SAN JOAQUIN COUNTY
FLOOD CONTROL & WATER CONSERVATION DISTRICT
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KRIS BALAJI
DIRECTOR OF PUBLIC WORKS

ADVISORY WATER COMMISSION

January 16, 2019, 1:00 p.m.

Public Health Conference Room, 1601 E. Hazelton Avenue, Stockton, California

AGENDA

I. Roll Call

II. Approve Minutes for the Meeting of September 19, 2018

III. Discussion/Action Items:

A. Update on SJAFCA Activities – Chris Elias

B. Presentation on Integrated Regional Water Management Planning – Brandon Nakagawa

C. Standing Updates:

1. Sacramento – San Joaquin Delta (See Attached)
2. Sustainable Groundwater Management Act – SGMA (See Attached)
3. Flood Management and Water Resources Activities

IV. Informational Items (See Attached):

A. January 7, 2019, kqed.org, "California's Indomitable Snowman Talks Snowpack Tech in a Changing Climate"

B. January 8, 2019, email from California Central Valley Flood Control Association (CCVFCA), "Save the Date for 2019 Flood Forum"

V. Public Comment: ***Please limit comments to three minutes.***

VI. Commissioners' Comments:

VII. Adjournment:

Next Regular Meeting
February 20, 2019, 1:00 p.m.
Public Health Conference Room

Commission may make recommendations to the Board of Supervisors on any listed item.

If you need disability-related modification or accommodation in order to participate in this meeting, please contact the Water Resources Staff at (209) 468-3089 at least 48 hours prior to the start of the meeting. Any materials related to items on this agenda distributed to the Commissioners less than 72 hours before the public meeting are available for public inspection at Public Works Dept. Offices located at the following address: 1810 East Hazelton Ave., Stockton, CA 95205. These materials are also available at http://www.sjwater.org. Upon request these materials may be made available in an alternative format to persons with disabilities.

REPORT FOR THE MEETING OF
THE ADVISORY WATER COMMISSION OF THE SAN JOAQUIN COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT
September 19, 2018

The regular meeting of the Advisory Water Commission of the San Joaquin County Flood Control and Water Conservation District was held on Wednesday September 19, 2018, beginning at 1:00 p.m., at Public Health Services, 1601 E. Hazelton Avenue, Stockton, California.

I. Roll Call

Present were Commissioners Nomellini, Roberts, Holman, Starr, Herrick, and Hartmann, Alternates Reyna-Hiestand, and Henneberry-Schermesser, Secretary Nakagawa, and Chairman Mc Gurk.

Others present are listed on the Attendance Sheet. The Commission had a quorum.

II. Approval of Minutes for the Meeting of August 15, 2018.

Motion and second to approve the minutes of August 15, 2018 (Hartmann/Holman). Unanimously approved.

SCHEDULED ITEMS

Tom McGurk, Chairman of the Advisory Water Commission (AWC), led the agenda.

III. Discussion / Action Items:

A. Update on San Joaquin Area Flood Control Agency (SJAFCA) Activities – Chris Elias

Mr. Chris Elias, SJAFCA – Executive Director, provided an update on the United States Army Corps of Engineers (Corp) signing of the Chief's Report for the Lower San Joaquin River Feasibility Study (LSJRFS), previously discussed at the AWC meeting held on August 15, 2018. Mr. Elias reported that on Thursday, September 13, 2018, the Chief's Report was authorized by the United States House of Representatives, thus "enshrines in law" federal government interest in the project. He added the Senate has yet to vote on this measure. The next component will be funding requests and appropriations.

A handout was distributed depicting a footprint map of the LSJRFS projects, which encompasses areas from Mosher Slough to French Camp Slough, at an estimated cost of over $3 million. Mr. Elias emphasized that these projects are integral in protecting our communities, people, and infrastructure, as well as improving our local economy and employment opportunities. In addition, the United States Assistant Secretary of the Army (ASA) has directed that Phase 2 of the LSJRFS shall include Reclamation District 17.

Mr. Elias announced the SJAFCA Board Meeting scheduled for September 20, 2018. On the agenda will be the Smith Canal Project, and also a consultant presentation on a funding plan for continued improvements of area levee systems. The funding plan is a requirement of the Central Valley Flood Protection Board (CVFPB), per SJAFCA's commitment towards levee improvements as submitted in the CVFPB progress report. He reiterated meeting details: SJAFCA Board Meeting, Thursday, September 20, 2018 at 9:00 a.m., Stockton City Council Chambers.

B. Discussion and Possible Action Regarding Activities Concerning Staten Island – Brandon Nakagawa

Mr. Brandon Nakagawa addressed the Commission that Staff is seeking a recommendation from the AWC body to the San Joaquin County Board of Supervisors (BOS) concerning Staten Island, and the activities associated with the district. A brief history provided by Mr. Nakagawa described the origination of California Proposition 1 – Water Bond in 2014, and the statute of providing counties the opportunity to comment on proposed projects (i.e. eco-system restoration, habitat, etc). In addition, the California Department of Fish and Wildlife (CDFW) or the Sacramento-San Joaquin Delta Conservancy, would reach out to these respective counties to obtain feedback.

Recently, San Joaquin County has received an email from CDFW for a grant program, which included a proposal from The Nature Conservancy (TNC) to convert a portion of Staten Island to rice and wetlands. Mr. Nakagawa contacted local reclamation districts and the San Joaquin County Mosquito & Vector Control District to obtain economical and/or environmental impacts of the proposed rice/wetlands project. Feedback received implied negative impacts including seepage issues, levee instability, and flooding issues of Bouldin Island on the south / Terminus Tract on the east / and Brack Tract to New Hope Tract going south to north. Mr. Nakagawa emailed CDFW on the negative feedback of the proposed project, and included opposing letters from the San Joaquin County Mosquito & Vector Control District. Per the mosquito and vector district, 2018 has been a record year for mosquitos found with West Nile and other viruses. Referenced in the opposing letters is a similar rice/wetland conversion project on Twitchell Island which has resulted in problematic mosquito and vector control.

Mr. Dino Cortopassi, CEO of Wetlands Preservation Foundation, contacted Mr. Nakagawa requesting opposition of the proposed projects on Staten Island. In addition, Mr. Mike Eaton has volunteered on behalf of Mr. Cortopassi and provided written opposition of the grant proposal, and activities occurring on Staten Island. Mr. Eaton's history includes former employment with TNC at the time of purchase of Staten Island. He states alleged actions include mismanagement of proceeds from farming on the island with profits syphoned off to TNC Headquarters, and a neglected levee system which threatens adjacent islands. In comparison to other projects studying greenhouse gas emissions and carbon sequestration in wetlands, Staten Island would need an additional $900K+ to study the possible conversion, thus would need to request more funds for the actual conversion.

State funding was awarded to TNC for the purchase of Staten Island from private ownership. At the time, the Commission made a recommendation to the BOS to oppose State funding for this purchase. In 2001, Mr. Eaton spoke before the Commission, on behalf of TNC, and explained the reason for the acquisition of Staten Island was to "keep the island in wildlife friendly agriculture," continue farming, maintain the levee system, and maintain the habitat values. Currently, the island is being proposed to revert to State (DWR) ownership. To summarize, Staten Island was "purchased" with State funding to a non-profit agency (TNC), who mismanaged their responsibilities, and will be sold back to State.

MOTION: Commissioner Nomellini moved and Commissioner Hartmann seconded a motion to recommend to the Board of Supervisors to oppose the bond funding and purchase of Staten Island by the State of California. Commissioner Hartmann added reference to Tower Park Village, a 200-home community on the southeast tip of Twitchell Island, which would be threatened by any levee seepage from Staten Island. The motion passed unanimously.

Mr. Nakagawa mentioned that an alternative is being proposed. Mr. Cortopassi is suing the State of California and TNC regarding the sale and transfer of ownership of Staten Island to DWR. However, there is a proposal on the table for a foundation, experienced in both the converting of agriculture land to rice and wetland farming, to use their own proceeds and take ownership of the island, be stewards of the land, and keep it in "wildlife friendly agriculture."

C. Standing Updates – Brandon Nakagawa

Standing monthly updates were provided on the following:

1. Sacramento – San Joaquin Delta:

   - A Joint Legislative Budget Committee Hearing was held on September 11, 2018. This was the first meeting held by this committee, which was established by Senator Lois Wolk and her legislation. This open informational meeting is a requirement, by statute, prior to any forthcoming Water Fix related actions. The County attended and saw this an opportunity to raise Delta issues and speak on behalf of Delta counties. Numerous environmental and special interest groups were in attendance and provided comment.

   - On September 17, 2018, a press conference was held by Restore the Delta. Restore the Delta has released an Environmental Justice Impacts Report with regards to Water Fix and other impacts in the Delta. The report depicts the status of Stockton and surrounding communities, with some communities rated as most economically disadvantaged in the nation. The report concludes the economic impacts to these areas if the Delta is further degraded, or if the Water Fix is ever built. Comments were made from Native American Tribes, as well as elected officials including Representative Jerry McNerney, Assemblymember Susan Eggman, Senator Cathleen Galgiani, Stockton Mayor Michael Tubbs, and San Joaquin County Supervisor Kathy Miller. The press conference was televised state-wide and an article was published in The Record.

   - Commissioner Nomellini stated that Monday, September 17, 2018 was the deadline for public comment on the proposed supplemental environmental design of the Water Fix. In addition, the Commissioner of the United States Bureau of Reclamation is challenging State Water Resources Control Board's (SWRCB) authority to adopt the Substitute Environmental Document (SED) as part of the Water Quality Control Plan. Strong opposing comments submitted are validation of a new SED for the Twin Tunnels, and compliance of water quality standards by both State water projects and Federal water projects. Commissioner Nomellini added that the Secretary of the Interior believes that SWRCB standards imposed on the project are contrary to specific congressional direction, and that the Attorney General of the United States should begin litigation to determine whether or not there is such conflict.

     Mr. Nakagawa asked how much water the State contributes towards environmental purposes versus the Federal government. Commissioner Nomellini responded that the State mainly has control of only Oroville Dam, thus 4.25 million acre feet of entitlement. Mr. Fritz Buchman, San Joaquin County Public Works – Deputy Director, interjected that since the Coordinated Operation Agreement was executed between the United States of America and the DWR, contributions should be 75% Federal, and

25% State. Commissioner Nomellini added that per the agreement, the State cannot export water unless water rights are protected.

2. Sustainable Groundwater Management Act (SGMA):

   - Included in today's agenda packet is the regular technical update presented to the Eastern San Joaquin Groundwater Authority's (ESJGWA) Board of Directors at the meeting held on September 12, 2018. Mr. Nakagawa reported that revenues from membership dues are being received from the Groundwater Sustainability Agencies (GSAs), and a grant agreement will be signed and finalized in the near future. A budget surplus is projected at the end of the Groundwater Sustainability Plan (GSP) development process in June 2019.

   - An ESJGWA Public Meeting was held on August 29, 2018 at the Robert J. Cabral Agricultural Center. The meeting was conducted in an "open house" forum with approximately 50 members of the public in attendance. Representatives of almost all the 17 GSAs were present to directly answer questions or address concerns from residents in their respective service areas. Mr. Nakagawa expressed opinion that the energy in the room was positive. The next public meeting will be held in November 2018.

   - Mr. Nakagawa gave an update of the "City of Brentwood's Basin Boundary Modification to Detach Eastern Contra Costa County from the Tracy Subbasin," whereby postcards were sent out to local agencies and public water systems within the Tracy Subbasin to obtain 75% affirmative approval from each group of entities. He reported that 75% of support was received and the application was deemed complete by DWR. The deadline for the 30-day public comment period is October 11, 2018.

3. Flood Management and Water Resources Activities:

   - Mr. Nakagawa announced the addition of two new County employees and introduced Mr. Andy Nguyen and Mr. Anthony Diaz. Mr. Nguyen is a recent graduate of the University of California, Berkeley, and Mr. Diaz is a recent graduate of California State University, Sacramento. Both engineers are being trained in combined duties of the Water Resources / Flood Management division and will be staff to the AWC.

     On a separate note, Commission Nomellini inquired if consultants are working to include projects to replenish groundwater in the GSP? Mr. Nakagawa responded that there is communication between the consultant and the GSAs regarding specifically suggested projects, and/or address areas where overdraft or high groundwater usage occurs. There was vast discussion amongst the Commission regarding GSAs articulating to the consultant a perceived "plan," for their respective areas, to be included into the GSP.

   - An ESJGWA Workshop will be held on October 10, 2018, following the regularly scheduled ESJGWA Board Meeting. Discussion will include potential projects and opportunities, as well as frequency, framework and prioritization. The workshop will conclude at approximately 2:30 p.m. and lunch will be provided. A suggestion was made to use projects listed on the Integrated Regional Water Management Plan (IRWMP). Mr. Nakagawa stated that the IRWMP is a "wish list," whereas the GSP is

a regulatory document with a commitment to the projects being implemented and producing.

IV. <u>Informational Items:</u>

A. August 16, 2018, nrpubs.com, "Keeping San Joaquin County Safe Together"
B. August 24, 2018, turlockjournal.com, "Valley Voices heard by State Water Board"
C. September 2018, Advisory Water Commission Annual Report for 2017-18
D. September 11, 2018, riponadvance.com, "Denham Seeks Guarantees California Water Amendment Passes in Final Spending Bill"

V. Public Comment: ***Public comments, adopted by the Advisory Water Commission on January 17, 2018, will be limited to 3-minutes, unless extended to the discretion of the Chair.***

No comments given.

VI. Commissioner's Comments:

No comments given.

Next Regular Meeting: October 17, 2018 at 1:00 p.m.
Public Health Conference Room

VII. Adjournment: 2:00 p.m.

SAN JOAQUIN COUNTY
FLOOD CONTROL & WATER
CONSERVATION DISTRICT

ADVISORY WATER COMMISSION
MEETING OF SEPTEMBER 19, 2018

ATTENDANCE SHEET

NAME	AFFILIATION	E-MAIL ADDRESS	PHONE
D. Barney	SJC PW WR	dbarney@sjgov.org	468-3089
Brandon Nakagawa	SJC PW		
Tom MCGURK	SEWD		
ANNETTE HENNEBERRY SCHERMESSER	AWC-AT LARGE ALT		
Stephanie K Reyna Hiesland	City of Tracy		
Elbert Holman	City of Stockton		
CHRIS ELIAS	SJAFCA	chris.Elias@Stocktonca.gov	209 937 8866
CHARLES STARR	NSJWCD		
GEORGE HARTMAN	RD 2074	gvhlaw@gmail.com	
Reid Roberts	CSJWCD		941-8714
Jon Herrick	SDWA	Jherrlaw@aol.com	663-9148
Dante John Nomellini	CDWA	ngmplcs@pacbell.net	465-5883
Fritz Buchman	SJC PW	fbuchman@sjgov.org	468-3101
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Alicia Connelly	SJC PW	aconnelly@sjgov.org	468-3531
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Mel Lytle	COS		
ANDY NGUYEN	SJC PW	aynguyen@sjgov.org	468-2999

ATTACHMENT
III.C.1.

BAY DELTA SCIENCE CONFERENCE: Drought, climate change, and restoration resiliency

November 29, 2018 Maven News and Features, Science Features

John Durand looks at the effects of the 2012-2016 drought on the Delta from the environmental, economic, and stakeholder perspectives

The 2012-2016 drought is one for the records in that, while not necessarily the driest or the longest for California since the state has been keeping records, it was the hottest drought with many scientists saying that we can expect similar droughts in the future. John Durand, a research scientist at UC Davis, gave this presentation at the 2018 Bay Delta Science Conference that looked at the impacts of the drought on the Delta from the perspectives of the environment, the economy, and Delta stakeholders.

John Durand began by saying he has been spending a lot of time, thinking about the big picture around restoration strategies for the Delta and the Suisun Marsh, and how the recent drought and climate change factor into it.

"*I'm going to look at the recent drought and try to apply it, because with the trend that we're seeing in these droughts, for the first time, it really seems like climate change is real*," he said. "*I feel like from our data and from our daily experiences, there's many aspects of the last drought that give us some idea about how climate change is scaling down to California, which has been an outstanding question for many years now.*"

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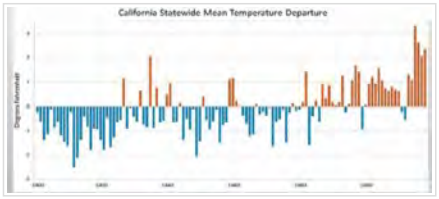
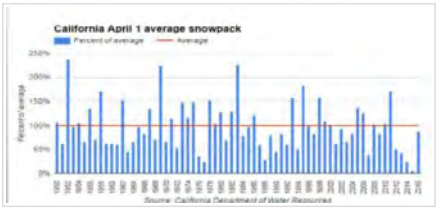
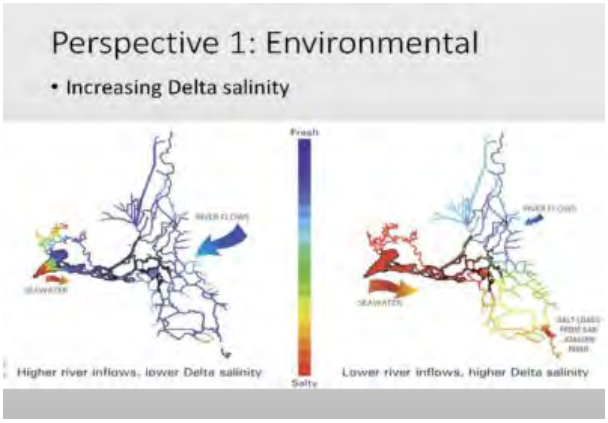
The trends that were seen in the last drought should drive our thinking about not only preparing for future droughts, but also preparing for climate change. The 2012-2016 drought wasn't the driest or longest drought in California history, but it was in some ways the driest, longest, hottest drought, he said.





Temperatures exceeded the norm (above, left), and along with that, there was very little snowpack (above, right). "*I argue that the characteristics of the drought give us an idea about how things are going to downscale, particularly the heat, the low snowpack, and the length*," he said. "*So I'm going to offer these three perspectives of drought and climate change: The first is going to be an environmental perspective of what's been happening. The second perspective will be economic, looking at the economics of the recent drought and how we can think about that going forward, and then third, from the perspective of three important stakeholders*."

Environmental perspective

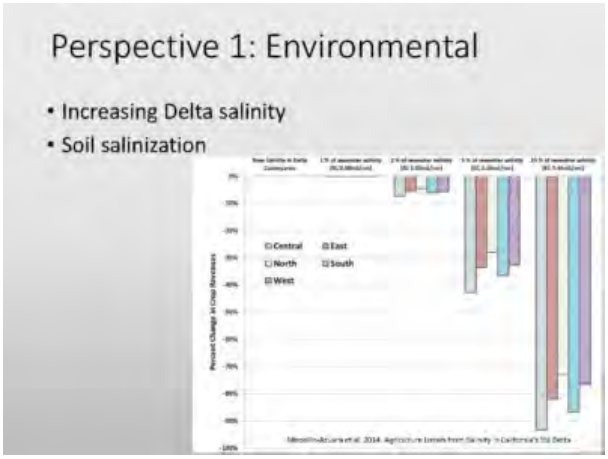


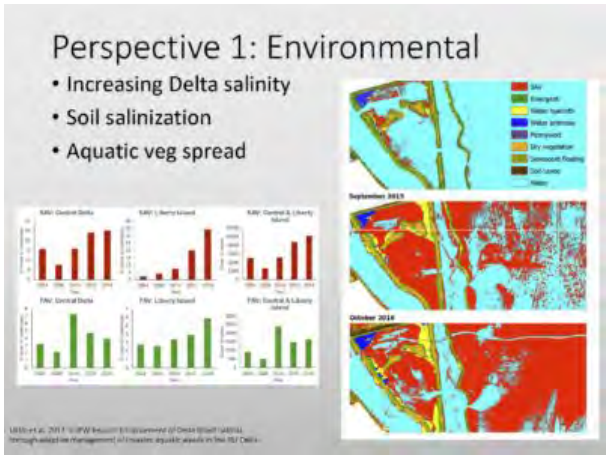
Increasing Delta salinity was a feature of the recent drought and it will be a feature of climate change, Mr. Durand said, presenting a slide showing Delta salinity in high and low flows, noting that it was from a model done by RMA. During the recent drought, salinity was largely managed by the implementation of a barrier in West False River, but there were salinity exceedances throughout the Delta, and these had an impact, not only on fish communities and the aquatic community, but also on soil salinization in the Delta, and Delta agriculture, he said.

Mr. Durand said there was a lot of anecdotal evidence that soil salinity increased and that it had some affect on crops. There was a voluntary fallowing program which turned out to be beneficial for a number of reasons for growers because of the increasing salinity as it minimized their risks and gave them a plan B.

He presented a model of decreasing crop revenues as a function of increasing salinity in the Delta, depicting the trend of loss of agriculture revenue as a function of increasing salinity in the Delta.

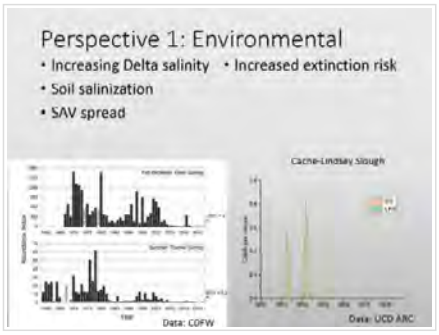
"*The thing about soil salinity is once we start applying to the soil, it has a sort of resilience in that it's difficult to reverse that process without using a lot of water, which we don't often have in California*," he said. "*These soil salinity effects can be chronic and ongoing over a longer period then with drought and unless we can manage salinity in the Delta, we would expect that that would continue*."

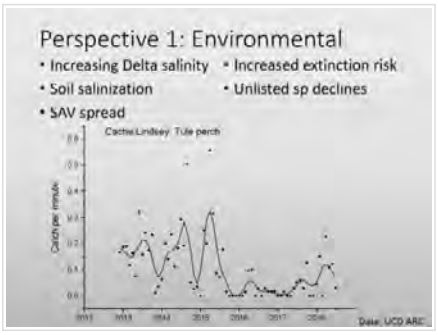




Aquatic vegetation spread tremendously in the drought. He presented some plots showing that the overall the spread of submerged aquatic vegetation as well as floating aquatic vegetation throughout the Delta increased throughout the drought. On the maps, red is submerged aquatic vegetation on Liberty Island. "*Liberty Island and the Cache-Lindsay complex was the place that was kind of resistant to this stuff for many, many years*," said Mr. Durand. "*But the truth is with the trend we saw during the drought, the ongoing trend is that the North Delta is becoming more and more like the South Delta, and that's a trend that we'll continue to see marching into the future*."

There is an increasing extinction risk. Mr. Durand presented a slide showing plots for the Delta smelt for the Fall Midwater Trawl and the Summer Townet survey. "*This has been a decadal decline, but during the drought, they all but disappeared*," he said. "*In our own surveys up in the north Delta, we saw very few Delta smelt at the beginning of our surveys in 2012, we saw more longin smelt occasionally, but they pretty much dropped off all detection*."

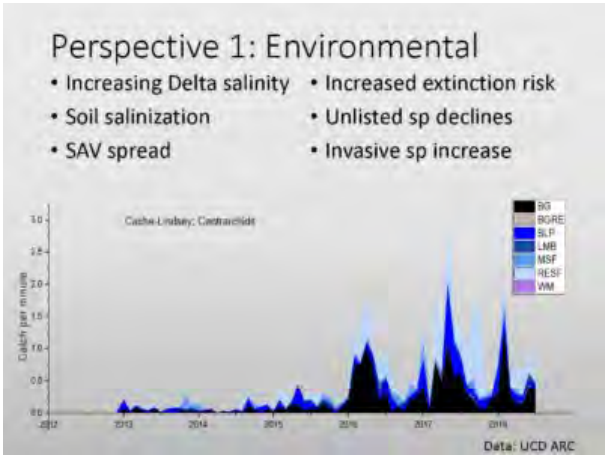




Unlisted species declines is something that can be expected. He presented a plot showing populations of tule perch, noting that it's a rather ubiquitous species, but by the end of the drought, tule perch populations had dropped significantly and hasn't really recovered since then. "*This is a trend that we could expect to see, not only for tule perch but for splittail, hitch, pike minnow and all non-listed species that have local importance as indigenous coldwater fishes that are unique to this area.*"

Then there was the reverse trend for invasive fishes, whose populations increased. He presented a slide showing the populations of centrarchids or sun fishes (all introduced fishes) in the North Delta, noting that the increase in that region probably mirrors the increase in submerged aquatic vegetation which provides habitat for them. "*These plots reflect the increase in blue gill, sunfish, large mouth bass and other invasive fishes across the drought. They increased during the drought and they haven't subsided since the drought, and I think in many ways, they are probably there to stay.*"

Finally, sea level rise. Although sea level rise is not part of the drought, it will be putting pressure on our systems going into the future, he said.



"*One of the implications is not just of the loss of intertidal habitat and island flooding risks which jeopardize agriculture, but these change the tidal prism that's operating through the system,*" he said, noting that the plot in the middle is from a Chris Enright talk he gave a few years ago. "*As we have a finite amount of tidal energy and as sea level rise increases the volume on the surface area of the Delta, it distributes that tidal energy across that plane. That finite amount of energy means the tidal prism shrinks so as sea level rise goes up and as islands flood, it means that tidal prism will diminish over time. That's a critical thing to think about in terms of restoration and also supporting native fishes, as there are processes tied into that that essentially defined this region as a tidal estuary.*"

The economic perspective

meeting-2/?instance_id=5507)

5:30 pm GRA SF Bay Chapter Meeting: SF B... @ Scott's Seafood Grill & Bar (https://cawaterlibrary.net/event/gra-sf-bay-chapter-meeting-sf-bay-regional-water-quality-control-boards-annual-regulatory-update/?instance_id=5508)

JAN 17 Thu

11:00 am Delta Conveyance Finance Authori... @ Tsakopoulos Library Galleria (https://cawaterlibrary.net/event/delta-conveyance-finance-authority-board-meeting-3/?instance_id=5391)

2:00 pm Delta Conveyance Design and Cons... @ Tsakopoulos Library Galleria (https://cawaterlibrary.net/event/delta-conveyance-design-and-construction-authority-board-of-directors-meeting-3/?instance_id=5414)

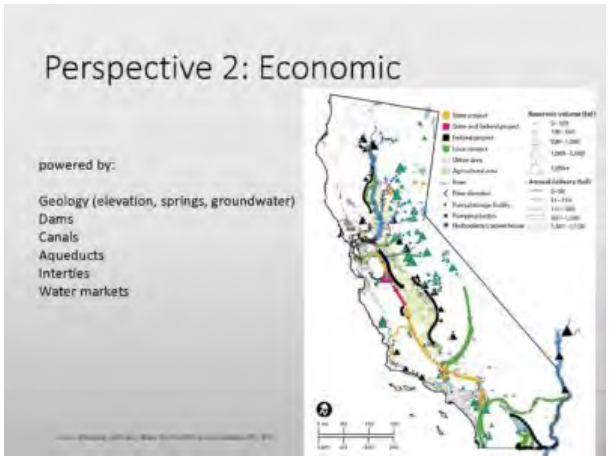
5:30 pm Delta Protection Commission @ Rio Vista City Hall (https://cawaterlibrary.net/event/delta-protection-commission-20/?instance_id=5265)

MORE WAYS TO STAY IN TOUCH

TODAY'S MOST POPULAR POST

DAILY DIGEST: The shape of water: When ag water management pays off; January storms benefit Sierra snowpack; Congressman Garamendi reintroduces bill to establish 'Delta Heritage Area'; Shutdown,

Mr. Durand then turned to the economic perspective. During the recent drought, the state's total economic losses totaled about $10 billion, which is less than .1% of the California's $2.5 trillion economy. "*It turns out that the drought impact on the economy was much less than the impact from just standard business cycles, from federal policies, and international exchange*," he said.

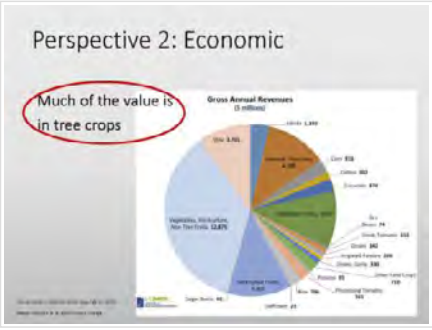


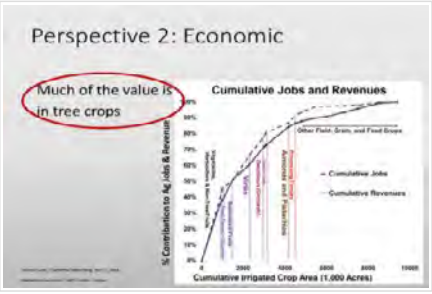
The reason is that California's infrastructure and geography is built for some kind of resilience. "*We have the elevation so the snowpack, although diminished, provides a lot of resilience. We have springs and groundwater resources in the valley, and we've learned to exploit all these resources through the California water system, which includes dams, canals, and aqueducts.*"

More recently in the past couple of droughts, innovations have occurred including interties between water systems which can be used in conjunction with water markets to get water from where it is to where it is needed. It has provided a lot of flexibility that in many ways sustained a variety of communities and a lot of industrial sectors across California.

"*During the drought in spite of the crisis, in spite of the overall trend, California's probably well suited to manage changing climate going into the future with an abundance of resources*," he said.

He presented a pie chart (lower, left) showing the different crops grown in California, noting that most of the value in agriculture is in tree crops. "*Very little of this value derives from other crops*," he said.





He then presented a plot showing cumulative ag jobs and revenue plotted against crop acreage (upper right). "*This is the cumulative irrigated crop area in relationship to the contribution to ag and ag jobs and revenue. 50% of the cumulative ag area provides 80-90% of the jobs and revenue, so if you cut back by half, you can still maintain almost all the revenue from ag, so it has a lot of resilience baked into it.*"

addition al request s for water could disrupt Arizona drought plan; and more …

January 10, 2019 (459)

MOST POPULAR POSTS LAST 7 DAYS

THIS JUST IN … Metrop olitan Water District begins drawing down stored water in Lake Mead

January 7, 2019 (2,156)

DAILY DIGEST, weeken d edition: Trump asks Suprem e Court to resolve groundwater fight; CA moves, haltingly, towards a post-lawn future; Wildfires pose hidden threat to the West's drinking water; Govt shutdown: How science research is grinding to a halt; and more …

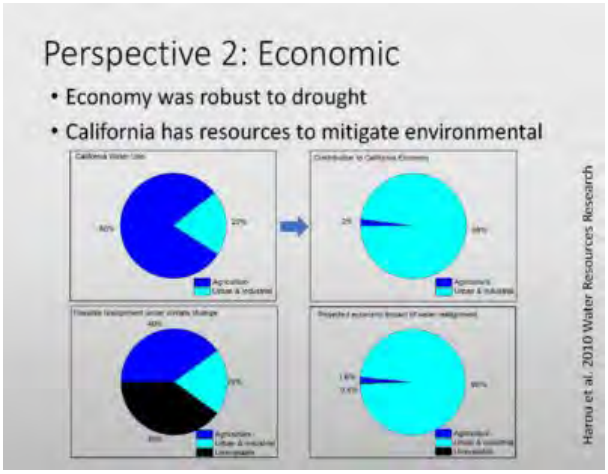
January 6, 2019 (1,152)

DAILY DIGEST: Will Gavin Newso m change the state's water course?; California snowpack below average in year's first survey; Weekend storm start of a Pacific storm parade; and more …

January 4, 2019 (878)

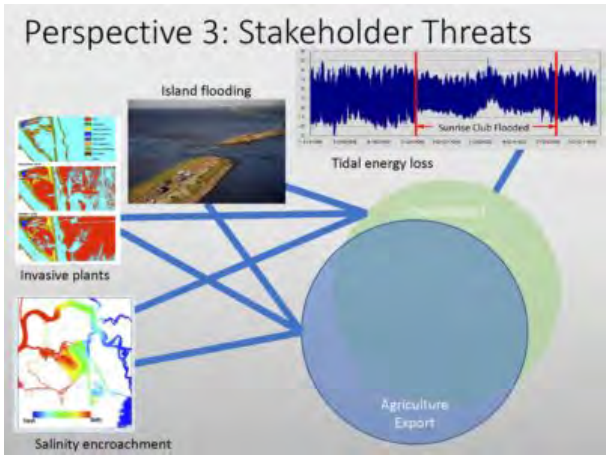
DAILY DIGEST: Next storm set to arrive by midweek; State's retiring snow guru talks snowpack tech and CA water; From Brown to Newsom, CA to

Agriculture uses about 80% of California's water while urban and industrial gets about 20%, but ag is contributed just 2% to the overall California economy. "*It's not a big part, but it's a very essential part of the economy and it has a critical role in our society, almost like a utility function*," he said. "*We support ag because it's necessary to feed people … but the fact is that our economy and agriculture is quite resilient to changes in water supply, so if we took off half of ag's irrigable crop area, it would result in an impact of about 0.4% – that is it would reduce ag to about 1.6% of the total state economy.*



"*My point is that our economy is very robust to drought and California has the resources to mitigate environmental problems during this if we choose to apply those resources*," he continued. "*We're a very rich state and we'll continue to be a rich state*."

The Delta stakeholder perspective



Mr. Durand then lastly turned to the perspective of three Delta stakeholders: The environment, agriculture, and water exports. "*These three stakeholders face similar threats, and I'm going to argue that they have much more interests that are aligned rather than separate*," he said. "*The main threats are island flooding, salinity encroachment, invasive plants and animals, and tidal energy loss.*"

"*Agriculture and export rely on levees, so there is the threat of flooding; invasives which can get in the way of moving water around, and salinity encroachment all affect agriculture and export in the same way. They also affect the environment.*"

Tidal energy loss is a threat to the environment that doesn't affect the others but the interests of agriculture and water exports largely overlap, he said. The threats of island flooding, salinity encroachment, invasive plants, and tidal energy loss can be managed with habitat restoration, levee maintenance, and managing water inflows, which he acknowledged are all expensive propositions that require a lot of effort. There's broad overlap in how they'll be managed as well as broad overlap in terms of ag, exporters,

see new style, substance; A moonshot for solving America's water crisis; and more …

January 7, 2019 (854)

DAILY DIGEST: A change of power as CA pushes further to the left; Governor Newsom, issue by issue; Storm poised to slam Sierra, dump another 2 feet of snow; One step closer for updated CEQA guidelines; and more …

January 8, 2019 (839)

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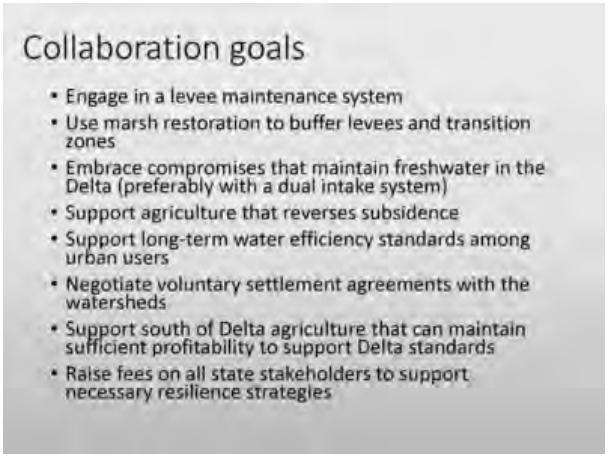
and the environment relying on these same tools, he said. Tidal energy loss can be managed mostly through careful habitat restoration but also requires the levee system, he noted.

"*What I'm trying to get at it here as I run out of time, is that the three big stakeholders have a lot of interests that overlap*," he said. "*They face a common enemy which is the changing climate, and the fact is that the historical antagonism between these three groups is more and more misplaced as we march into the future.*"

In conclusion …

"*Climate change is like the Gollum and it's the enemy*," said Mr. Durand. "*We can use the Gollum as a tool to force us to engage and collaborate and find solutions that will march us into the future, or we can panic and do nothing, which has been a large part of the federal strategy and have the Gollum wreck Progg. I don't want it to wreck Progg, I'd like to work on the Delta. And I think we have the resources to implement changes and so I'm going to conclude my talk with the key collaboration goals that these stakeholders have in common which is to keep the Delta fresh, maintain it as a tidal system, maintain the levee system, and control invasive vegetation.*"



"*To make that happen, there are a series of goals that we can agree on broadly among the stakeholders. Some of these we're implementing but we should do it much more aggressively because the change is coming and it's coming already.*"

"*The key things we need to do is engage or expand our levee maintenance system to buffer not only against sea level rise but also earthquakes; it's a huge effort but we have the resources to do it*," he said. "*Use marsh restoration to buffer those levees in transition zones which will be compromised in the future. Embrace comprises that maintain fresh water in the Delta, preferable with a dual intake system which benefits more stakeholders in the process. Support ag that reverses subsidence, which is being done but not enough. Support long-term water efficiency standards among urban users as well as ag, although ag has done a lot in this realm*

and in the last drought, urban users did as well. Negotiate voluntary settlements agreements with the watersheds; I didn't talk about what's going on up river but that's a key part of what's going on for the Delta, support south of Delta that can maintain profitability to support Delta. South of Delta agriculture is going to contract, it has to contract, but there are profitable enterprises there that can help support restoration in the Delta. And then finally, raise fees on stakeholders. We have to do it. We have the resources, we have to make the decision."

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Leave a comment Bay Delta Science Conference, climate change, drought

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CA WATER COMMISSION: Climate change effects on the State Water Project and Central Valley Project

January 3, 2019 Maven Meetings

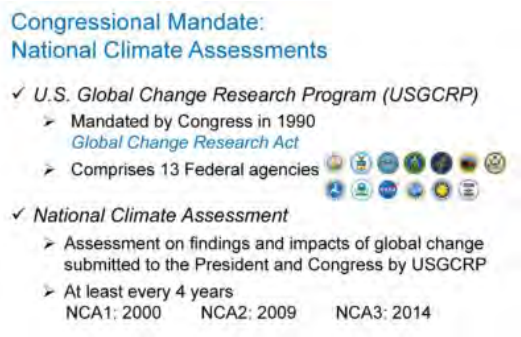
The latest climate change assessments show reduced Delta exports and carryover storage due to climate change likely by mid-century

In the latter half of 2018, both the federal and state governments released new climate change assessments that outline the projected course of climate change and its potential effects on water resources. Both federal and state assessments include chapters on water resources and California's Fourth Climate Change Assessment includes two reports about the impacts of climate change on the State Water Project. At the December meeting of the California Water Commission, staff from the Department of Water Resources and the Delta Stewardship Council were on hand to present an overview of the newly released assessments.

John Andrew, Assistant Deputy Director for Climate Change Program, began the presentation by noting that the Department of Water Resources (DWR) was quite involved in the preparation of the state's fourth climate change assessment, contributing to 9 out of 50 of the technical papers or about 20%. "*By my count, only UC Berkeley exceeded the number of papers contributed by an institution and so that means that we're up there with other recognized science organizations like UC Davis and the USGS*," he said. "*I think it's a real tribute just in the sheer numbers of papers contributed by DWR show DWR's commitment to climate science.*"

Fourth National Climate Assessment (NCA4)

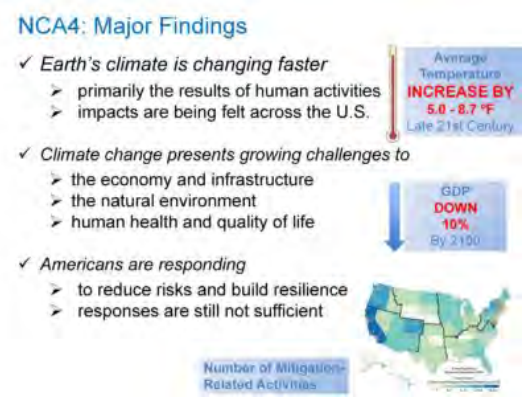
Kevin He, an engineer with the Department of Water Resources, then gave a brief overview of the major findings contained within the Fourth National Climate Assessment (or NCA4), which was a joint effort of over 300 people in different fields across the nation, including three people from three California state agencies. Mr. He served as a review editor for the water chapter with the support of DWR's climate change program and the Bay Delta Office.



The US Global Change Research Program (USGCRP) was established by Presidential Initiative and mandated by Congress in the Global Change Research Act (GCRA) of 1990 to develop and coordinate "a comprehensive and integrated United States research program which will assist the Nation and the world to understand, assess, predict, and respond to human-induced and natural processes of global change." The USGCRP works across 13 federal agencies to advance understanding of the changing Earth system and maximize efficiencies in global change research.

The USGCRP is required to produce a synthesis report of climate impacts and trends across the nation every four years. The intention of the NCA is to inform resource managers, officials, and stakeholders in considering climate-related risks in their decision making by distilling a large body of research into a report framed around risks to people and resources. It also serves as a more general educational resource about what's at stake for society as a result of climate change. The report, known as the National Climate Assessment (NCA), was first produced in 2000, with subsequent iterations released in 2009 and 2014.

The Fourth National Climate Assessment has two volumes. The first volume, released in November, 2017, focuses on the physical science of climate change; the second volume, released in November of 2018, focuses on societal impacts with 29 chapters and has chapters that cover topics such as water, energy, transportation, ecosystem, coast, forest, and human health, as well as ten regional chapters, one adaptation chapter, and one mitigation chapter.



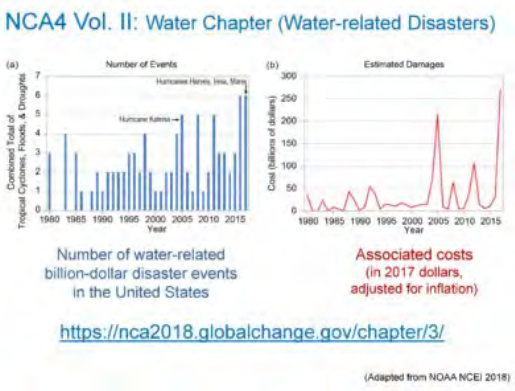
Mr. He gave the major findings of the NCA4. Our climate is changing faster than at any point in modern civilization and those changes are mostly the result of human activities. The corresponding impacts are being felt across the nation. The climate is projected to change even faster in the future, with temperature possibly increasing by 5 to 8.7 degrees Fahrenheit by the end of this century.

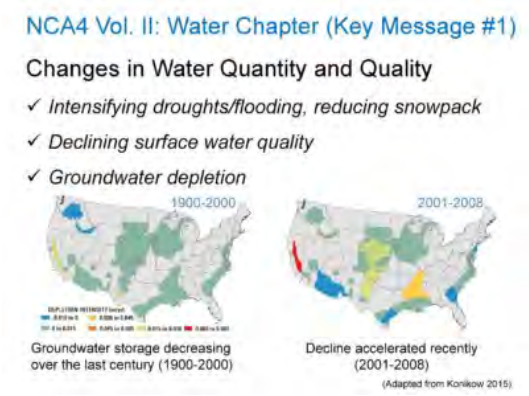
Secondly, climate change presents growing challenges to our economy, infrastructure, natural environment, human health, and quality of life. For example, the GDP could potentially lose up to 10% by 2100 if no major action is taken to fight climate change, he said. However, Americans are taking actions to reduce risks and build resilience.

The map on the bottom of the slide shows the number of mitigation-related activities by state with the bluer color meaning more activities; the orange dots are the cities supporting greenhouse gas

emission reductions. "*So we can say it's quite clear that California is a champion with no doubt*," said Mr. He. "*That being said, nationwide what we're doing is still not enough to avoid substantial damage to our economy, our environment, and human health. We need to do more.*"

The water chapter in volume 2 points out that costs are rising from water-related disaster events. The plot on the left is the number of water-related billion dollar disaster events like the flood, drought, and hurricanes from 1980 to 2017; the plot on the right is the estimate of cost of these events in the same period. "*It's quite clear that in the past couple of decades, we are having more of such events and we are paying average than higher prices*," said Mr. He. "*So this number is telling us our water is changing unfortunately in an undesirable direction.*"



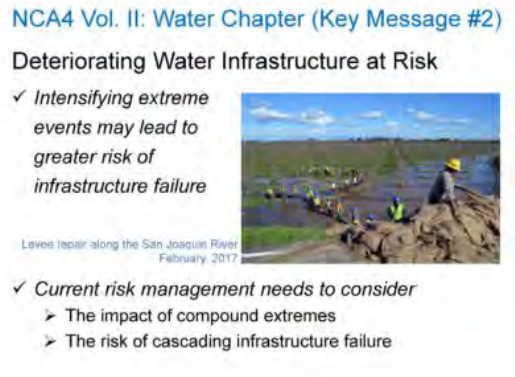


The first key message is that water quality and water supply are changing due to multiple factors: Intensifying droughts, floods, and hurricanes; the snowpack is becoming smaller, surface water quality is declining, and groundwater storage is being depleted, he said.

The two figures on the slide indicate the groundwater depletion rate in regional major aquifers across the nation in two different periods: from 1900 to 2000 on the left and 2001 to 2008 on the right with warmer colors indicating a higher depletion rate, with red being the highest depletion rate.

"*So looking at the Central Valley in California, our groundwater storage has been decreasing in the past century and this decrease has accelerated recently*," said Mr. He. "*If we consider the most 2012 to 2015 drought, the depletion rate is going to be even higher.*"

The second key message is that the nation's water infrastructure is aging and deteriorating and at a higher than normal risk in a changing climate.



"*Intensifying extreme events increase the possibility of infrastructure failure*," he said. "*For us, 2017 was the most recent example when we had a number of big storm events, and levee breaks. … In spite of changes in the frequency, intensity, and duration of extreme events, they are not always isolated in space and time, so our current risk management needs to consider the impact of compound extreme events like flood after fire, and also the risks of cascading infrastructure failure like dam failure followed by levee break.*"

drinking-water-needs-assessment-public-water-systems/?instance_id=5471)

1:00 pm Delta Independent Science Board:... @ Park Tower Building (https://cawaterlibrary.net/event/delta-independent-science-board-steps-toward-implementing-recommendations-from-the-delta-isbs-water-quality-review/?instance_id=5440)

JAN 14 Mon

12:30 pm Flood-MAR Agricultural Community... @ University of California Cooperative Extension (https://cawaterlibrary.net/event/flood-mar-agricultural-community-listening-session-in-merced/?instance_id=5475)

JAN 16 Wed

9:30 am California Water Commission @ Natural Resources Building (https://cawaterlibrary.net/event/california-water-commission-37/?instance_id=5330)

11:30 am Water Data Advisory Council Meet... @ Laguna Niguel, Orange County (https://cawaterlibrary.net/event/water-data-advisory-council-meeting-2/?instance_id=5507)

5:30 pm GRA SF Bay Chapter Meeting: SF B... @ Scott's Seafood Grill & Bar (https://cawaterlibrary.net/event/gra-sf-bay-chapter-meeting-sf-bay-regional-water-quality-control-boards-annual-regulatory-update/?instance_id=5508)

JAN 17 Thu

11:00 am Delta Conveyance Finance Authori... @ Tsakopoulos Library Galleria (https://cawaterlibrary.net/event/delta-conveyance-finance-authority-board-meeting-3/?instance_id=5391)

2:00 pm Delta Conveyance Design and Cons... @ Tsakopoulos Library Galleria (https://cawaterlibrary.net/event/delta-conveyance-design-and-construction-authority-board-of-directors-meeting-3/?instance_id=5414)

5:30 pm Delta Protection Commission @ Rio Vista City Hall (https://cawaterlibrary.net/event/delta-protection-commission-20/?instance_id=5265)

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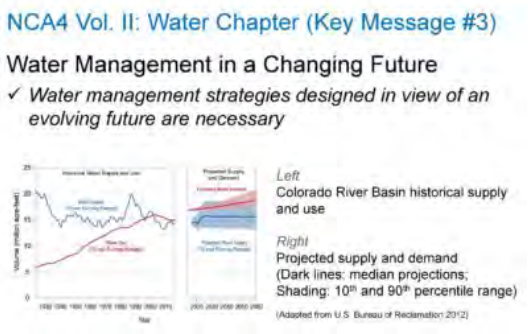
MORE WAYS TO STAY IN TOUCH

The third key message as that in light of the changing climate, changing water, and changing water infrastructure, our current water management strategies and planning principles do not consider the risks of change with time, so we need to change that and we need to be flexible, he said.



"*As an example, the plot on the left hand side shows the Colorado River Basin historical water supply in blue and the water use in red. The plot on the right hand side is the projected future water supply and the future water demand*," he said. "*The shaded area is the 10th and 90th percentile range, so these two plots highlight a challenge faced by many US managers which is a potential imbalance between future water supply and future water demand, but with considerable long-term variabilities, which is not well understood yet. So we do need to have adaptive water management strategies to address this challenge and to plan for plausible future conditions which we have not experienced in the past*."

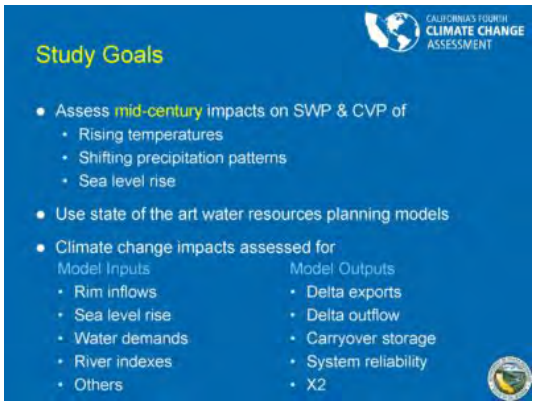
"*Simply put, how much water we have tomorrow and how good our water will be tomorrow depends on how proactive and how adaptive we could be today*," concluded Mr. He.

CITED REPORTS IN THIS PRESENTATION:

- Click here for the Fourth National Climate Assessment (or NCA4)
- Click here for Volume II, Chapter 3 (Water)

Mean and Extreme Climate Change Impact on State Water Project

Jianzhong (Jay) Wang works for the Department of Water Resources; he spoke next about California's Fourth Climate Change Assessment Report that was released in August and a report that was produced for the effort, Mean and Extreme Climate Change Impact on the State Water Project.



The main goal of the report was to assess climate change impacts on the State Water Project and the Central Valley Project at the middle of this century (from 2045 to 2074, centered at year 2060) due to rising temperatures, shifting precipitation patterns, and sea level rise. Rising temperatures, earlier and faster snow melting, and a higher ratio of precipitation due to the warming are causing monthly flow pattern shifting. Future water demand for agriculture is expected to rise because of the future warming increasing potential evapotranspiration rate. In developing the report, the newest release of Cal SIM III was used to assess the impacts.

To perform the analysis, they first assessed climate change impacts on model inputs such as rim inflow, mean streamflow in the upper watershed of the Sierra Nevada mountains, sea level rise in the San Francisco Bay, agricultural water demand in the Valley, and river indexes such as the Sacramento River Index and the San Joaquin River index, and others. Then they did model runs and assessed climate change impacts on model outputs such as Delta outflow, Delta exports, carryover storage in north-of-Delta reservoirs, system reliability, and X2.

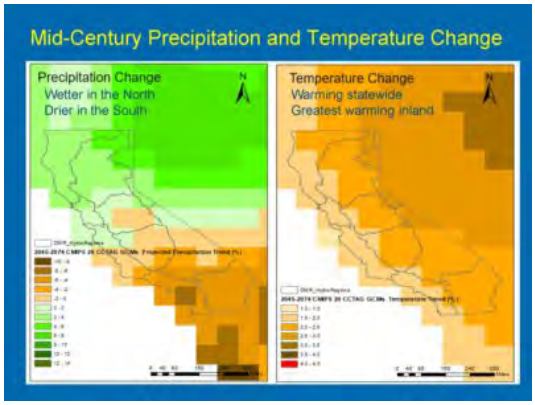
The approach used for the assessment originates from the first climate change assessment report in 2006 and the second assessment report in 2009. The first step is to select the global climate models projections to use; DWR's Climate Change Technical Advisory Group selected 20 Coupled Model Intercomparison Project Phase 5 (CMIP5) global climate model projections, including 10 global climate models. Two greenhouse gas emissions scenarios were selected, model rate emission scenario Representative Concentration Pathways (RCP) 4.5 and the highest greenhouse gas emissions scenario, RCP 8.5.

The second step was to downscale the projections as the grid size for global climate models at 100-200 kilometers is too big. They downscaled the temperature and precipitation data to grids of 10 kilometers using a method developed by Scripps Institute of Oceanography called LOCA, or Localized Construction Analog.

The third step is to use a hydrological model called Variable Infiltration Capacity Model to generate runoff and streamflow for the Sacramento River Basin and the San Joaquin River Basin with the downscaled global model projections.

The fourth step was to assess climate change impacts on model inputs. Rather than putting the above generated streamflow directly into CalSim model, Mr. Wang explained they used climate change information embedded in streamflow from the year 1950 to end of this century to calculate the perturbation ratio and the historical flow from 1992 to 2015 to generate a climate change effect on streamflow. They also determined the estimated sea level rise in San Francisco Bay and the estimated agricultural water demand change for each global climate model projection.

The fifth and last step was to use the latest iteration of DWR's water planning model, CalSim 3, for each global climate model projection and then analyze mean and extreme climate change impact on the State Water Project and Central Valley Project, including Delta export and the Delta outflow.



The left panel shows the average change in precipitation of 20 climate change scenarios for the middle century. Green color stands for precipitation increase and the yellow color stands for precipitation decrease. "*Overall, they project a wetter climate in Northern California and dry climate in Southern California in mid-century*," said Mr. Wang.

The right panel is average change of temperature over 20 climate change scenarios in middle century. Overall, California is projected to become 1.5 to 3.0 Celsius degrees in the middle of the century than current climate with the greatest warming occurring inland.

The models project a precipitation increase in the middle of the century on average with rim flow in the Sacramento River increasing by 4.4% or about 900 TAF. Most of the streamflow increase would occur during the winter high flows.


crisis; and more …
January 7, 2019 (852)


DAILY DIGEST: A change of power as CA pushes further to the left; Governor Newsom, issue by issue; Storm poised to slam Sierra, dump another 2 feet of snow; One step closer for updated CEQA guidelines; and more …
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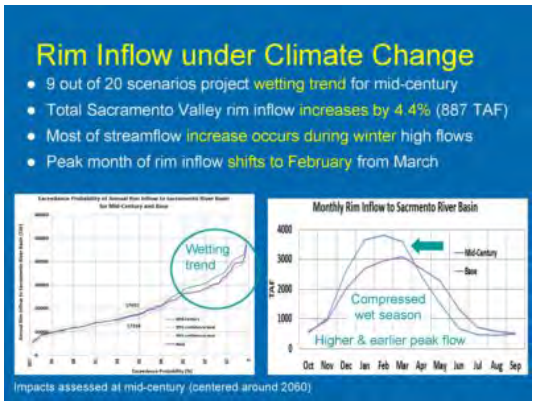
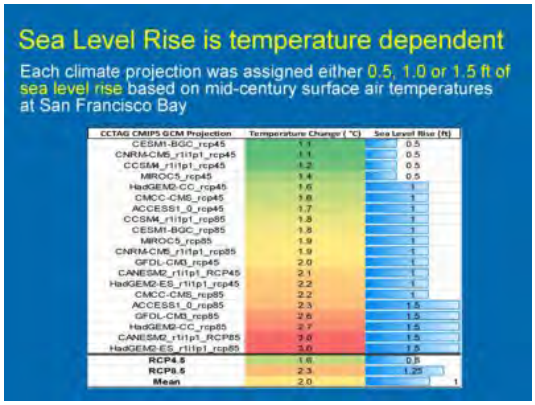
The left panel is an exceedance probability curve for annual rim flow to Sacramento River Basin for the middle of the century, showing the range of high flows projected (the blue line) as compared to the current climate base line (shown in purple); the dashed line is the 95% confidence curve. The right panel shows the average projected monthly rim inflow to Sacramento River Basin for base and middle of century scenario. Blue line is for the middle century climate change scenario; purple line is for base scenario without climate change.

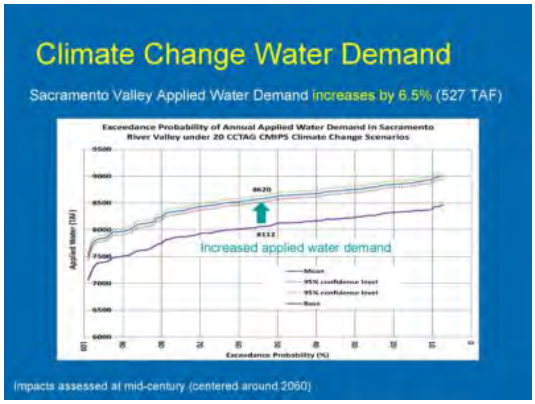


"*You can see peak flow months occur in February for middle of century, one month earlier than base scenario, which is the current climate*," said Mr. Wang. "*This is due to early snow melting and higher ratio of rain in precipitation. More warm rain in the future*."



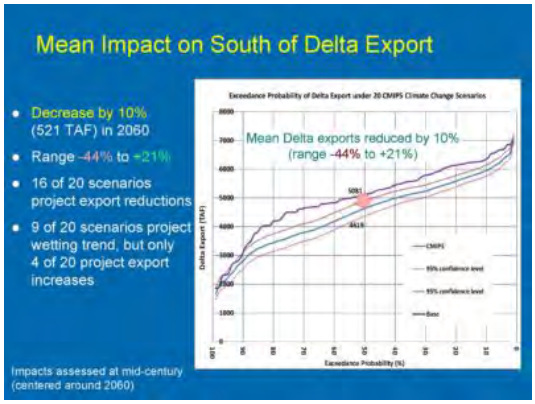
For sea level rise, each model projection was assigned either .5, 1 foot, and 1.5 foot sea level rise based on the middle century surface air temperature at San Francisco Bay. The first column in the table are the names for 20 climate change scenarios; the second column is temperature change in San Francisco Bay in the middle of century compared to the current climate; and the third column is the sea level rise in San Francisco Bay assigned to each climate model projection. There are four climate change scenarios with a half a foot of sea level rise, eleven climate change scenarios with 1 foot sea level rise, and 5 climate change scenarios with 1.5 foot sea level rise. Mean sea level rise is about 1 foot on average for the middle of century; Mr. Wang acknowledged this is a conservative estimate.

Rising temperatures will increase the crop evapotranspiration rate, thereby increasing agricultural water demand. The figure shows exceedance probability curve of annual applied water demand in Sacramento River Valley for the mean of the 20 middle century climate change scenarios; the blue line is the climate change scenario for the middle century and the purple line is the base scenario.



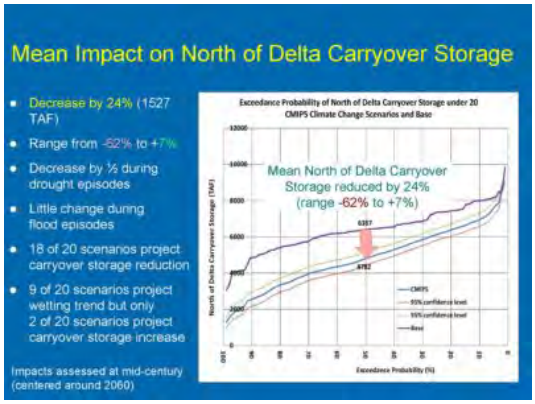
"*The Sacramento Valley agricultural demand will increase 527 TAF on average, about half a million acre-feet increase by 6.5% if other things do not change, such as land use remains unchanged, crop types remain unchanged*," Mr. Wang said, noting that this calculation doesn't consider a number of other factors, such as carbon dioxide increases or the growing period change.

The figure on the slide shows the exceedance probability curve for south of Delta exports for the middle of century scenario, which is the blue line; the base scenario is the purple line.

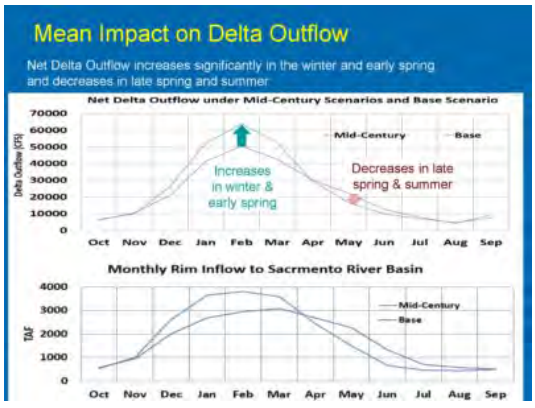


"*South of Delta exports are reduced by 10% due to climate change, which is 521 TAF acre-feet on average for the middle of century,*" he said. "*A 10% Delta export reduction in middle century is significant. We have to take this seriously. The reduction of Delta exports ranges from a reduction of 44% to a 21% increase. Among the 20 middle century climate change scenarios, 16 scenarios project an export reduction.*"

Next, for the mean impact on north of Delta carryover storage, he presented a figure showing the exceedance probability curve of north of Delta carryover storage for middle of century scenario with the blue line showing the projected carryover storage and the base scenario shown in purple. "*North of Delta carryover storage will reduce by 24% due to climate change by about 1.5 MAF on average for middle of century,*" said Mr. Wang. "*North of Delta carryover is decreased by half during drought episodes for middle of century. Carryover storage changes from 62% reduction to 7% increase. Among 20 climate change scenarios, 18 scenarios project carryover storage reduction in the middle of the century.*"



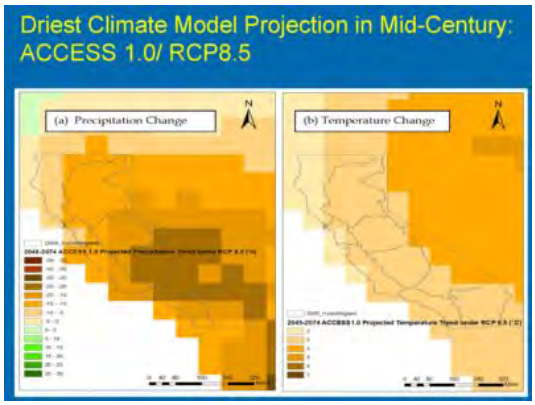
He then presented a slide showing the mean impact on Delta outflow. The upper panel is net monthly Delta outflow averaged over 20 climate change scenarios shown by the blue line and the Delta outflow base scenario as the purple line. He noted that net Delta outflow increases significantly in the winter and early spring, and it decreases in late spring and summer because of climate change.

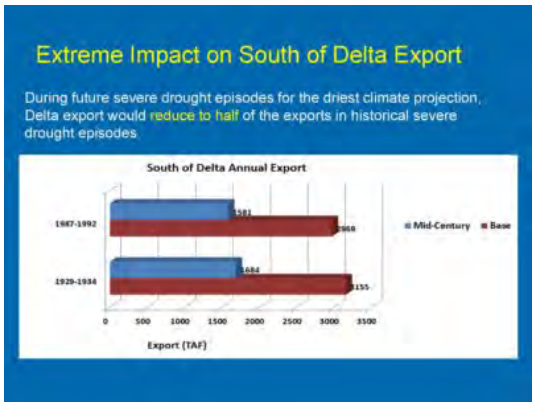


The lower panel is monthly rim inflow to Sacramento River Basin averaged over 20 climate change scenarios shown in blue; the rim inflow base scenario the purple line. "*Increased rim flow in the winter and the early spring due to early snow melting and higher rain ratio of precipitation matches with the Delta outflow pattern shifts pretty well,*" he said. "*That's the mean increase in rim flow in the winter and the early spring due to the warming most likely becomes Delta outflow.*"

To assess extreme impact on State Water Project and Central Valley Project, the driest climate model project for the middle century made by the Australia climate model ACCESS 1.0 on the

highest emission scenario, RCP 8.5, was selected. The left panel shows the precipitation change in the middle century compared to the current climate; yellow means precipitation is reduced in the middle century statewide by 5% to 25%. The right panel shows the temperature change in middle century compared to the current climate; an increase in 2 to 3 degrees Celsius is projected.

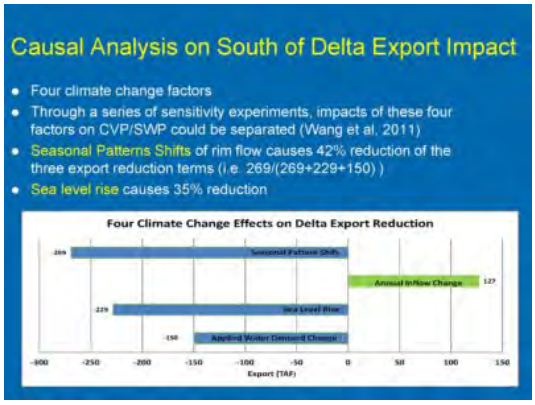




He then presented a slide showing the impact of the extreme scenario on South of Delta exports. The figure show the south of Delta exports for the middle century as the blue bar and Delta exports for the base scenario show in purple for two historical drought periods: the 1987-1992 drought and the 1929-1932 drought. During the 1987-1992 drought, Delta exports were 2969 TAF, but in the middle of century, this kind of drought becomes more severe under the driest climate change scenario, with Delta exports reduced to 1581 TAF in the middle of century, or reduced to half. For the 1929 to 1932 drought, Delta exports has 3155 TAF but in the middle of century, Delta exports were reduced to 1684 TAF.

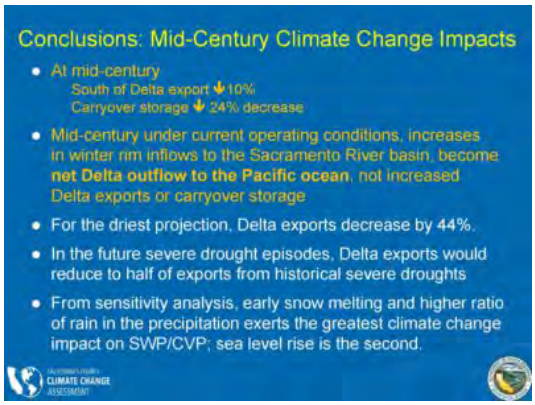
"*For the driest climate model projection, Delta exports were reduced to half of exports in historical severe drought episodes*," said Mr. Wang.

Digging deeper into the impacts to south of Delta exports, there are four climate change factors that affect the State Water Project and the Central Valley Project: Seasonal flow pattern shift due to early snow melting and the higher rain ratio in the precipitation, sea level rise due to global warming, agricultural water demand change due to the increased crop evapotranspiration rate, and the annual rim inflow change due to the future precipitation change.



This figure shows a series a sensitivity experiments on the impact of the four factors on State Water Project and Central Valley Project. "*The seasonal pattern shift of rim flow had the most impact, causing a 42% reduction*," he said. "*Annual inflow change makes positive contribution to exports. The sea level rise causes 35% reduction*."

Mr. Wang then gave his conclusions. "*At the middle of the century, south of Delta export will decrease by 10% or half a million acre-feet because of climate change*," he said. "*Carryover storage will decrease 24%, which is 1.5 MAF. Mid-century under current operating conditions, increases in winter rim inflows to the Sacramento River basin because of early snow melt and higher rain ratio in*



precipitation become net Delta outflow to the Pacific Ocean, not increased Delta exports or carryover storage. This is a main message."

CITED REPORTS IN THIS PRESENTATION:

- California's Fourth Climate Change Assessment Report
- Mean and Extreme Climate Change Impact on the State Water Project

DISCUSSION PERIOD

Commissioner Andrew Ball notes that the study considered 20 different scenarios, with some earlier slides showing that Northern California was actually going to be wetter, and then the later slides showed that in the driest scenario, it was going to be considerably drier. The mean impact on south of Delta export ranges a 44% decrease to a 21% increase. "*That is a wide range; it's difficult to really predict what's actually going to occur and then you come down to your final conclusions and you conclude that we're actually going to have significant reductions due to a variety of different things. It's a little bit confusing there. Can you provide clarity as to why within just 20 scenarios, you have ranges that are so extreme as to cast some doubt upon the reliability of the predictions?*"

Mr. Wang acknowledges the uncertainty in the model projections, and pointed out that some elements are more uncertain than others. "*Annual rimflow change is very uncertain. We don't know. The certain part is the seasonal pattern shift because of the warming. All the common model projections project a warming and sea level rise. 1 foot sea level rise in mid-century is conservative estimate. Also, if evapotranspiration increases due to warming, we need more water for watering crops, this is pretty certain. … Because climate models project an increase or decrease in precipitation, then rimflow increase or decrease, this is uncertain a lot.*"

Commissioner Ball then notes that there is higher rim inflow on the Sacramento River, and an impact relative to temperature change on the snow, so wouldn't we be able to capture in storage that increased amount of water?

"*Because of earlier snow melting and also because more precipitation falls as rain than current climate, so most of the rim inflow is shifted to March and February*," said Mr. Wong. "The current system cannot capture this shift of water. They release it as a flood flow, so it cannot be captured. These kinds of flood flow, they just go to the Delta outflow, so we need to figure out a way to capture this shifted water."

Commissioner Ball said, "*It seems to me we need increased water storage in order to be able to capture the earlier flows.*"

Climate change risk faced by the California Central Valley water resource system

Andrew Schwartz is one of the authors of the report, Climate Change Risks Faced by the California Central Valley Water Resource System, which was also prepared as part of California's Fourth Climate Change Assessment Report. Mr. Schwartz is working with the Delta Stewardship Council now, but when he worked on this report, he was working at the Department of Water Resources under John Andrew's supervision. This project was a collaboration between the Department of Water Resources and a research group at the University of Massachusetts Amherst.

"*The key message that I'd like you to get out of this presentation is that by using our tools differently, we can handle climate change uncertainty in a way that uses the most reliable information from the data that we have and provides decision-relevant information consistent with a risk management approach that's more familiar to resource managers*," Mr. Schwartz said. "*What I mean by that is I'm going to discuss an approach that's a bit different than the previous presentation but gets at many of the same metrics and uses almost all of the same tools, but uses them in a different way to get different information*."

Mr. Schwartz said he would contrast the two studies, but he doesn't want it to be interpreted that the previous study isn't relevant; it provides useful information; this type of study provides a different type of information, and there are ways to use them both.

The study area was the State Water Project and Central Valley Project watersheds that flow into Oroville, Shasta, and Folsom and provide water for those projects.

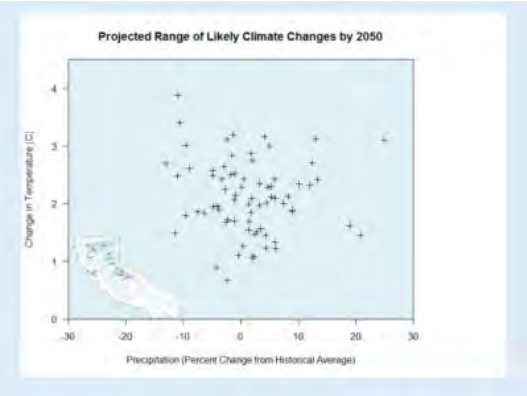
Mr. Schwartz noted that the previous presentation described a top-down scenario analysis approach starting with the climate change models, selecting ten scenarios from climate change models and representation concentration pathways that the state has chosen, downscaling them, running them through a hydrologic model and CalSim 3, and then getting system performance predictions. What comes out of that are some projections such as the impact of Delta exports could be anywhere from -44% to +27%, so how are decision makers to go forward and make investments with that level of uncertainty?

For this project, they took a risk management approach to make the information more decision-relevant. They started with the system model, CalLite, which is a simplified version of the CalSim model, and they fed the model many different scenarios to understand how the system reacts when things are warmer, wetter, and drier and how that in turn affects things like reservoir storage, Delta exports, and Delta outflows. That gives a range of how the system responds; they then looked at how likely it is that a situation would occur where there would be a bad response out of the system.

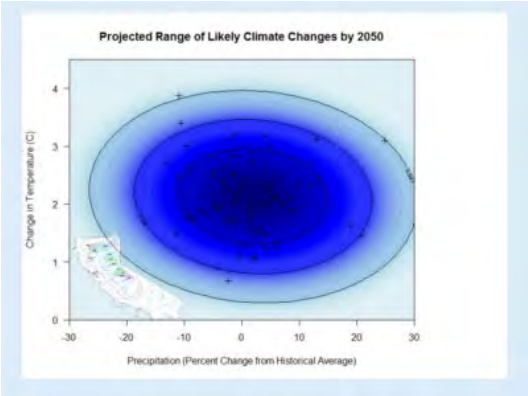
"*We use the climate models in a different way*," he said. "*We use the same information but in a little different way to try and understand how likely it is that we'll get one of these responses. And we can put all that information together to get more of a probabilistic system response prediction*."

There are a number of sources of uncertainty in climate modeling, such as whether humans will work to reduce emissions, or in the models in terms of how sensitive the atmosphere really is to CO2, or how ice dynamics are going to result in sea level rise. "*Instead of using that as the foundation piece, it's the last piece, and the benefit of that is we can change those climate projections if we disagree on what they are or if we want to look at more climate change projections or less or IPCC comes out with a new assessment*," Mr. Schwartz said. "*We can add those in very quickly and very easily*."

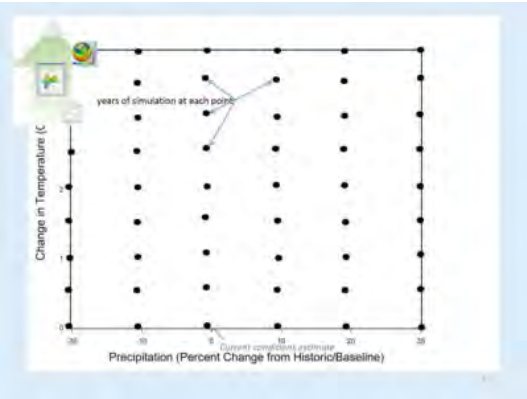
He presented a plot showing the projected range of climate changes by 2050, based on the same 20 climate models used in the previous presentation plus a few more; there are 32 climate model projections used in this analysis. "*Each of the scenarios are compressed down to a change in average temperature and average precipitation by 2050*," he said. "*There are projections going up to almost 4 degrees Celsius or 8 degrees Fahrenheit, and projections down to a half or maybe 1 degree Fahrenheit 2050; then ranging from almost -20% precipitation to a positive of almost 30%, so a huge range. How do you deal with that?*"



They made an assumption that these projections from the best climate models represent the likely range of impacts, and where more climate models project that same output, that is more likely. "*So we apply a bivariant normal distribution to these data, which basically means we make these little clouds based on this data, and the darker areas represent higher probability based on more models projecting that outcome, and lighter is still possible, but less likely; and the outer black ring is the 99.7% confidence interval, so pretty much everything we think we might see.*"



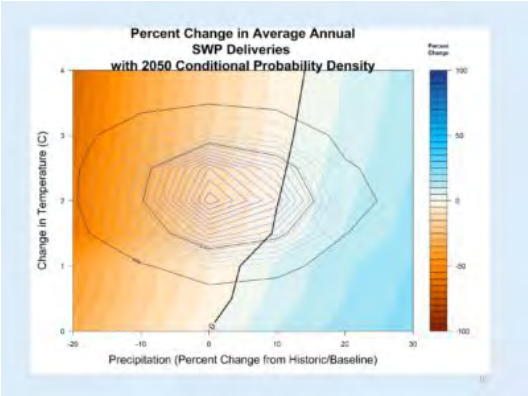
He showed an animation showing the projection over time from now to 2100, acknowledging that the uncertainty grows as the projection goes farther out, but there is still information that can be derived from this. "*Temperature is undeniably going up by 2030 or by 2040, we've left the area where a 99.7% confidence interval, you would see no temperature rise. We're going to see temperature rise,*" said Mr. Schwartz. "*But in terms the average precipitation change, it's all over the place. From negative -30 to +30 possibilities, a huge range – so how are we going to use that information?*"



Mr. Schwartz then explained how they got to these projections. He presented a grid showing change in temperature plotted against change in precipitation, and said that each of these black dots represents a simulation they performed using the CalLite model. At every one of these combinations of temperature change and precipitation change, they ran an 1100 year simulation using data from paleo records of tree ring reconstructions which included longer droughts.

"*We used historical data to inform what the precipitation would look like during those historical droughts, so we can simulate this whole period and then what we get is what is called a 'response surface,*" he said. "*This is the response of the State Water Project system to be able to deliver project water over varying conditions of temperature and precipitation.*"

He noted that at the '00' mark, there's no change in temperature and no change in precipitation from current conditions; that's what can be delivered right now. The black line represents combinations of climate conditions where the project could continue to deliver about the same amount of water; so actually if it gets warmer, deliveries can probably be maintained as long as there is about 10% more precipitation every year.

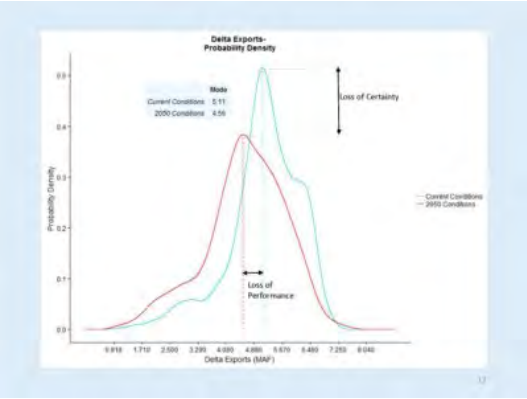


The colors represent the percentage change in the ability to deliver water. The red or orange colors are conditions are worse than historical conditions; the blue and green colors are better than historical conditions. The circle is the same plot of climate change shown a few slides earlier now imprinted over the response surface. He noted that the response surface is not time dependent; it is agnostic with respect to time. It just shows the response of how our system responds to warming, whether that warming occurs tomorrow, or in 28 years or in 50 years, he said.

"*So we can imprint the probability of getting a certain amount of warming and precipitation over the top and what you see is the vast majority of our probability space is over worse areas*," said Mr. Schwartz. "*There are areas in blue on the right side … something like your 20% better. But it's the outer range; it's very, very unlikely. It is there, it is a possibility, and so is the outer range on the really hot dry side. So this gives us a little bit better picture of how likely these outcomes are, where we we're comfortable with our residual risk is now a policy decision that can be informed by this. How much of this space are we willing to leave to chance?*"

Mr. Schwartz said that figures he just presented were for State Water Project deliveries, but they performed the analysis for a whole range of other impact metrics that are important. He presented a summation of those other impact metrics, and pointed out that there are very high probabilities of inferior condition situations across a whole range of different metrics.

"*Specifically, carryover storage gets hammered because of the seasonal pattern shift and the warming with the water coming off earlier*," Mr. Schwartz said.



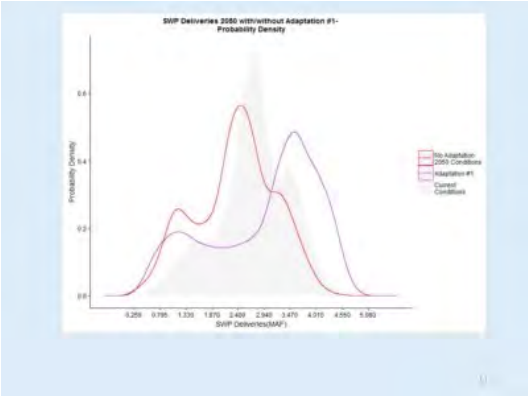
In water management, the concern is what is happening from one year to the next. He presented a chart for Delta exports, explaining that the bell curves are based on all of the data underlying the response surface and the climate model data to calculate an expected value for the 11 years of simulation across all the different uncertainties in climate. He explained that the blue line is the historical climate; there has always had a range of deliveries from very dry years to very wet years and the current system was designed to handle that to a certain extent; the red line shows how it moves across the uncertainty range.

"*By 2040, on average, we'd lose about 500,000 acre-feet of deliveries*," he said. "*One of the things I would point out is the fatness of that red tail off to the left: those are drought years, those are the years that are really dry. There will get to be a lot more of them, and they will get drier. Those are where our system is really going to struggle, and we have fewer and fewer wet years to refill the*

system. The shift to the left is really the loss of performance; the slumping down is really a loss of certainty."

"*When we start to think about adaptation strategies and building infrastructure and responding to this, we are not going to be able to deal with this loss of certainty*," he said. "*That is, we just don't know about the future, so we can't look for solutions that are going to be the best, because we don't know what the situation we're going to have to deal with is. So we should look at strategies that increase performance in the places that we most care about, so maybe this left fat tail and shift the distribution over.*"

He then presented a graph of what he called an adaptation strategy caricature, noting that the shaded area in the background is where we are today, the red line is where we would be in 2050 if we do nothing, and the purple line is an adaptation strategy at 2050. "*What this is showing is that it looks pretty good on the average*," he said. "*You're getting much more water out of the system, but on the far left hand side, you still have a lot of dry years that are much more problematic than what you've had historically. So this looks like a real good adaptation strategy and it does some things, but it would probably need to be paired with some other strategies to really be effective at dealing with drought. For SWP deliveries, this is going to get you more water out for SWP deliveries but it's not going to help you in the dry years.*"



Mr. Schwartz said that this type of information does a better job of exploring climate change uncertainty, being really explicit about the uncertainty that we face, and understanding that uncertainty, and then putting it in a probabilistic way that fits within a risk informed decision making framework which we are very comfortable with as water resource managers.

"*Flood projects are all considered in a risk management framework*," he said. "*We understand that there is residual risk. We don't build our levees for a 10,000 year flood. We've accepted a certain amount of residual risk in the interest of public finance and what we can possibly do.*"

"*So I think that it's a useful framework for thinking about adaptation to climate change. We often want to think about the worst case scenario. How does this do under the worst case scenario? Well, it may not do well, but that may not mean that we shouldn't build some of those things. We just have to, as a society and as decision makers, come to an understanding about what kind of residual risk we're willing to take in these adaptations and how much money we have to deal with this.*"

DISCUSSION PERIOD

Chair Armando Quintero noted that as a result of the recent drought, most water agencies are really looking at diversifying their water portfolios. It's promising to see that Los Angeles just passed a local measure to fund $30 million a year for stormwater capture and treatment and putting that into their water supplies. "*I think part of what you're doing here is really making the case that water*

agencies throughout the state really need to look at local solutions, but at the same time be focused on things that you raised," he said.

Commissioner Andrew Ball noted that it'd be interesting to take this information and now start to apply it to solutions. "*There were a lot questions we all had as we went through this process, as we look forward, how can we possibly have the same amount of water or more water going forward than we do now, when it's obvious that we're having more periods of drought that we have to deal with, and that was always a conundrum certainly for me and other commissioners. This type of approach would be one that as you start to use this information to come up with possible structural solutions, it could be very informative and very interesting*."

Mr. Schwartz said that this report forms one of the key elements of the DWR vulnerability assessment, and the second phase of that is to look at what physical mechanisms or reoperations or things that we could do in the system to really 'turn the dial'. "*It's challenging because some of the solutions like groundwater storage aren't necessarily really well captured in the model that we used. There are other strategies, upper watershed effects that we think we can model better, and then having to consider how operation of the system itself would change if you add a big reservoir near Colusa County or somewhere else*."

"*It would be great to see how we can really use this extra water and put it into groundwater storage*," said Commissioner Ball.

"*I think that's the plan with lots of work going on at DWR with Flood MAR which is definitely looking at these types of impacts and how they can be moved through the system and put into the ground*," said Mr. Schwartz. He noted that the Army Corps of Engineers is looking flood impacts and a pilot study on the Tuolumne that is bringing this information in figure out how to run flood models and water supply operations at the same time. "*When we do flood risk analysis, it's mostly event based, and we run a big flood through it and show that, and those aren't really connected to these monthly time step water supply models and so there's still this gap. And I think those studies are trying to get at how to put these together and really be able to work with solutions*."

REPORTS CITED IN THIS PRESENTATION:

- Climate Change Risks Faced by the California Central Valley Water Resource System

FOR MORE INFORMATION …

FOURTH NATIONAL CLIMATE ASSESSMENT

- Fourth National Climate Assessment (or NCA4)
- Volume II, Chapter 3 (Water)

CALIFORNIA'S FOURTH CLIMATE CHANGE ASSESSMENT

- California's Fourth Climate Change Assessment Report
- Mean and Extreme Climate Change Impact on the State Water Project
- Climate Change Risks Faced by the California Central Valley Water Resource System

OTHER

- DWR's Climate Change Program website
- Agenda, meeting materials, and webcast link for the December

NEWS WORTH NOTING: Michael George Begins Second Four-Year Term as Delta Watermaster; Notice: Validation of State Water Project, Water Supply Contract Extension Amendments

January 8, 2019 Maven News Worth Noting

Michael George Begins Second Four-Year Term as Delta Watermaster

Our office is pleased to announce that Michael George begins his second four-year term as the Delta Watermaster on Monday, January 7, 2019. In the position created by the legislature in 2009, he administers water rights in the Delta and advises the State Water Board and Delta Stewardship Council on related matters. An attorney, Mr. George was active in western water law and policy prior to his appointment. The Delta Watermaster is a multi-faceted job involving water rights, water quality and operations affecting the Delta, a critical estuarine habitat, vital agricultural area and hub of California's water distribution system.

Click here to visit the Delta Watermaster webpage.

Notice: Validation of State Water Project, Water Supply Contract Extension Amendments

The information below relates to a judicial proceeding related to the validation of the Contract Extension Amendments.

Since 1960, the Department has approved, planned and constructed an integrated system of water storage and transportation and power generation facilities called the State Water Resources Development System, more commonly known as the State Water Project. Pursuant to applicable statutes and other authorities, the Department is authorized to perform various duties and functions related to the State Water Project. Among its powers, the Department is authorized to enter into contracts for the sale,

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delivery, or use of water, generated through the State Water Project, to water agencies in the State.

Twenty-nine (29) public water agencies ("Contractors") currently have contracts ("Water Supply Contracts") with the Department for delivery of water from the State Water Project. The Contractors receive water service in exchange for paying all costs associated with constructing, operating, and maintaining State Water Project facilities attributable to water supply. The Water Supply Contracts are required to be substantially uniform with respect to their basic terms and conditions for all 29 Contractors.

The Water Supply Contracts originally included 75-year terms with ending dates that ranged from November 4, 2035 to August 31, 2042, depending on when each Water Supply Contract was executed. Article 4 of the Water Supply Contracts provides that the Contractors may elect to receive continued service under the Water Supply Contracts under certain conditions. In accordance with Article 4, the Department initiated a process to amend and extend the Water Supply Contracts.

On December 11, 2018, the Department's Director approved the "Amendments for Continued Service and the Terms and Conditions Thereof," referred to as the Contract Extension Amendments. The Contract Extension Amendments extend the term of the Water Supply Contracts to 2085, and amend other financial provisions to ensure that the State Water Project is properly managed and financed.

The Department brought a validation action in Sacramento County Superior Court, Case No. 34-2018-00246183, to obtain a judgment confirming the validity of the Contract Extension Amendments and the proceedings related thereto. A validation action is a judicial proceeding in which a governmental agency, like the Department, can confirm the validity of a proposed action before it commits to or performs the action. No individual person is sued in a validation action, and no action is required by any individual.

Any interested person may appear and contest a validation action, subject to specific time limits and procedural requirements. In the Department's validation proceeding, interested persons must appear, in conformance with applicable legal requirements, not later than February 25, 2019.

If you are interested in obtaining a copy of the Department's validation complaint related to the Contract Extension Amendments, and the legal summons that corresponds to the complaint, they are available on the Department's internet website, at https://water.ca.gov/Programs/State-Water-Project/Management/Water-Supply-Contract-Extension, and on the Sacramento County Superior Court's website, www.saccourt.ca.gov, under the case number referenced above.

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The Metropolitan Water District of Southern California

NEWS RELEASE

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Jan. 9, 2019

METROPOLITAN INVESTS IN FUTURE DEVELOPMENT OF LOCAL WATER SUPPLIES
Agency provides $3.5 million for research to facilitate the future development of seawater desalination, groundwater, stormwater capture, recycled water

The potential future production of more local water supplies received a financial boost Tuesday (Jan. 8) from the Metropolitan Water District of Southern California.

Metropolitan's Board of Directors gave the final approvals necessary to provide $3.5 million for 15 pilot projects and technical studies aimed at reducing the technical and regulatory barriers for seawater desalination and groundwater enhancement as well as stormwater and recycled water.

Under Metropolitan's Future Supply Actions Funding Program, 11 Metropolitan member agencies were awarded funding. When combined with matching funds from the member agencies, and other local, state and federal resources, an additional $8 million will be infused into the projects.

"The status quo is never good enough, not when we have the responsibility of ensuring Southern California has access to a reliable water supply today and into the future," said Metropolitan Chairwoman Gloria Gray. "We are constantly looking for opportunities to develop additional water resources."

The Future Supply Actions program is part of Metropolitan's Integrated Resources Plan, a comprehensive roadmap to expand and diversify the region's water supply portfolio.

In August, Metropolitan invited member agencies to submit proposals requesting up to $500,000 of funding. A panel composed of Metropolitan staff and independent experts evaluated the proposals based on how projects could help increase potential for development of local water supplies and provide regional benefits, in addition to the effectiveness of proposed work plans, schedules and costs.

more . . .

Selected projects include analyzing an innovative reverse osmosis process in brackish groundwater treatment; testing an EPA-certified pesticide to manage invasive quagga and zebra mussels in stormwater recharge basins; and piloting artificial intelligence technology in the control systems of a water treatment plant.

This is the second round of funding provided through Metropolitan's FSA program. Under a 2013 pilot, Metropolitan provided about $3 million for 13 technical studies and pilot projects. The program culminated in a conference where participating agencies showcased their projects and results. Details and reports about those projects are available here.

"The FSA program is key to helping us address an uncertain water future," said Metropolitan General Manager Jeffrey Kightlinger. "By investing in studies by our member agency partners, we're increasing the knowledge and data available throughout the region, helping us all make more informed decisions about the potential for new water resource programs in Southern California."

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The Metropolitan Water District of Southern California is a state-established cooperative that, along with its 26 cities and retail suppliers, provide water for nearly 19 million people in six counties. The district imports water from the Colorado River and Northern California to supplement local supplies, and helps its members to develop increased water conservation, recycling, storage and other resource-management programs.

WATER & DROUGHT

Newsom inherits a 'whole bunch of headaches' despite last-minute water deals by Brown

BY DALE KASLER AND RYAN SABALOW

JANUARY 09, 2019 12:00 AM, UPDATED JANUARY 09, 2019 02:27 PM

The State Water Resources Control Board will hold two days of hearings on a proposal to leave more of the water in the lower San Joaquin River and its three tributaries, the Tuolumne, Merced and Stanislaus.
By Akira Olivia Kumamoto | Randall Benton | Ryan Sabalow

As his term as governor drew to a close last month, Jerry Brown brokered a historic agreement among farms and cities to surrender billions of gallons of water to help ailing fish species. He also made two big water deals with the Trump administration — one to shore up support for his struggling Delta tunnels project, the other to transfer some of urban California's water to Central Valley farmers whom the White House supports.

It added up to a dizzying display of deal-making over an issue that confounded Brown during much of his four terms in Sacramento. His top aides said the agreements represented a bold attempt to calm California's notorious water wars and inject a dose of common sense into a system traditionally ruled by strife and paralysis.

"We rise together, we fall together," Fish and Wildlife Director Chuck Bonham said in rolling out Brown's plan for the fish. "I see a future that can help us bring all parties together."

Yet as Gavin Newsom takes over as governor, the state of water in California seems as unsettled as ever.

The centerpiece agreement Brown made — a giant compromise on reallocating water to help the fish — ran into immediate trouble. The State Water Resources Control Board, a powerful agency governed by Brown appointees, essentially shelved the plan hours after it was unveiled Dec. 12.

The board agreed to reconsider the compromise in the coming months, but opposition to Brown's plan was instantaneous. Environmental groups — always a powerful voice in California water — say they'll do what's necessary to kill the compromise for good. They say the Brown plan is a sham, part of a broader sellout of environmental concerns to appease Donald Trump.

Environmental attorney Doug Obegi, of the Natural Resources Defense Council, said Brown's various deals are likely to produce "a whole bunch of headaches rather than a grand bargain."

On the other side of the spectrum, the Merced Irrigation District, representing 2,000 Valley farmers who haven't agreed to surrender any water, sued the state board to block what it called an illegal "water grab." The district is one of several in the San Joaquin Valley that so far have refused to sign on to Brown's water-sharing compromise. The Trump administration, which has been aggressively pushing for more water for agriculture, also has threatened to sue — even as it made peace with California officials on other water issues.

Newsom has talked about scaling back the Delta tunnels project but otherwise has said little about water. He barely mentioned the topic in his inaugural speech Monday.

ALL ABOUT THE DELTA

Like practically everything in California water, the agreements revolve around the rivers that flow into the Sacramento-San Joaquin Delta. The estuary is the hub of the state's network of dams and canals that supply water to the farms and cities that belong to the State Water Project, built by Brown's father Gov. Pat Brown in the 1960s, and the U.S. government's Central Valley Project, begun by Franklin Roosevelt during the New Deal.

Water users and environmentalists have fought over the Delta for decades — how much flows in, how much reaches the ocean and how much gets pumped south.

State scientists say farms and cities take as much as 90 percent of the natural flows on some of the tributaries, leaving salmon, steelhead and Delta smelt on the brink of extinction. To revive the species, scientists say more water needs to follow its natural flow to the Pacific.

Since 2009 the state water board has been working on a proposal to re-divide the Sacramento and San Joaquin rivers and their tributaries and allow more water to rush through the Delta. The state proposed leaving almost 300,000 extra acre-feet of water in the San Joaquin watershed, plus anywhere from 1.1 million to 3.1 million acre-feet in the Sacramento and its tributaries. By comparison, Folsom Lake can hold around 1 million acre-feet.

The plan would mean substantially less water for farms and cities that draw from those rivers — including the city of San Francisco and several Bay Area suburbs, which rely heavily on the Tuolumne River, a tributary of the San Joaquin, to serve 2.6 million people.

The state board's proposal would also spell trouble for numerous water agencies that don't feed directly from those rivers but count on lots of water being available for pumping out of the Delta. Among them: the giant irrigation districts controlled by San Joaquin Valley farmers, and the 19 million customers of the Metropolitan Water District of Southern California.

Already struggling with frequent shortages, water agencies began negotiating with environmental groups over alternatives to the state board's proposal.

The talks intensified last summer. That's when the board's staff finalized its proposal for the San Joaquin watershed — and Ryan Zinke, who was then Trump's Interior secretary, jumped into the fray.

The U.S. Bureau of Reclamation, which runs the Central Valley Project, threatened to sue the state if it took water from farmers. Zinke and his deputy David Bernhardt, a former water lobbyist for Valley farmers, began pressuring California to find more water for agriculture, not less.

Environmentalists say Zinke's team also threatened to fight the Delta tunnels project, Brown's controversial plan to re-route the estuary's water flows in an effort to improve conditions for fish. Losing the feds would send the project back to square one after ten years and $200 million worth of planning.

Zinke's initiatives "really changed the dynamic," said Rachel Zwillinger of Defenders of Wildlife, one of the environmental groups at the negotiating table. "There were more pieces of the puzzle being negotiated."

The puzzle began taking shape in early December. First Brown endorsed a proposal in Congress to extend a 2016 law signed by former President Barack Obama that relaxes some of the environmental restrictions on Delta pumping. The proposed extension, backed by Democratic Sen. Dianne Feinstein and House Minority Leader Kevin McCarthy, R-Bakersfield, is still pending.

Then came a series of agreements unveiled Dec. 12.

TWO DEALS WITH TRUMP

In one deal, the Trump administration pledged to continue working on Brown's Delta tunnels project. In return, the state guaranteed that Valley farmers wouldn't lose any water to the project. Farmers had feared they could wind up with less water because they've refused to contribute money to the tunnels project.

Brown also agreed to renegotiate the "coordinated operating agreement," an arcane rulebook that governs the Delta pumps.

The rewrite is a concession to the Trump administration. It allows the feds' Central Valley Project and its mostly agricultural customers to take a bigger share of the Delta's waters — as much as 200,000 acre-feet a year — from the mainly urban customers of the State Water Project. An acre-foot is 326,000 gallons, a year's supply for one to two households.

The extra water proved critical to securing agriculture's support for the biggest deal revealed that day: Brown's settlement plans for the rivers. Jeff Kightlinger, whose Metropolitan Water District of Southern California is the State Water Project's biggest customer, said the state had to give farmers additional water from the Delta so they'd be willing to surrender a portion of their supplies to help Brown's plan for the fish.

"You have to have the Central Valley part of it," he said last month.

Brown's people described the compromise as a breakthrough. San Francisco would take less from the Tuolumne. Water agencies from greater Sacramento would take less from the American. Many of the Central Valley's farming districts kicked in water, too, with some agreeing to idle land.

The new water for fish would total at least 740,000 acre-feet a year, for 15 years. It could grow to 1 million if scientific studies proved more was needed for the fish.

While this was less than the volume sought by the state board, the offer included a sweetener. The water districts promised $800 million over 15 years, and the Brown administration pledged $900 million in bond funds, to revive fish populations through other means: spawning grounds, nutrient-rich floodplains and other habitat projects. Some of the cash would compensate water districts for coughing up water, particularly the agricultural districts where farmers have agreed to fallow land.

Brown's administration saluted the willingness to surrender water.

"There's a touch of courage here," Karla Nemeth, director of the Department of Water Resources, told the state water board.

'SMOKE AND MIRRORS'

But as Nemeth spoke, environmentalists and fishing groups were fuming. They said the water wasn't nearly enough, and the habitat projects were inadequate.

Zwillinger of Defenders of Wildlife said environmentalists were essentially frozen out of the negotiations in recent weeks, and the deal "really did not reflect input from the conservation community."

And, as environmental groups went through the details of the settlements, they were troubled by what they saw: Many of the habitat projects have been on the drawing board for years and would likely get completed anyway, they said. Some are already underway.

For instance, almost all of the habitat projects proposed for the Tuolumne had already been promised by regional water districts to secure a new federal license for New Don Pedro Dam. An official with the dam's part-owner, the Turlock Irrigation District, acknowledged as much in an interview with the Sacramento Bee, though he said the proposed deal would speed up the process to getting them done.

"We hope we can start making progress on the river sooner rather than later," said Steve Boyd, the Turlock district's water resources director.

In the Glenn County community of Hamilton City, a $90 million floodplain restoration project has been under construction since 2015, yet it's listed under the proposed agreements. The project consists of moving a levee further back from the Sacramento River to create more habitat on a wider floodplain. When a Bee reporter visited the site in December, a worker was driving an ATV between rows of freshly planted native trees.

About 30 miles east of Hamilton City, crews in hard hats were wrapping up work for the winter season last month on another project on Brown's list. This one involves cutting a notch into a levee on the Feather River to allow more water to flow into seasonal marshlands south of Oroville.

John McManus of the Golden Gate Salmon Association, which represents fishermen, said it's "smoke and mirrors" to count "required habitat restoration that's already built or been in the works for years" as something new.

State officials counter by saying that that many of these projects — even ones that may be underway — need funding to get finished, and the proposals provide that certainty.

Michael Bessette of the Sutter Butte Flood Protection Agency, which is overseeing the Oroville levee work, said $12 million has been spent on the project, but another $7 million is needed to finish the job.

He was thrilled Brown's proposal appeared to make it a priority.

For now, though, the Brown settlements haven't convinced the state board. It voted 4-1 to go ahead with its original plan to reallocate water to the fish — more water than Brown's compromise offered. The vote only covered the San Joaquin River watershed; a vote on the rivers of the Sacramento Valley hasn't yet been scheduled.

Board members promised to continue studying the settlement plans in the meantime. Chairwoman Felicia Marcus called them "intriguing" but also hinted she was disappointed that environmentalists had been cut out of the talks.

"I would encourage ... that the process become more open, and more players be involved," she said in a reference to environmentalists.

Whatever the state board decides, however, the courts will probably have the last word.

There's "going to be litigation anyway, right? It's a given," said water policy expert Jeff Mount of the Public Policy Institute of California. "Hardly anything happens in water without litigation; that's just what we do here in California."

This story was updated to reflect that the state water board has been working on river allocations since 2009, and that the board hasn't yet scheduled a vote on the Sacramento Valley's rivers.

RELATED STORIES FROM SACRAMENTO BEE

CAPITOL-ALERT

Deal could avoid shutdown, but California wildfire and water measures have to wait

ATTACHMENT
III.C.2.

Agenda

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

- Approval of November Meeting Minutes
- Projects and Management Actions
  - Project Review Summary
  - Project Portfolios
- Values Discussion Around Funding
- Monitoring Network and TSS Update
  - Update from DWR
- Situation Assessment Findings Overview
- 3rd Informational Meeting
- February Agenda Items

2

What If We Do Not Implement Projects?

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

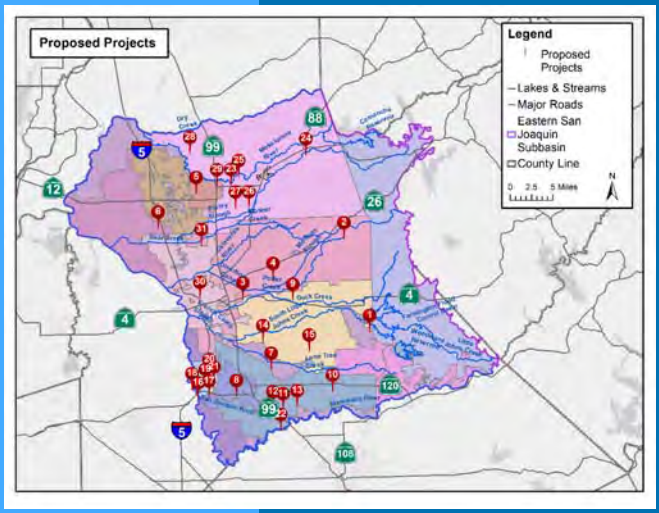
Pumping would need to be reduced by approximately 100,000 AFY, likely to include:

- Pumping restrictions to reduce pumping by ~8-10 percent reduction on a subbasin-wide basis, to be enforced by GSAs
- Meter installation on private pumpers using more than 2 AFY

4

Preliminary List of Projects

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

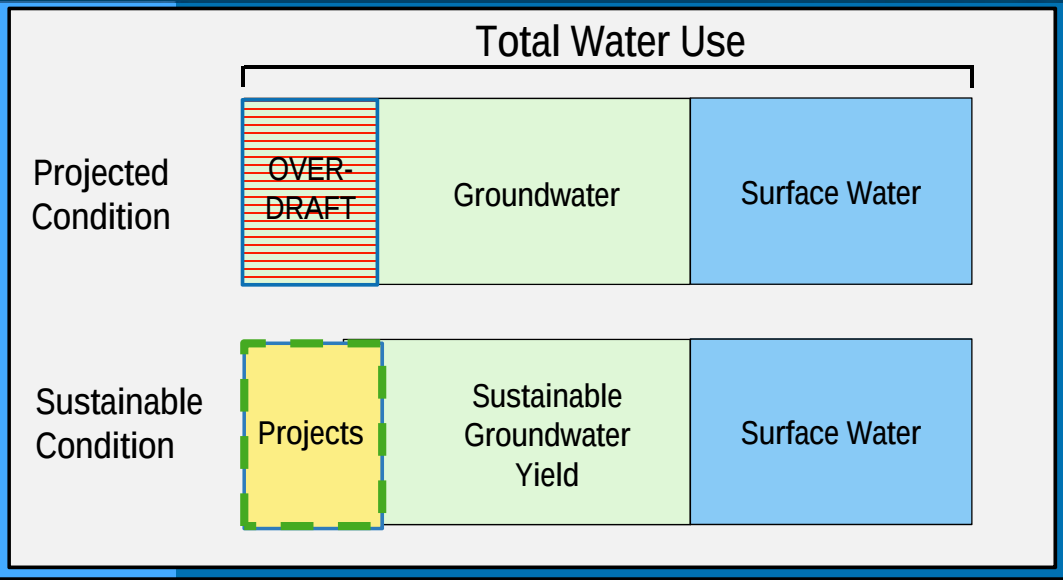


1 – Farmington Dam Repurpose Project
2 – Lake Grupe In-Lieu Recharge
4 – SW Implementation Expansion
5 – SW Facility Expansion & Delivery Pipeline
6 – White Slough WPCF Expansion
7 – Recycled Water Transfer to Agriculture
9 – Water Transfers to SEWD and CSJWCD
10 – Increase Nick DeGroot SW Deliveries
11 – City of Escalon Wastewater Reuse
12 – South San Joaquin Stormwater Reuse
13 – Pressurization of SSJID Facilities
14 – BNSC Intermodal Facility Recharge Pond
15 – CSJWCD Capital Improvement
22 – City of Ripon Surface Water Supply
24 – Mokelumne River Loss Study
25 – North System Modernization
26 – PDA Banking
27 – South System Modernization
29 – Winery Recycled Water
30 – Advanced Metering Infrastructure
31 – Mobilizing Recharge Opportunities

5

Projects and Management Actions May be Used to Offset Overdraft

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



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Pathway to Project Implementation

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

1. Approach

- Regional-scale
- Subregional-scale
- GSA-scale

We are here

2. Funding

- Regional
- GSA

3. Implementation

- Regional JPA
- Subregion GSAs

7

Project/Portfolio Development Process

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

1. Confirm Project Benefits
2. Identify Portfolio Themes
3. Review & Consider Portfolio Benefits
4. Refine & Optimize Portfolios
5. Address Undesirable Results (GSA-scale Projects)

8

Criteria

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Projects were reviewed with project proponents using the criteria developed by the Advisory Committee:

1. Implementability
2. Location / Proximity to Area of Overdraft
3. Cost per Volume Water Savings
4. Environmental Benefit / Impact
5. Disadvantaged Community Benefit
6. Water Quality Impact (Positive or Negative)
7. Affordability

10

Criterion 1: Implementability

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Difficulty or ease of implementation in terms of technical complexity, regulatory complexity, institutional consideration, and public acceptance.

Review Guidance:

- No known issues in any category
- Issue in one category
- Issues in two categories
- Issues in three categories
- Surmountable but major issues in all four categories

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Criterion 1: Implementability

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Distribution:

- Standard municipal projects or prior/current operation assumed to be most easily implemented
- Projects with potential regulatory, financial, public perception, and land acquisition issues assumed to be more challenging

Examples of "Easy to Implement" Projects:

- CSJWCD Capital Improvement Program
- White Slough WPCF Expansion
- Increase Nick DeGroot Surface Water Deliveries
- City of Ripon Surface Water Supply

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Criterion 2: Location

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Region(s) of beneficial water savings were identified for each project. Project locations were compared to the Q4 2017 groundwater elevations.

Review Guidance:

- Benefits accrue to cone of depression
- Majority of benefits in area with known elevation issues
- Project benefits both areas with & without known elevation issues
- Majority of benefit in area with no known elevation issues
- Project benefits area with no known groundwater elevation issues

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Criterion 2: Location

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Distribution:

- Projects that directly offset groundwater pumping in areas above the cone of depression assumed to provide greatest benefit
- Projects that benefit areas far outside cone of depression assumed to provide less benefit

Examples of Projects Providing Benefits to Cone of Depression:

- Water Transfers to SEWD and CSJWCD
- Lake Grupe In-Lieu Recharge
- SEWD Surface Water Implementation Expansion

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Criterion 3: Cost per Volume Water Savings

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Cost per volume was calculated for each project using available estimates for capital costs, annual operations & maintenance costs, project life, and annual water savings. Cost estimates ranged from $5/AF to $1500/AF.

Review Guidance:

- ≤ $10/AF
- ≤ $50/AF
- ≤ $200/AF
- ≤ $500/AF
- > $500/AF

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Criterion 3: Cost per Volume Water Savings

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Distribution:

- Range of Project Costs from $4/AF to $1490/AF

Example Projects with Lowest Unit Cost:

- BNSC Intermodal Facility Recharge Pond
- Lake Grupe In-Lieu Recharge
- SEWD Surface Water Implementation Expansion

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Criterion 4: Environmental Benefit / Impact

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Environmental impacts, both positive and negative, were considered for each project based on proposed location, existing environmental conditions, construction requirements, potential for mitigation, and resulting ecosystem or environmental benefit.

Review Guidance:

- Beneficial environmental impacts with no adverse effects
- No identified adverse environmental impacts
- Potential environmental impacts less than significant
- Potential significant adverse environmental impacts that could be mitigated to less than significant
- Potential significant unavoidable adverse environmental impacts

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Criterion 4: Environmental Benefit / Impact

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Distribution:

- Projects using existing Infrastructure assumed to have no / minimal potential impact
- Projects that impact river flow and require installation of several miles of pipeline assumed to have greater potential impact

Example Projects Assumed to Have No / Minimal Potential Impact:

- BNSC Intermodal Facility Recharge Pond
- PDA Banking
- Surface Water Transfers to SEWD and CSJWCD

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Criterion 5: DAC Benefit

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Many projects would at least partially benefit DAC regions, while others may only provide indirect benefits to these areas

Review Guidance:

- All benefits directly accrue to DACs
- Majority of benefit in areas with DACs
- Benefit in areas with and without DACs
- Majority of benefit in areas without DACs
- Indirect benefits to DAC areas

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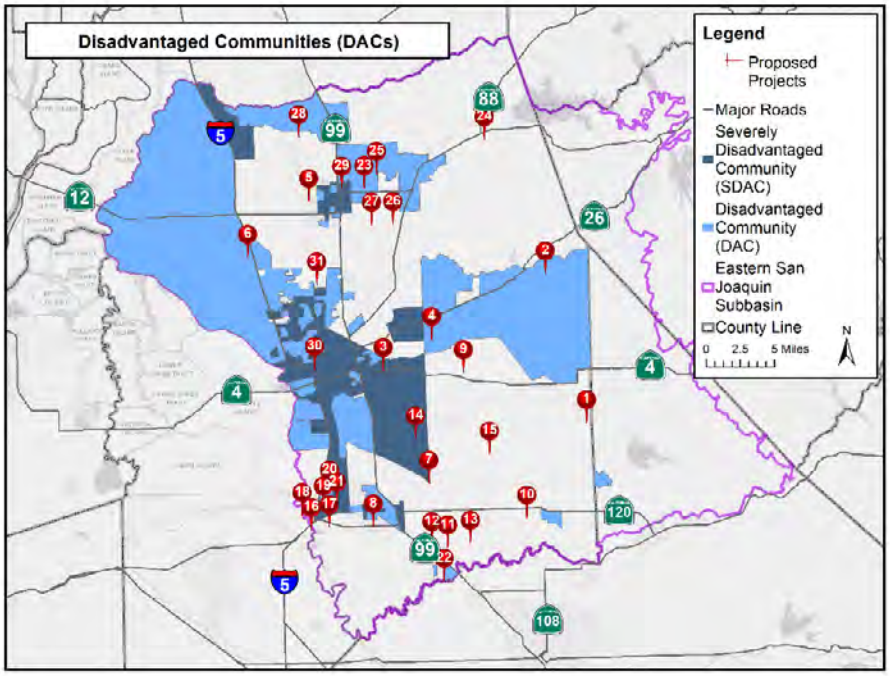

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Criterion 5: DAC Benefit

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Criterion 5: DAC Benefit

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Distribution:

- Projects that provide direct benefits to DACs assumed to have greatest potential to benefit DACs
- Projects that provide only indirect benefits to DACs assumed to have less potential to benefit DACs

Example Projects with Greatest Potential to Benefit DACs:

- Lake Grupe In-Lieu Recharge
- White Slough WPCF Expansion
- BNSC Intermodal Facility Recharge Pond

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Criterion 6: Water Quality

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Potential impacts, both positive and negative, were assessed. Compounds were analyzed using the Water Board's GeoTracker tool including: TDS, gas & diesel, synthetic organics, and other constituents of concern. Projects were screened to avoid areas identified as having potential to create or worsen a plume.

Review Guidance

- Improves water quality in an area of known water quality issues
- Improves water quality in an area with no known water quality issues
- No change in water quality
- Negatively impacts water quality but does not threaten thresholds
- Negatively impacts basin water quality and threatens thresholds

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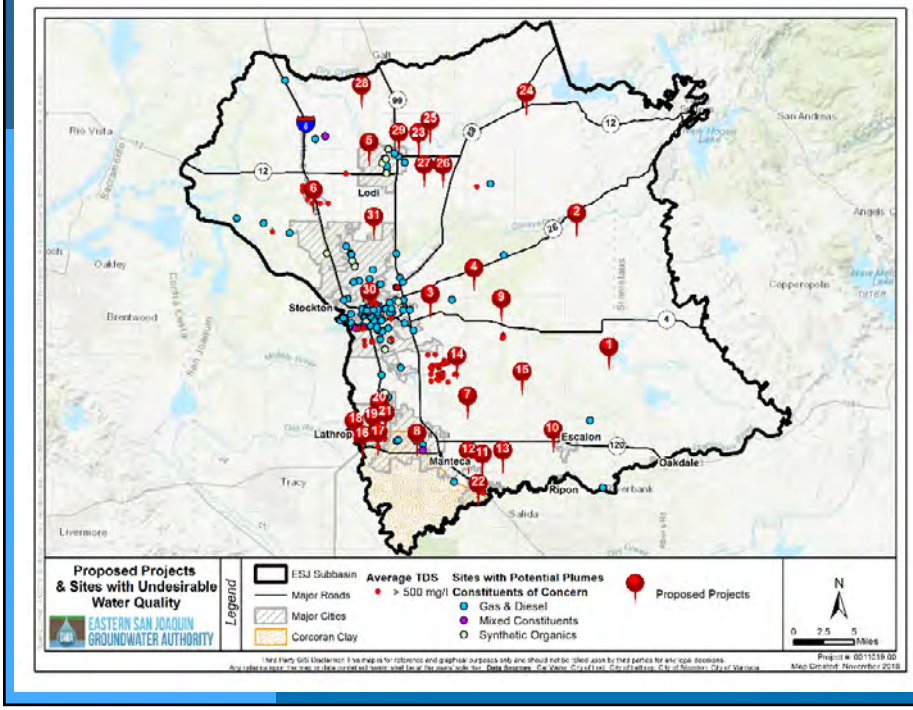

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Criterion 6: Water Quality

23

Criterion 6: Water Quality

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Distribution:

- Projects that improve water quality in areas of known water quality issues assumed to have greatest benefit in this area
- Projects that negatively impact basin water quality assumed to have least benefit in this area

Examples of Projects Providing Water Quality Benefits:

- City of Lodi Surface Water Facility Expansion and Delivery Pipeline
- White Slough WPCF Expansion
- BNSC Intermodal Facility Recharge Pond

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Criterion 7: Affordability

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Affordability could be assessed at the project level using capital costs only as a high level estimate of total capital needed (capital cost estimates ranged from $50,000 to $328,000,000).

Review Guidance:

- ≤ $1,000,000
- ≤ $10,000,000
- ≤ $25,000,000
- ≤ $50,000,000
- > $50,000,000

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Preliminary Project Portfolios

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Goal: Assemble preliminary groupings ("portfolios") of projects that together would offset overdraft at the subbasin scale

Process

- Initial portfolios were developed around themes discussed by Advisory Committee
- Next Steps
  - Review and discuss strengths and weaknesses of preliminary groupings
  - Identify "hybrid" groupings that better meld the benefits and drawbacks of each portfolio

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Preliminary Project Portfolios

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Preliminary portfolio themes:

- Cost-Effectiveness
- Regional Diversity
- Minimized Infrastructure
- Environmental Benefit
- DAC Benefit
- Impact to Cone of Depression
- Fast Implementation
- Small-Volume Projects
- Large-Volume Projects

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Portfolio 1: Cost-Effectiveness

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Project Description	Lifecycle Cost	Water Savings (AFY)	Unit Cost ($/AF)
Lake Grupe In-Lieu Recharge	$900,000	4,500	$4.00
BNSC Intermodal Facility Recharge Pond	$150,000	1,000	$5.00
SW Implementation Expansion	$2,250,000	19,000	$7.89
CSJWCD Capital Improvement Program	$1,550,000	5,000	$10.33
PDA Banking	$5,500,000	4,000	$34.38
City of Ripon Surface Water Supply	$8,600,000	6,000	$47.78
South System Modernization	$13,000,000	4,500	$72.22
North System Modernization	$11,000,000	2,600	$105.77
Winery Recycled Water	$5,500,000	750	$183.33
Water Transfers to SEWD and CSJWCD	$9,000,000	45,000	$200.00
Increase Nick DeGroot SW Deliveries	$16,289,000	2,015	$269.46
Recycled Water Transfer to Agriculture	$58,015,000	5,193	$372.39
TOTAL	**$131,754,000**	**99,558**	**$129.20**

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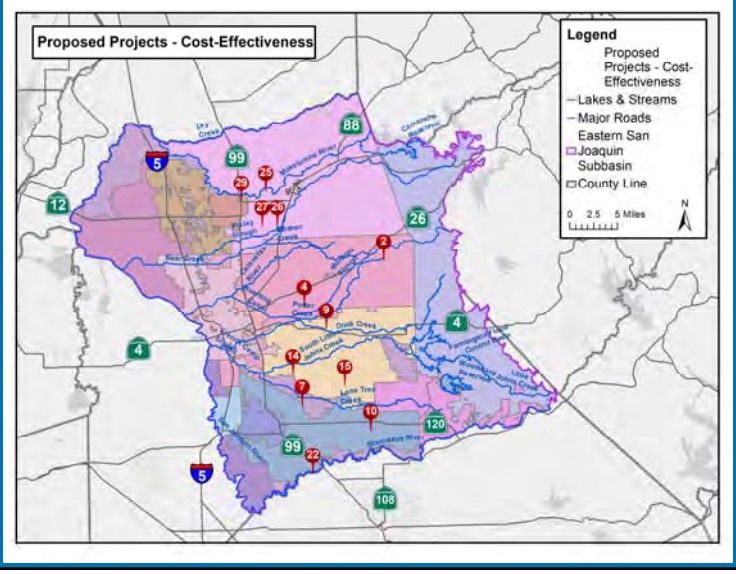
Portfolio 1: Cost-Effectiveness

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



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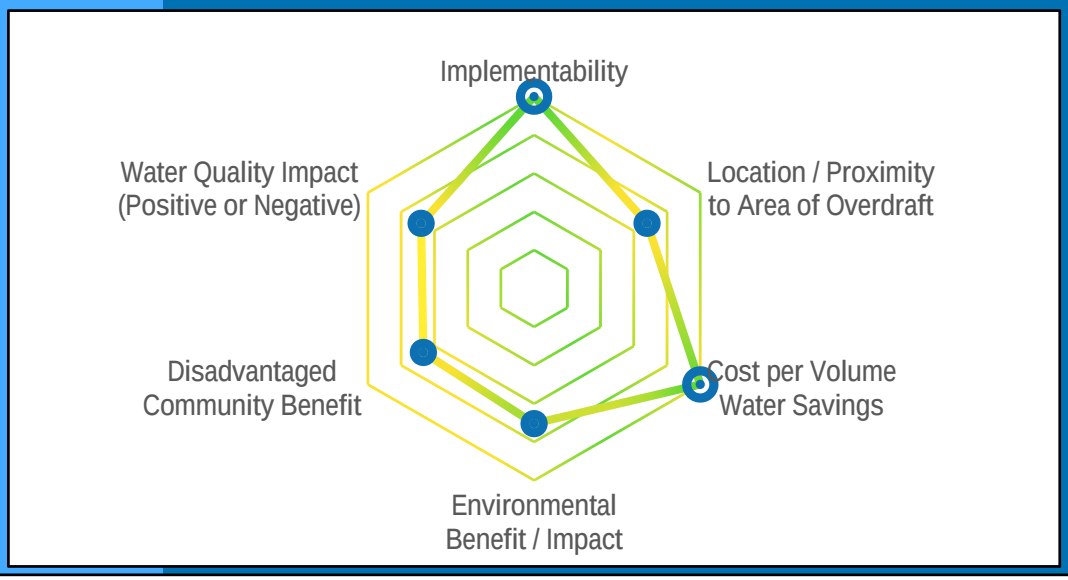
Portfolio 1: Cost-Effectiveness

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



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Portfolio 2: Regional Diversity

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Project Description	Lifecycle Cost	Water Savings (AFY)	Unit Cost ($/AF)
Water Transfers to SEWD and CSJWCD	$9,000,000	45,000	$200.00
PDA Banking	$5,500,000	4,000	$34.38
Increase Nick DeGroot SW Deliveries	$16,289,000	2,015	$269.46
SW Facility Expansion & Delivery Pipeline	$74,200,000	4,750	$520.70
Recycled Water Transfer to Agriculture	$58,015,000	5,193	$372.39
SW Implementation Expansion	$2,250,000	19,000	$7.89
CSJWCD Capital Improvement Program	$1,550,000	5,000	$10.33
City of Ripon Surface Water Supply	$8,600,000	6,000	$47.78
Lake Grupe In-Lieu Recharge	$900,000	4,500	$4.00
South System Modernization	$13,000,000	4,500	$72.22
BNSC Intermodal Facility Recharge Pond	$150,000	1,000	$5.00
TOTAL	**$189,454,000**	**100,958**	**$147.82**

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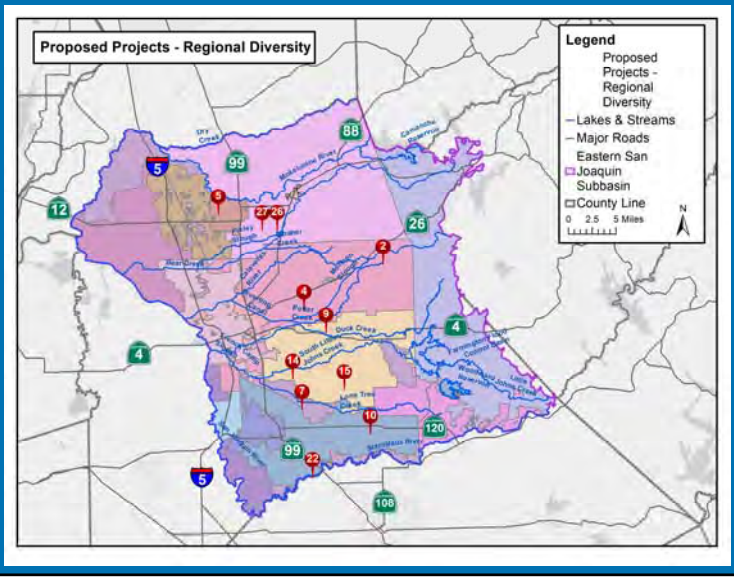
Portfolio 2: Regional Diversity

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



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Portfolio 2: Regional Diversity

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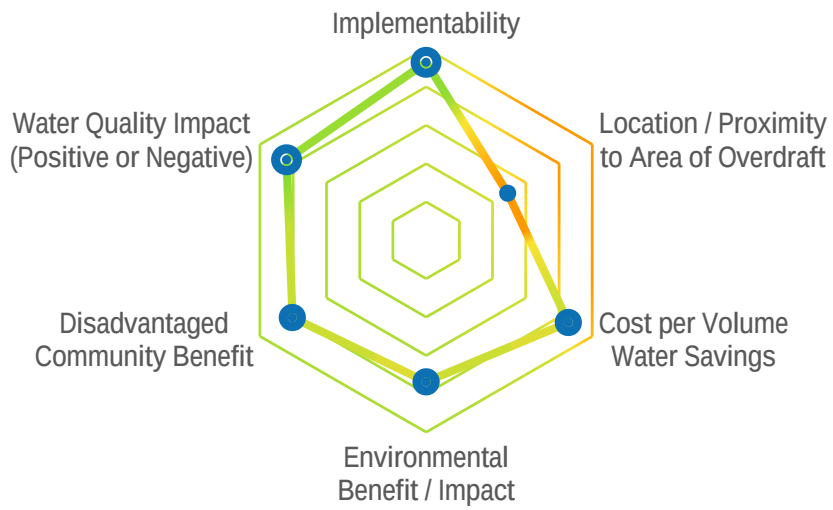

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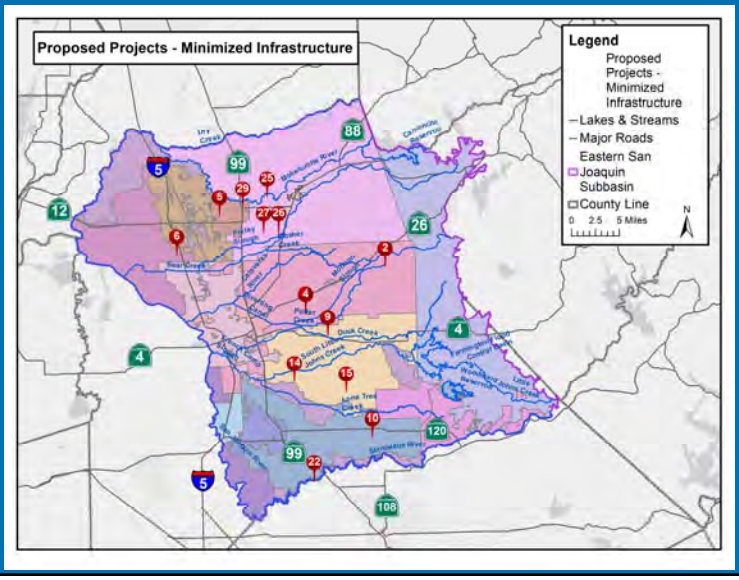
Portfolio 3: Minimized Infrastructure

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Project Description	Lifecycle Cost	Water Savings (AFY)	Unit Cost ($/AF)
BNSC Intermodal Facility Recharge Pond	$150,000	1,000	$5.00
Water Transfers to SEWD and CSJWCD	$9,000,000	45,000	$200.00
SW Implementation Expansion	$2,250,000	19,000	$7.89
Lake Grupe In-Lieu Recharge	$900,000	4,500	$4.00
South System Modernization	$13,000,000	4,500	$72.22
CSJWCD Capital Improvement Program	$1,550,000	5,000	$10.33
PDA Banking	$5,500,000	4,000	$34.38
White Slough WPCF Expansion	$6,000,000	568	$352.27
SW Facility Expansion & Delivery Pipeline	$74,200,000	4,750	$520.70
Winery Recycled Water	$5,500,000	750	$183.33
City of Ripon Surface Water Supply	$8,600,000	6,000	$47.78
Increase Nick DeGroot SW Deliveries	$16,289,000	2,015	$269.46
North System Modernization	$11,000,000	2,600	$105.77
TOTAL	**$153,939,000**	**99,683**	**$136.46**

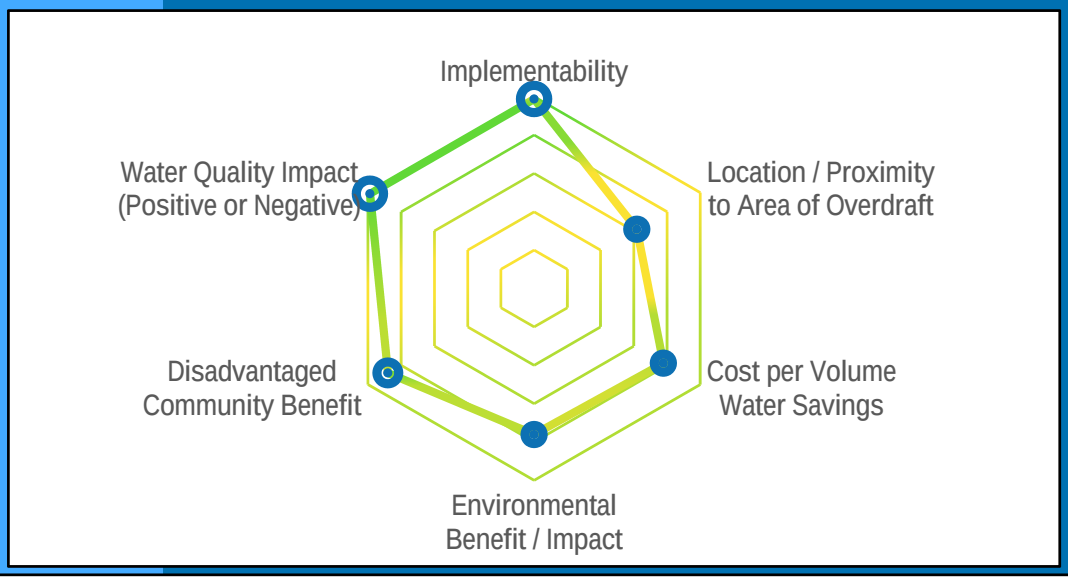
Portfolio 3: Minimized Infrastructure

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



Portfolio 3: Minimized Infrastructure

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



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Portfolio 4: Environmental Benefit

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Project Description	Lifecycle Cost	Water Savings (AFY)	Unit Cost ($/AF)
BNSC Intermodal Facility Recharge Pond	$150,000	1,000	$5.00
Water Transfers to SEWD and CSJWCD	$9,000,000	45,000	$200.00
PDA Banking	$5,500,000	4,000	$34.38
City of Escalon Wastewater Reuse	$30,000,000	672	$1,488.98
Winery Recycled Water	$5,500,000	750	$183.33
South San Joaquin Stormwater Reuse	$30,900,000	1,100	$936.36
CSJWCD Capital Improvement Program	$1,550,000	5,000	$10.33
City of Ripon Surface Water Supply	$8,600,000	6,000	$47.78
Pressurization of SSJID Facilities	$583,000,000	30,000	$647.78
Lake Grupe In-Lieu Recharge	$900,000	4,500	$4.00
Increase Nick DeGroot SW Deliveries	$16,289,000	2,015	$269.46
TOTAL	**$691,391,023**	**100,037**	**$316.31**

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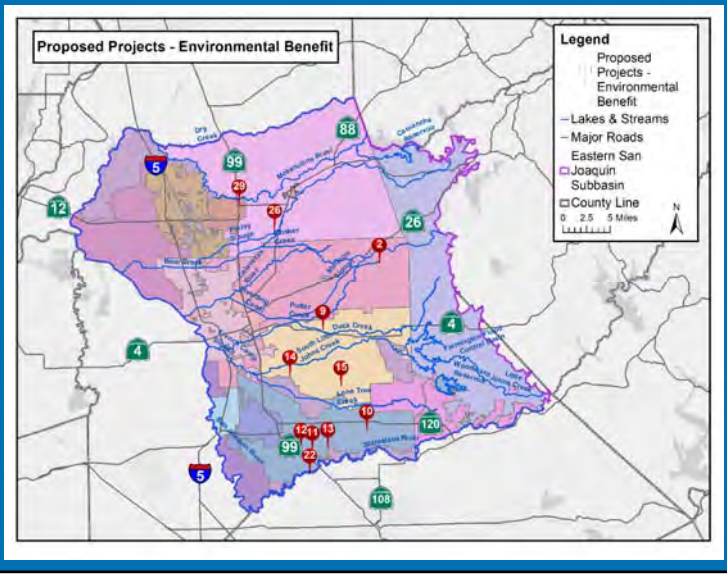
Portfolio 4: Environmental Benefit

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



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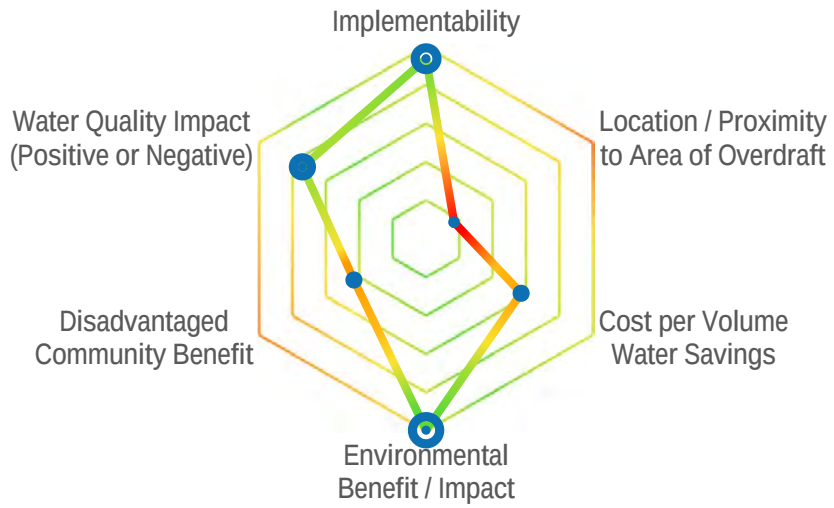
Portfolio 4: Environmental Benefit

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



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Portfolio 5: DAC Benefit

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Project Description	Lifecycle Cost	Water Savings (AFY)	Unit Cost ($/AF)
BNSC Intermodal Facility Recharge Pond	$150,000	1,000	$5.00
Lake Grupe In-Lieu Recharge	$900,000	4,500	$4.00
White Slough WPCF Expansion	$6,000,000	568	$352.27
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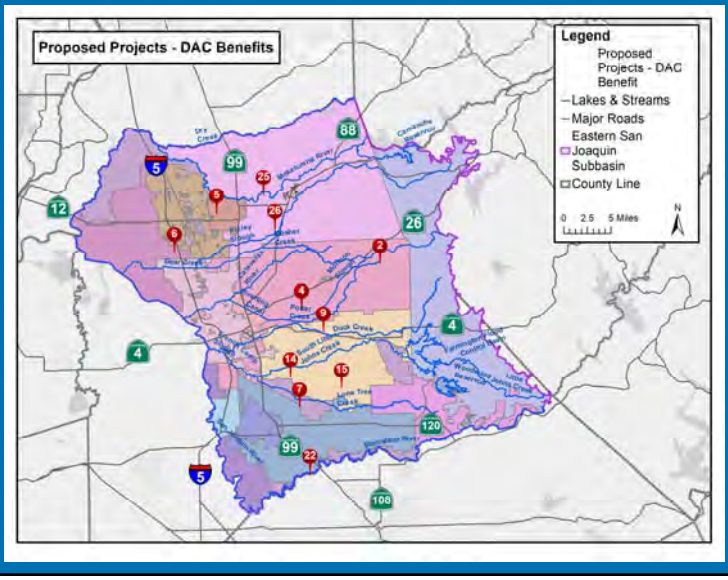
SW Implementation Expansion	$2,250,000	19,000	$7.89
SW Facility Expansion & Delivery Pipeline	$74,200,000	4,750	$520.70
City of Ripon Surface Water Supply	$8,600,000	6,000	$47.78
CSJWCD Capital Improvement Program	$1,550,000	5,000	$10.33
Recycled Water Transfer to Agriculture	$58,015,000	5,193	$372.39
North System Modernization	$11,000,000	2,600	$105.77
PDA Banking	$5,500,000	4,000	$34.38
TOTAL	**$177,165,000**	**97,611**	**$148.87**

41

Portfolio 5: DAC Benefit

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



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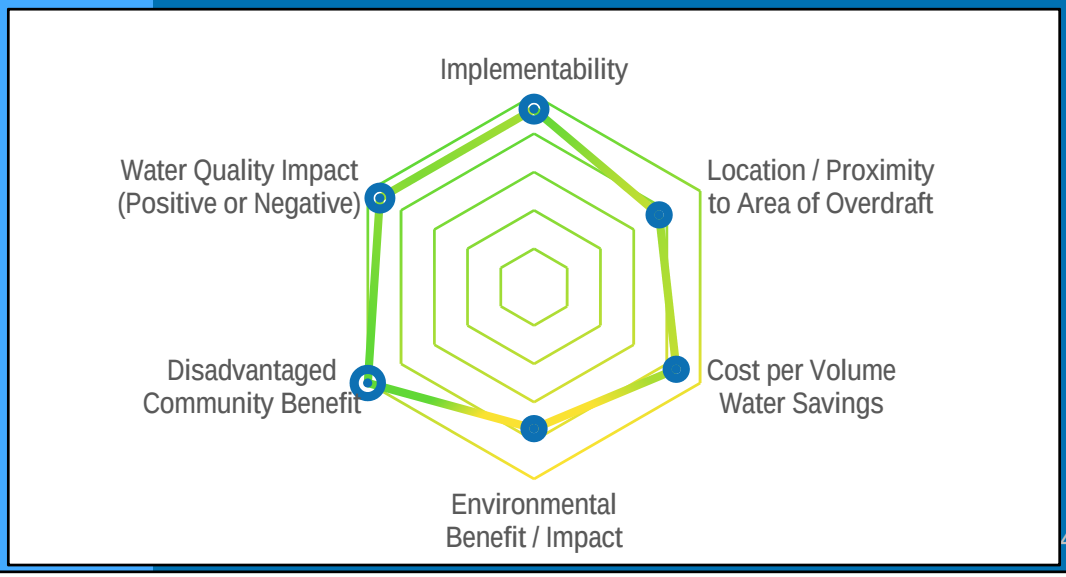
Portfolio 5: DAC Benefit

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



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Portfolio 6: Impact to Cone of Depression

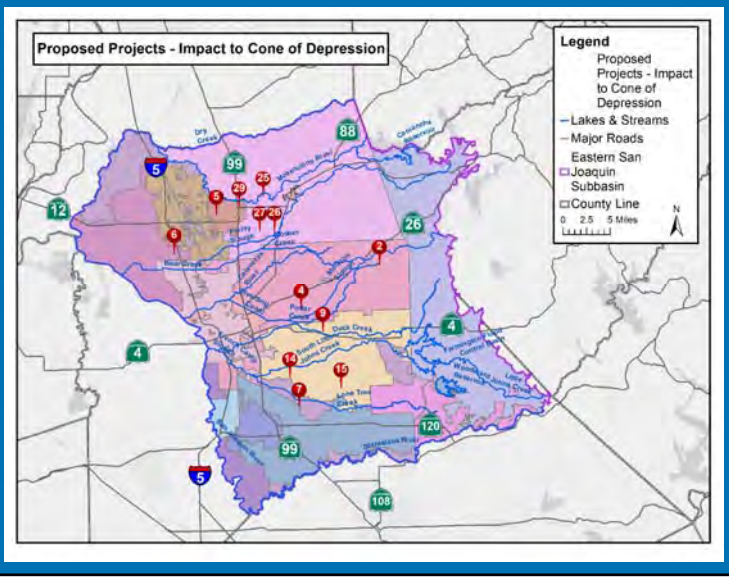
EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Project Description	Lifecycle Cost	Water Savings (AFY)	Unit Cost ($/AF)
Water Transfers to SEWD and CSJWCD	$9,000,000	45,000	$200.00
Lake Grupe In-Lieu Recharge	$900,000	4,500	$4.00
SW Implementation Expansion	$2,250,000	19,000	$7.89
PDA Banking	$5,500,000	4,000	$34.38
North System Modernization	$11,000,000	2,600	$105.77
South System Modernization	$13,000,000	4,500	$72.22
BNSC Intermodal Facility Recharge Pond	$150,000	1,000	$5.00
CSJWCD Capital Improvement Program	$1,550,000	5,000	$10.33
Winery Recycled Water	$5,500,000	750	$183.33
SW Facility Expansion & Delivery Pipeline	$74,200,000	4,750	$520.70
White Slough WPCF Expansion	$6,000,000	568	$352.27
Recycled Water Transfer to Agriculture	$58,015,000	5,193	$372.39
TOTAL	**$187,065,000**	**96,861**	**$151.83**

44

Portfolio 6: Impact to Cone of Depression

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



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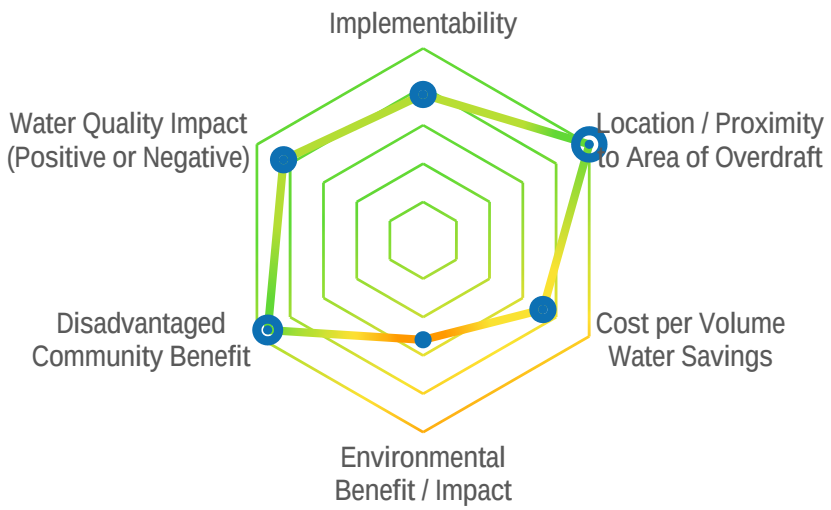
Portfolio 6: Impact to Cone of Depression

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



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Portfolio 7: Fast Implementation

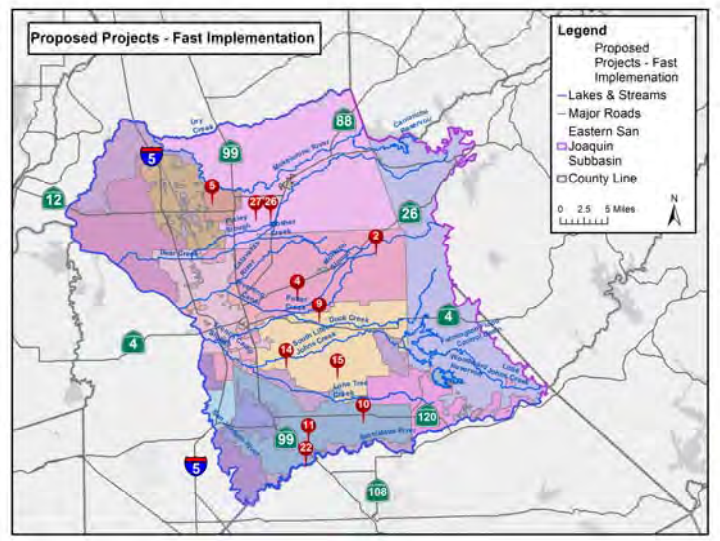
EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Project Description	Lifecycle Cost	Water Savings (AFY)	Unit Cost ($/AF)
BNSC Intermodal Facility Recharge Pond	$150,000	1,000	$5.00
Water Transfers to SEWD and CSJWCD	$9,000,000	45,000	$200.00
CSJWCD Capital Improvement Program	$1,550,000	5,000	$10.33
White Slough WPCF Expansion	$6,000,000	568	$352.27
South System Modernization	$13,000,000	4,500	$72.22
Lake Grupe In-Lieu Recharge	$900,000	4,500	$4.00
PDA Banking	$5,500,000	4,000	$34.38
City of Ripon Surface Water Supply	$8,600,000	6,000	$47.78
Increase Nick DeGroot SW Deliveries	$16,289,000	2,015	$269.46
SW Facility Expansion & Delivery Pipeline	$74,200,000	4,750	$520.70
City of Escalon Wastewater Reuse	$30,000,000	672	$1,488.98
SW Implementation Expansion	$2,250,000	19,000	$7.89
TOTAL	**$167,439,000**	**97,004**	**$146.28**

47

Portfolio 7: Fast Implementation

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



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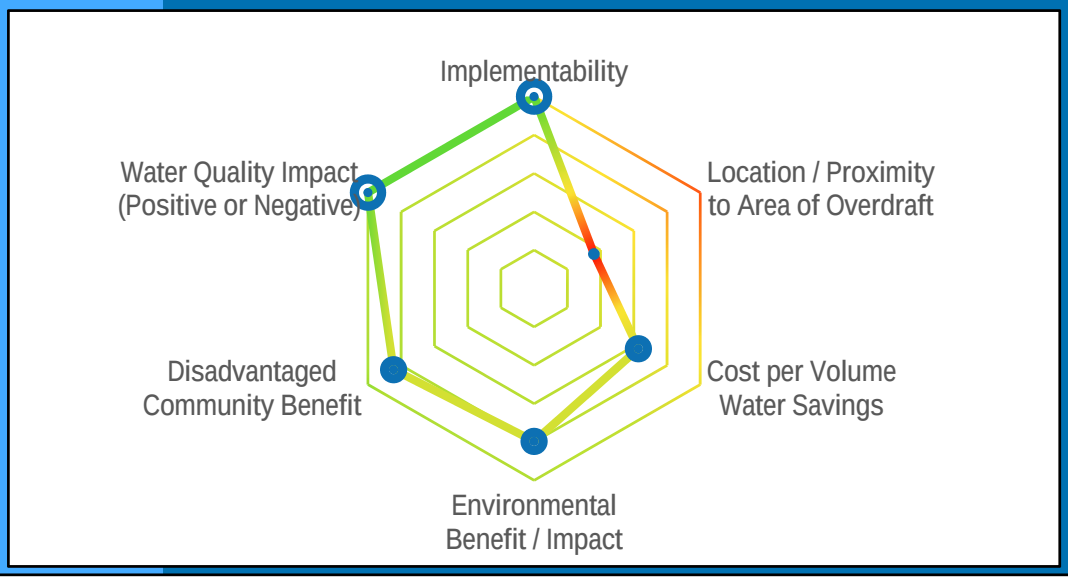
Portfolio 7: Fast Implementation

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



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Portfolio 8: Large-Volume Projects

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Project Description	Lifecycle Cost	Water Savings (AFY)	Unit Cost ($/AF)
Water Transfers to SEWD and CSJWCD	$9,000,000	45,000	$200.00
Pressurization of SSJID Facilities	$583,000,000	30,000	$647.78
SW Implementation Expansion	$2,250,000	19,000	$7.89
City of Ripon Surface Water Supply	$8,600,000	6,000	$47.78
TOTAL	**$602,850,000**	**100,000**	**$288.70**

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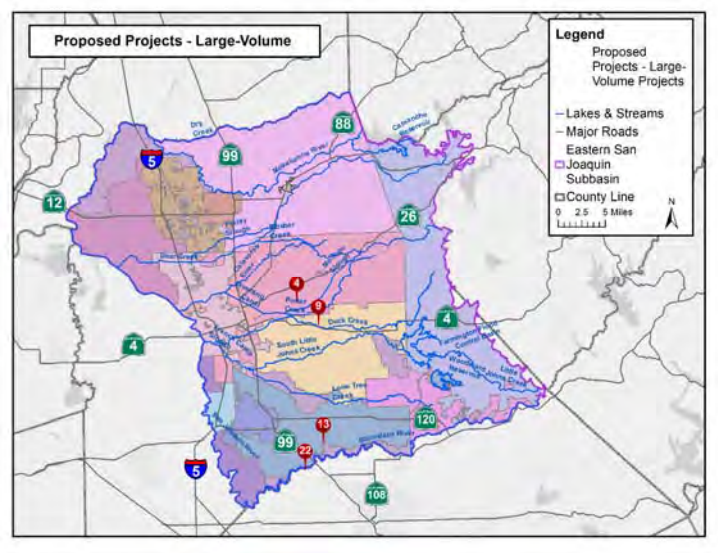
Portfolio 8: Large-Volume Projects

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



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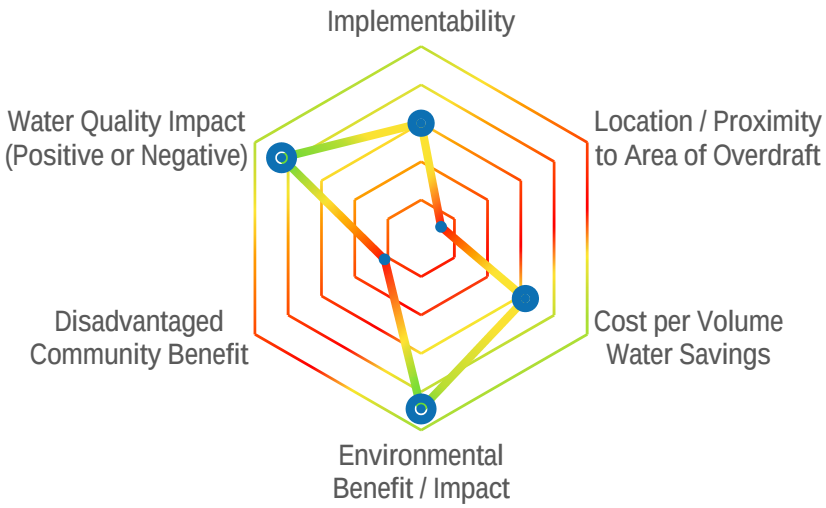
Portfolio 8: Large-Volume

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



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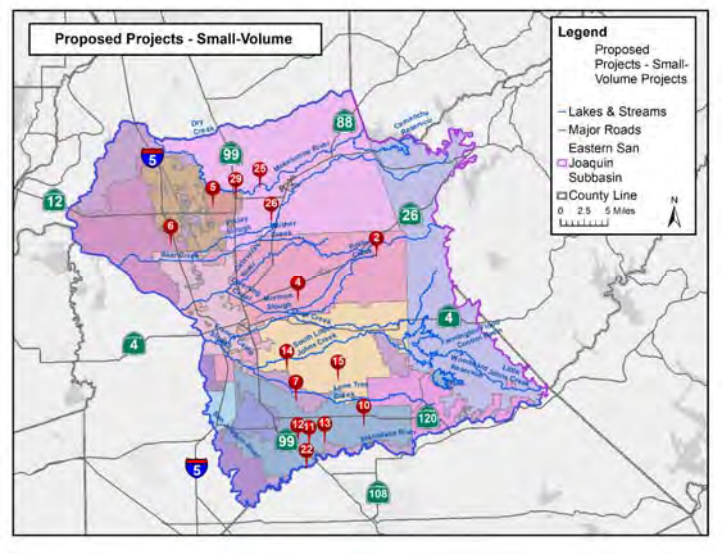
Portfolio 9: Small-Volume Projects

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Project Description	Lifecycle Cost	Water Savings (AFY)	Unit Cost ($/AF)
White Slough WPCF Expansion	$6,000,000	568	$352.27
City of Escalon Wastewater Reuse	$30,000,000	672	$1,488.98
Winery Recycled Water	$5,500,000	750	$183.33
BNSC Intermodal Facility Recharge Pond	$150,000	1,000	$5.00
South San Joaquin Stormwater Reuse	$30,900,000	1,100	$936.36
Increase Nick DeGroot SW Deliveries	$16,289,000	2,015	$269.46
North System Modernization	$11,000,000	2,600	$105.77
PDA Banking	$5,500,000	4,000	$34.38
South System Modernization	$13,000,000	4,500	$72.22
Lake Grupe In-Lieu Recharge	$900,000	4,500	$4.00
SW Facility Expansion & Delivery Pipeline	$74,200,000	4,750	$520.70
CSJWCD Capital Improvement Program	$1,550,000	5,000	$10.33
Recycled Water Transfer to Agriculture	$58,015,000	5,193	$372.39
City of Ripon Surface Water Supply	$8,600,000	6,000	$47.78
SW Implementation Expansion	$2,250,000	19,000	$7.89
Pressurization of SSJID Facilities	$583,000,000	30,000	$647.78
TOTAL	**$846,854,000**	**91,647**	**$305.52**

Portfolio 9: Small-Volume Projects

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY



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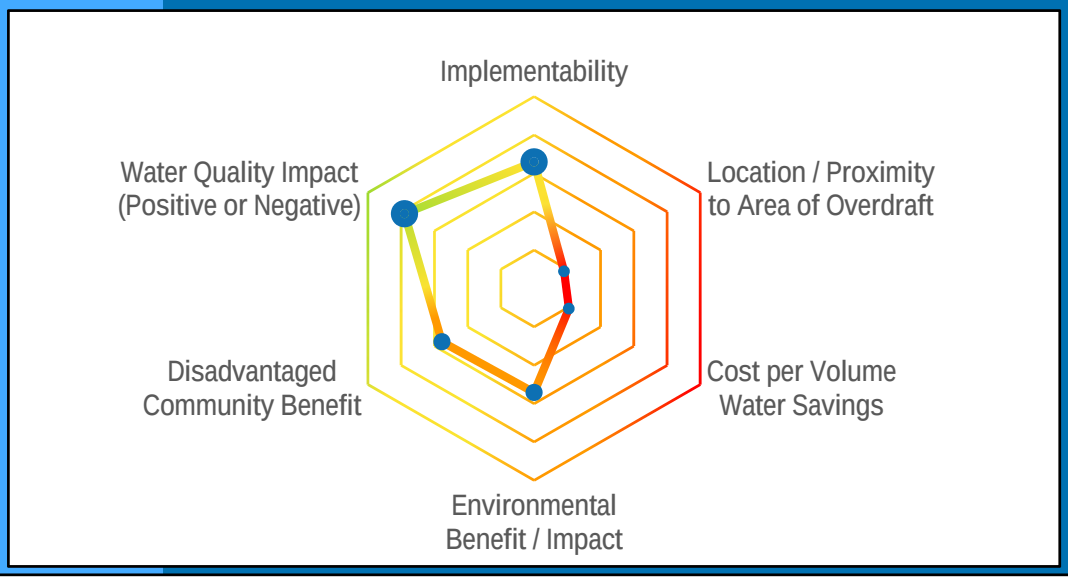
Portfolio 9: Small-Volume



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Portfolio Comparison

Portfolio	Lifecycle Cost	Water Savings (AFY)	Unit Cost ($/AF)
1. Cost-Effectiveness	$131,754,000	99,558	$129.20
2. Regional Diversity	$189,454,000	100,958	$147.82
3. Minimized Infrastructure	$153,939,000	99,683	$136.46
4. Environmental Benefit	$691,391,023	100,037	$316.31
5. Disadvantaged Community Benefit	$177,165,000	97,611	$148.87
6. Impact to Cone of Depression	$187,065,000	96,861	$151.83
7. Fast Implementation	$167,439,000	97,004	$146.28
8. Large-Volume	$602,850,000	100,000	$288.70
9. Small-Volume	$846,854,000	91,647	$305.52

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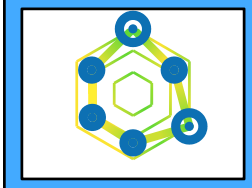
Implementability
Water Quality
Location
DAC Benefit
Cost / Volume
Environmental

Portfolio Comparison

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Cost-Effectiveness

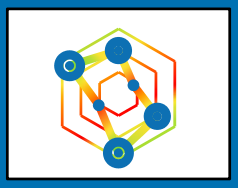


Regional Diversity

Environmental Benefit

Impact on Cone of Depression

Large Projects



Minimize Infrastructure

DAC Benefit

Fast Implementation

Small Projects

Other Categories of Projects

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Considered for Long-term Implementation:

- Farmington Dam Repurpose Project
- Mobilizing Recharge Opportunities Project
- Advanced Metering Infrastructure Project

Considered for Monitoring and Verification:

- Mokelumne River Loss Study

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Approaches to Financing Projects

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GSA-Scale Approach

AF/acre groundwater allocation to meet sustainable yield.

Groundwater allocations are assigned to GSAs based on acreage; GSAs implement additional supply projects as needed / desired.

Basin-Scale Approach

Basin-wide supply projects eliminate overdraft

All groundwater users pay into project implementation

Basin Sustainability

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Discussion: Benefits of Basin-Wide Solution

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- Overall cost-effectiveness and economies of scale
- Consistent with scale of SGMA compliance
- Well-positioned for outside funding
- Reduces burden to raise funding at the GSA scale
- Some SGMA compliance and administration measures must be implemented at the basin-scale, such as:
  - Monitoring and reporting
  - Validation and verification
  - GSP updates

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3 Locations Approved

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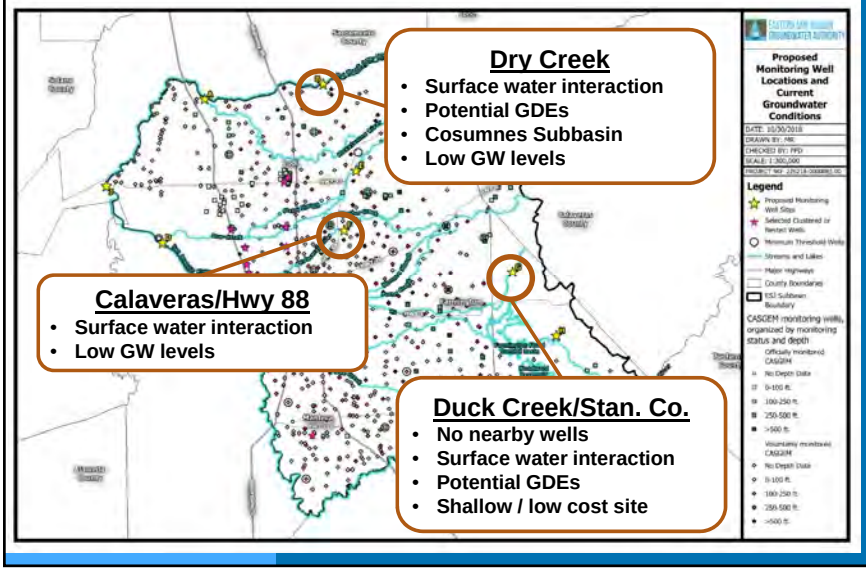

In November, the Board approved 3 locations to be included in the TSS funding application monitoring well request.

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Well Siting Specifics

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A meeting was held on December 19 with SEWD, NSJWCD, and Eastside GSA to discuss well siting specifics.

Objective: Identify exact well siting locations with consideration to access, proximity to streams, and property ownership

Outcome: Primary and alternate parcels identified for installation of each of the three wells

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Next Steps

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- TSS application is being finalized

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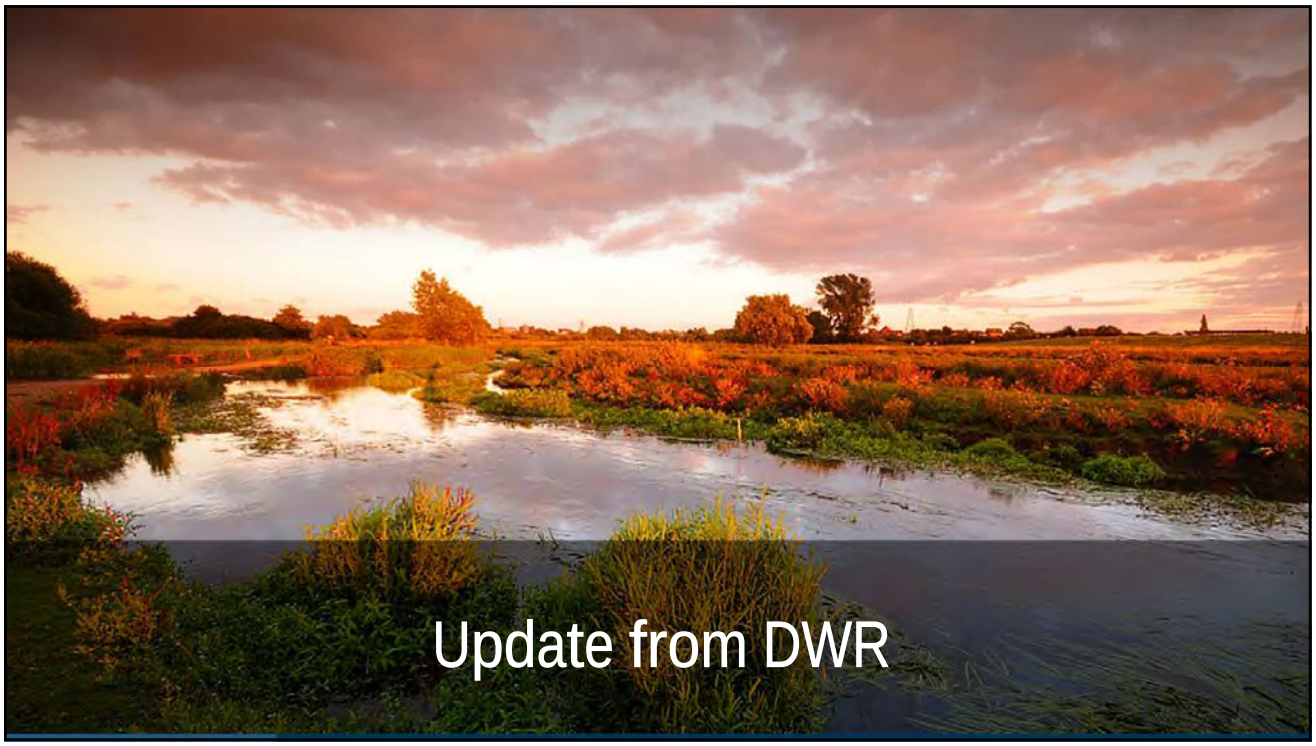

What is the Situation Assessment?

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

The Situation Assessment findings were developed based on third-party interviews with the members of the Groundwater Sustainability Workgroup. Findings were presented to the Workgroup on December 12.

Full report can be found here: www.esjgroundwater.org/Agendas

Objective #1: Understand and document stakeholder concerns

Objective #2: Incorporate feedback into plan development process

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Situation Assessment Findings

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Example Recommendations – Workgroup Discussions:

- Consider options for side bar conversations, where people can learn about specific issues (e.g., ad hoc work)
- Increase time for discussions by providing a tighter recap of the previous meeting
- Provide some space and latitude in meetings, to follow where the group wants to go
- Involve decision-makers in workgroup meetings
- Provide a timeline for technical deliverables
- Create a process for adding new attendees and dropping members who don't attend.

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Situation Assessment Findings

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Example Recommendations – Relationship to Decision-Making:

- Clarify whether/how comments will be incorporated into plan development
- Clarify the work that needs to be done by the Workgroup (e.g., clarify what kind of input and comments the GWA is seeking)
- Define the mission, goals and objectives for the workgroup.
- Look at bringing other voices into the governance structure to bring in new thinking and help with outreach.

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Situation Assessment Findings

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Example Recommendations – Public Outreach:

- Make information understandable for the average person – explain the legislation, what it looks at, and the timeline.
- Approaches to share information and distribute the draft GSP:
  - Arrange for a newspaper interviews and articles
  - Partner with other activities
  - Distribute information in utilities correspondence or property tax bills
  - Post recordings of meetings for the GWA and technical AC
  - Create a speakers bureau
  - Use newsletters, ag alerts
  - Create a "How to be involved" toolkit
  - Encourage every GSA to provide a recap of monthly outreach efforts. Support the individual GSAs in reaching out to constituents.
  - Make stakeholder and public meetings meaningful / relevant to the process

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3rd Informational Meeting

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

- The 3rd informational meeting will be held at the Lockeford Community Center

February 12th, 6:30-8 p.m.
Lockeford Community Center
19258 N. Jack Tone Rd
Lockeford, CA 95237

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February Agenda Items

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

- Projects and Management Actions
- Financing
- Monitoring Networks

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ATTACHMENT
IV.A-B

WATER

California's Indomitable Snowman Talks Snowpack Tech in a Changing Climate

LISTEN

Frank Gehrke spent 31 years measuring the Sierra snowpack. He retired in December at 71. **(Calif. Dept. of Water Resources)**

Frank Gehrke says that back in Missouri, where he was raised, snow was "something to be plowed." He would soon take a very different view.

The Airborne Snow Observatory was a game-changer, says Frank Gehrke, California's former chief snow surveyor.

In December, Gehrke retired as chief snow surveyor for the California Department of Water Resources. He spent much of his 31 years with the department on skis and snowshoes, in remote corners of the Sierra Nevada, measuring the "frozen reservoir" that ultimately provides about a third of California's water supply.

He was also the guy flanking Gov. Jerry Brown in late March of 2015, when there was no snow to measure and Brown announced sweeping drought measures.

Shortly after his retirement, I met Gehrke near his home on the American River, for some reflections. The following is an edited transcript.

What's it like not being involved in the snow surveys after all this time?

It's a little bittersweet. But by the same token it's a relief not to have those worries about what could go wrong.

What was it like to see the monthly surveys become a media event?

When I first came to work for the department in 1987, there would be an occasional call from the media about when we were doing the survey. And then as things evolved in that first five-year drought, I realized that when the media brought their own snowshoes they were serious.

Surveyors using a Mt. Rose snow gauge to measure water content in 1958. Manual surveys are still done the same way. *(Calif. Dept. of Water Resources)*

It seems like the technology has really changed since you started in 1987.

Well it has, and the real game-changer is what's known as the Airborne Snow Observatory.

A Disappointing Start

The first manual snow survey of the winter, conducted on Jan. 3, showed water content of the Sierra snowpack at just 67 percent of the long-term average, but that still beats last year at this time, when it was 31 percent of normal. Keep in mind the snowpack water content can change dramatically as the winter months progress.

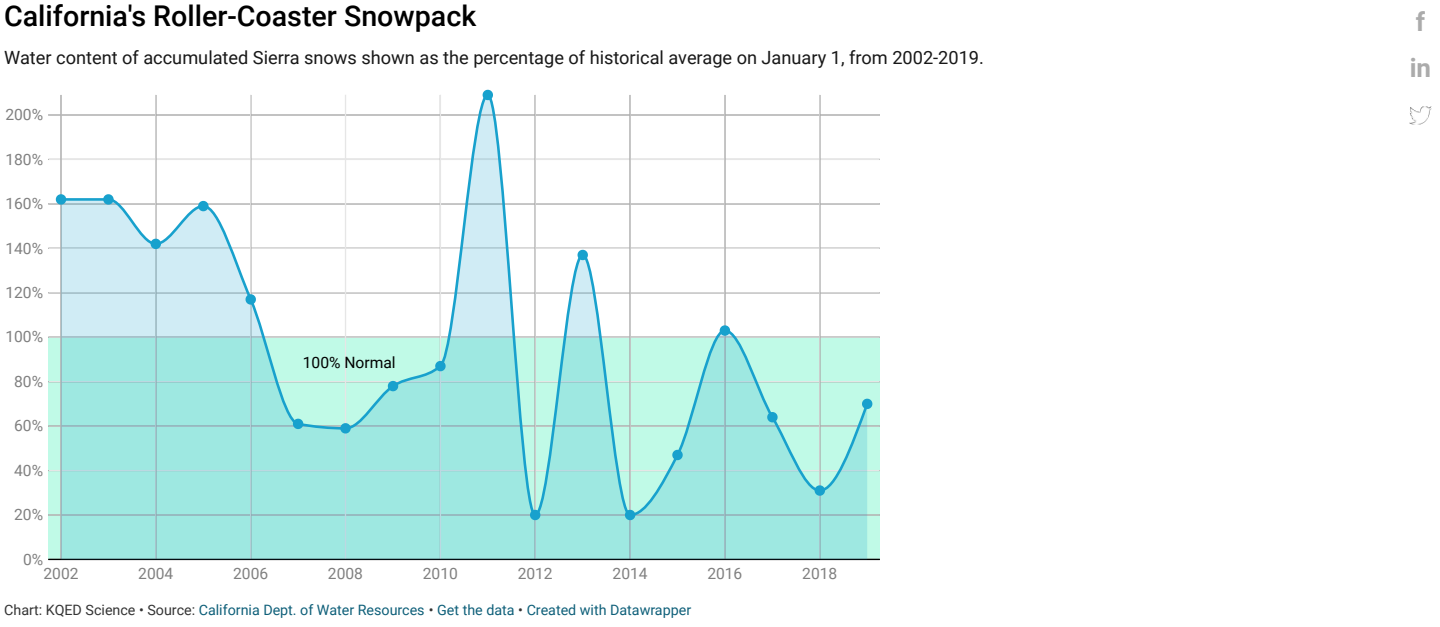
These are guys from NASA basically flying over the mountains in a plane, using light beams to measure the snow?

Absolutely. We started that. And that truly has been the huge change in all of the history of snow surveys. Being able to look at this basin-wide snow-water equivalent truly is phenomenal. And because we now can very accurately determine the snow in a basin, then we can start to look at some of the other factors that go into runoff prediction and examine those with the idea that the snow is now a known quantity. We're not guessing or trying to estimate. We know how much snow is up there.

How important are these precision measurements?

Well, they're hugely important, especially as things are changing. Predictions are for less snow, more rain, so being able to accurately determine where the snow is and how much there is makes a big difference in terms of your modeling for those short-term flood events, and also for more long-term water-supply forecasting.

And it's also very important, for example down in the Tuolumne River watershed, where our highest ground-based measurement is at about 10,000 feet. Fully a third of the watershed is above that measurement point. So if you get into a spring situation where the snow has basically melted up to 10,000 feet, you're flying blind -- or you were prior to the Airborne Snow Observatory. And the ability to look at that, especially that late-spring runoff, can be extremely important for determining reservoir levels and managing that reservoir capacity for the benefit of both flood control as well as water supply and hydroelectric and a number of other benefits that you can more accurately monitor the reservoir and make intelligent decisions about releases.



You've been doing this over the past 30 years. What changes have you seen in the snowpack?

Actually not very much. We talk about the seasonal or inter-annual variability.[How California whipsaws between wet and dry years]. And those swings can mask perhaps a longer-term signal that's in there. The snow-course record, people look at it and they tweak it and some people see a signal, others don't.

(Editor's note: Recent scientific studies have projected that the Sierra snowpack could shrink by nearly 80 percent by 2100, and timing of the runoff could change dramatically.)

Do you worry at all about California's water future?

Even now, there is a lot of water in California. But it doesn't come with the timing and the location of where we as a civilization really want it. That's where I think technology can do a great deal. We probably aren't going to be moving more water than we are right now; it's unlikely we'll be building any giant new pipelines or something. But what we'll be able to do is identify where the water is, when it occurs, and improve that accuracy.

Here in 2019, we don't know what water the rest of the year is going to bring. And if we could improve that, even a little bit, it would go a long way toward being able to manage what we have right now in terms of physical infrastructure.

How do they do the manual snow surveys? Find out in this video from 2010, when I trailed Gehrke out to Tamarack Flat in El Dorado County.

Speaking of technology, when does skiing up into a pass and shoving aluminum tubes into the snow to weigh the water content become obsolete?

I can see the number of surveys being reduced. But I think, at least for the foreseeable future, they're still what we use to verify everything else. Even though we have very advanced models, you still need that ground truth to ensure that something hasn't gone haywire.

From: CCVFCA [mailto:ccvfca@floodassociation.net]
Sent: Tuesday, January 08, 2019 12:55 PM
To: CCVFCA <ccvfca@floodassociation.net>
Subject: CCVFCA 2019 Food Forum - Save The Date

CA Central Valley Flood Control Association
Invites You to Attend...

2019 FLOOD FORUM

SAVE THE DATE

Wednesday, March 20, 2019
10 a.m.- 1:30 p.m.
Dante Club
2330 Fair Oaks Blvd., Sacramento

March is when ***National Flood Safety Awareness Week*** reminds the public about the importance of investing in flood protection. It's also when the ***CCVFCA Annual Flood Forum*** and luncheon addresses the most current issues affecting the Central Valley's extensive flood control system.

Please mark your calendars to hear a panel of experts present their views at this years Flood Forum.

Click Here to Register Now!

CALIFORNIA CENTRAL VALLEY
FLOOD CONTROL
ASSOCIATION