressure increases, so does an irrigation system's flow rate," says David L. White, channel marketing manager for Rain Bird, Azusa, California. "Visibly, high-pressure flows look like misted water and clouds of overspray that blow out of the irrigation zone with the wind. The results are wasted water, higher water bills and damaged system components."

There's a simple solution to this. "To get the largest amount of water savings with sprays and rotors, use the ones that are pressure-regulated," says Davey.

In California, this will soon be a requirement. Starting next year, any new sprinkler nozzles sold in the state must, by law, incorporate pressure regulators. The Natural Resources Defense Council says that this alone could save over 400 million gallons of water per day in 10 years. Colorado, Hawaii, Vermont and Washington state have adopted similar regulations.

Davey says the second-largest savings would come from using some sort of a check device (also called a check valve), whether it's an internal one built into the spray head itself or added on as an ancillary item. If it's not already built into a nozzle, a check device can be threaded

onto it. All the major manufacturers provide check device options in most of their pop-up spray or rotor lines.

Find turf's happy medium

When a drought hits, municipalities and water purveyors start offering monetary incentives to home and business owners for replacing their lawns with artificial turf or plants such as succulents or natives.

Turf replacement is a controversial topic in landscape and irrigation circles, and understandably so. Landscape, landscape maintenance and lawn care contractors don't like to hear people being encouraged to tear out grass lawns, as mowing, trimming, fertilizing, aerating and applying weed and pest control to that grass are their livelihood.

And grass has benefits. It produces oxygen, reduces soil erosion and reduces the urban heat island effect. Most of all, it produces beauty and provides human enjoyment and serenity.

The key is to find a happy medium, and that's to water turf more efficiently. You can start doing this right away, without even changing out any of the sprinkler heads, by resetting the controller to "cycle and soak." If the controller doesn't have a cycle-and-soak setting, change the schedule so that the system stays on long enough to water down to a 6-inch depth. Then, the lawn should be allowed to dry out almost completely before the controller lets the system water again.

Deep, infrequent watering gets down to the grass' roots and prevents saturation and runoff. Individual grass plants send roots deeper into the ground, resulting in healthier lawns — and a healthy lawn needs much less water overall.

Plant xeriscapes and natives

You can also exchange thirsty ornamentals for drought-tolerant plants such as cacti and succulents, plant natives, or use a combination of both.

Xeriscapes are popular in Arizona, and Andy Avots, co-owner of Agave Landscape, Gilbert, Arizona, installs plenty of them. Avots says xeriscape plants still need some water, just not as much. He cautions that every yard has a hot spot, and some plants, even xeriscape plants, can't tolerate being planted there.

Planting natives is Avots' choice when selecting water-saving plant alternatives. Natives need much less water because they've evolved in the region and are more likely to survive its conditions.

Recycle the rainwater

It is surprising that rainwater harvesting isn't practiced more, since rain is one of the few things in life we get for free. And very few states have regulations controlling rainwater harvesting. If dollar bills or diamonds fell from the sky at regular intervals, everyone would have barrels out to catch them. It's common in places like Africa, where rainfall isn't taken for granted.

Interest in rainwater recapture systems peaks during periods of drought. During California's last long dry spell, landscape and irrigation contractors who installed them had more work than they could handle. The market was driven by people's fears of dead trees and landscapes in the face

of draconian water restrictions and tiered rates. Now that the drought has been over for a while, the demand for these systems has cooled.

Systems range from a simple rain barrel or cistern that uses gravity to feed water into a drip irrigation system, to sophisticated setups with underground storage and filtration.

According to RainCatcher, a Tacoma, Washington-based nonprofit organization that works to provide clean water for children in the developing world through affordable and sustainable solutions, a 1,000-square-foot roof can capture as many as 625 gallons of clean water for every inch of rainfall.

Dig a rain garden

A rain garden is a bowl-shaped depression designed to collect runoff from a lawn, a roof or pavement and hold it temporarily until it percolates back down into the ground, keeping it out of storm drains. A rain garden can hold 200 gallons of water.

Wilson teaches his students how to construct them. They dig a 12-inch deep hole that is flat across the bottom with banked sides that slope about 45 degrees. “We put seeds and plant plugs in the bottom right away, and throw in some clover, as it pops up quickly and gives you a nice green look while all the other native plants and wildflowers are taking hold.”

Oftentimes, gravel is placed in the bottom to aid drainage. Wilson says that in the Midwest, it’s common to just have soil in the bottom of a rain garden; it depends on what type of soil an area has and how well it drains.

You’d think that a rain garden would be an ideal breeding spot for mosquitoes, but Wilson says it’s not. “When you first build one, water will sit in it for about three days; after a while, it’s lucky if it stays in there for one day. The breeding cycle of a mosquito is seven to 10 days. Unless it rains every three days or for 10 days straight, the larvae dry up.”

So, if we could design the ideal water- efficient landscape, what would it look like? It would be irrigated completely or partially with collected rainwater, graywater or reclaimed water (partially treated sewage water is available in some places). Areas with grass would be fitted with precision spray nozzles or rotary sprinklers with matched precipitation rates; planting beds would have drip emitters, low-volume microsprays or bubblers. Then we’d add rain and soil moisture sensors and a smart controller to schedule everything.

On the landscaping side, we’d use a combination of native or drought-tolerant plantings, properly mulched, in good soil full of microbes and mycorrhizae with a rain garden or two thrown in.

Even if you do just one or two of these things for your clients, you will cut their water usage, and their bills, by a substantial amount. And they, and all the living things on this planet that can’t survive without water, will thank you for doing so.

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