XIII

Your presence is
joyfully requested to celebrate
the many achievements of our friend

Diane Rathmann

Thursday, July 6th, 2023
Gathering commences at Noon
Lunch served promptly at 12:30PM
Tributes will begin at 1:15PM

Wool Growers
609 H Street, Los Banos, CA 93635

Please RSVP to:
dmoses@panochewd.org

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conference registration information, hotel booking information, sponsorship opportunities, and the latest schedule of events.

ADMINISTRATIVE & MISCELLANEOUS

- Mike Wade (California Farm Water Coalition) wrote this guest commentary ("In defense of alfalfa") for the California Farm Bureau "Ag Alert", discussing the "Alfalfa 101" paper that our two organizations put together late last year.

- The audience at the Mid-Pacific Water Users Conference in late January was the largest since I've been on the conference planning committee (24 years!). Amongst the crowd were plenty of Alliance members and supporters. I had the honor of moderating two outstanding panels: 1) With of Central Valley Project Authority and district managers, including Federico Barajas and Alliance Advisory Committee Members Jason Phillips and Jeff Sutton; and 2) With three lobbyists, including former Congressman Dennis Cardoza (D-CA), Bill Ball, and our own Lane Dickson. Mike Wade and I did a tag-team "TedTalks" luncheon presentation on our latest favorite topic: food security.

- I drove back from Reno and provided an Alliance update (virtually) to the Tri States meeting, which included members of the Idaho Water Users Association, Oregon Water Resources Congress (OWRC) and Washington State Water Resources Association, which was hosted by our long-time Advisory Committee member April Snell, of OWRC.

- I'm traveling to Orlando later this week where I'll be on a panel with Reclamation Deputy Commissioner David Palumbo and Andre Monette (BBK Law) to talk about the Western Drought at the National Council of Farmer Cooperatives annual meeting.

This is a quick summary of just a few of the issues the Alliance has been engaged in. Please do not hesitate to contact me at ***dan@familyfarmalliance.org*** *if you would like further information about what the Alliance is doing to protect water for Western irrigated agriculture.*

XIII.

MID rehires attorney years after settling discrimination suit

DEKE FARROW JFARROW@MODBEE.COM

MID general counsel Ronda Lucas. Photographed Feb. 14, 2019, at the Modesto Irrigation District building in downtown Modesto.

BY JOHN HOLLAND
JHOLLAND@MODBEE.COM

The Modesto Irrigation District board voted 4-1 on Tuesday to bring back an attorney who had sued the agency over gender issues.

Ronda Lucas will assist General Counsel Wes Miliband under a contract yet to be negotiated. Director Janice Keating dissented after noting that the cost and other details were not available before the vote.

Miliband said Lucas would concentrate in part on the state's push to boost reservoir releases to aid Tuolumne River fish. She also will handle issues related to how the board interacts with the staff.

Lucas headed MID's legal team from January 2016 until her termination in November 2018. In a 2019 lawsuit, she alleged sexual harassment and discrimination.

Lucas settled the case the next year and received a $320,000 payment from the district, which did not admit liability.

Tuesday's vote was the first involving legal staffing since the November election brought three new board members. Keating, John Boer and Robert Frobose joined Larry Byrd and Nick Blom. Stu Gilman lost his re-election bid. John Mensinger and Paul Campbell did not seek new terms.

Frobose said Lucas has the skills to protect MID's water supplies and should not have been fired by the previous board.

"This is what was on my mind, the way Ronda Lucas was treated," he said.

The contract drew criticism from Ripon-based attorney Stacy Henderson, whose clients include farmers in MID. She said the public needs to know the cost of the contract and whether Lucas might cause tension with the current staff.

"Explain that to your ratepayers, who had to fund her settlement and lawsuit," Henderson said.

The Tuolumne flow issue has been going on for several years and also involves diversions by the Turlock Irrigation District and San Francisco. They reached a tentative compromise last year with the State Water Resources Control Board but still have to nail down the details.

"We've got to put our best offense in front of us," Boer said of his vote for Lucas, "or we're going to be playing defense the whole time."

John Holland: 209-578-2385

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XIII.

How California's Water Rights System Gouges You and Me

February 06, 2023 Kate Poole

I've written recently about the deep inequities built into California's water rights system, embedding California's racist past firmly into our present system of water distribution. The systematic exclusion of Native Americans, Asians, and other people of color from claiming and owning water rights during European settlement of California means that those communities continue to be deprived of critical water resources even today. But there is another lingering aspect of California's antiquated water rights system that affects nearly everyone who lives in the state, and that is the price of water. Just as our racist and exclusionary past shapes access to water, it also shapes the cost of water, again privileging the few European immigrants who laid claim to water in the late nineteenth and early twentieth century to the detriment of nearly everyone else.

Here is a snapshot of the wildly varying price for water across different constituencies in 2022:

Glenn-Colusa Irrigation District	Central California Irrigation District	Metropolitan Water District of Southern California	Westland Water District	Bottled water

Base rate in 2022: **$21.79/ acre-foot**	Rate for first 2.5 acre-feet/acre in 2022: **$20/acre-foot**	Tier 1 full service untreated rate in 2022: **$799/acre-foot**	Wholesale rate for untreated water for low-income communities: **$432.37/acre-foot**	**$420,411/acre-foot** (at ~ $1.29/gallon x 325,900 gallons in an acre-foot)

"Senior" water rights holders – those whose rights flow from the European immigrants who settled California in the late 1800s/early 1900s – paid around $20/acre-foot for water in the severe drought year of 2022. That includes the Glenn-Colusa Irrigation District and Central California Irrigation District, both of which claim "pre-1914" water rights. Those two districts are typical of a larger set of diverters of which they are a part: Glenn-Colusa is part of a group of over 100 primarily irrigation districts that form the Sacramento River Settlement Contractors, and Central California Irrigation District is part of a group of irrigators called the Exchange Contractors. Together, the Sacramento River Settlement Contractors and Exchange Contractors lay claim to almost three million acre-feet of water annually – about six times the amount of water that the City of Los Angeles uses in a year. And they get their water on the cheap as a function of the claimed "seniority" of their water rights.

Compare that to the cost of untreated water charged by the Metropolitan Water District of Southern California (MWD) to its urban water district customers, including the City of Los Angeles, which was $799/acre-foot in 2022, or **nearly 40 times the cost** paid by senior water rights holders. The cost of treated water is even higher, but one would expect that cost jump to ensure the water meets drinking water standards. Why the

huge cost differential? MWD sells water imported from the Sacramento and San Joaquin Rivers, the same rivers from which the Glenn-Colusa and Central California Irrigation Districts withdraw their supply. There are transportation costs to move that water through miles of canals to southern California, but those costs hardly justify a 40-fold increase in price. Indeed, the Westlands Water District charged its urban water users over $430/acre-foot for untreated water in 2022, or **over 20 times the cost** paid by senior water rights holders, and it is adjacent to the Central California Irrigation District. The cost of moving water does not explain this vast differential.

Instead, almost every residential water customer in the State of California pays a considerable fee for using water while senior water rights holders essentially get their water for free, paying only minimal diversion charges. The cost differential is even more stark for those communities that rely on groundwater wells for drinking and bathing, but where those wells have dried up largely due to excessive overpumping on nearby agricultural lands. In the last year alone, over 5,100 households in the state have reported their wells going dry. Many of those households must rely on bottled water for drinking without any supply from their taps. At an average price of $1.29/gallon, an acre-foot of bottled water costs a whopping $420,411/acre-foot (there are approximately 325,900 gallons in an acre-foot). That's **over 20,000 times the cost of water** paid by senior water rights holders.

Granted, these are not all apples-to-apples comparisons. Bottled water is not the same quality as that pulled directly from a river. But the fact remains that today's "senior" water rights holders, who gained their preferential status purely as the result of profiting from California's violent and racist history, pay far less to take water from our rivers to irrigate their farms than almost every California resident pays for water to drink.

It's time for California's water managers to reform this antiquated system and prioritize water for human health and safety and for the shared environment over water for farms.

XIII.

THIS JUST IN ...Governor Newsom Signs Order to Build Water Resilience Amid Climate-Driven Extreme Weather

mavensnotebook.com/2023/02/13/this-just-in-governor-newsom-signs-order-to-build-water-resilience-amid-climate-driven-extreme-weather/

Maven Breaking News February 13, 2023 0 223

February 13, 2023

From the Office of the Governor:

Governor Gavin Newsom today signed an executive order to protect the state's water supplies from the impacts of climate-driven extremes in weather. After years of prolonged drought, recent storms resulted in the wettest three-week period on record in California. The storms have been followed by an unseasonably dry February, however, and the state could see a return to warm and dry conditions during the remaining weeks of the wet season – just as heavy rains in fall 2021 gave way to the driest January-February-March period in over 100 years.

While recent storms have helped replenish the state's reservoirs and boosted snowpack, drought conditions continue to have significant impacts on communities with vulnerable water supplies, agriculture, and the environment. The latest science indicates that hotter and drier weather conditions could reduce California's water supply by up to 10% by the year 2040.

The frequency of hydrologic extremes that is being experienced in California demonstrates the need to continually adapt to promote resiliency in a changing climate. To protect water supply and the environment given this new reality, and until it is clear what the remainder of the wet season will hold, the executive order includes provisions to protect water reserves, and replace and replenish the greater share of rain and snowfall that will be absorbed by thirstier soils, vegetation and the atmosphere.

The order helps expand the state's capacity to capture storm runoff in wet years by facilitating groundwater recharge projects. It also continues conservation measures and allows the State Water Board to reevaluate requirements for reservoir releases and diversion limitations to maximize water supplies north and south of the Delta while protecting the environment. Additionally, the order directs state agencies to review and provide recommendations on the state's drought response actions by the end of April, including the possibility of terminating specific emergency provisions that are no longer needed, once there is greater clarity about the hydrologic conditions this year.

The text of the executive order can be found here.

Leveraging the more than $8.6 billion committed by Governor Newsom and the Legislature in the last two budget cycles to build water resilience, the state is taking aggressive action to prepare for the impacts of climate-driven extremes in weather on the state's water supplies. In the 2023-24 state budget, Governor Newsom is proposing an additional $202 million for flood protection and $125 million for drought related actions.

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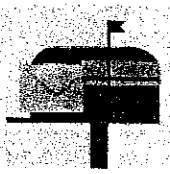


The latest water news by around 9am
Breaking news alerts too!

EXECUTIVE DEPARTMENT
STATE OF CALIFORNIA

EXECUTIVE ORDER N-3-23

WHEREAS on April 21, 2021, May 10, 2021, July 8, 2021, and October 19, 2021, I proclaimed States of Emergency due to drought conditions that continue today and exist across California; and

WHEREAS climate change continues to intensify the impacts of droughts on our communities, environment, and economy, and these impacts continue to affect groundwater basins, local water supplies, and ecosystems, resulting in continuing drought in the State; and

WHEREAS the ongoing drought continues to have significant, immediate impacts on communities with vulnerable water supplies, farms that rely on irrigation to grow food and fiber, and fish and wildlife that rely on stream flows and cool water; and

WHEREAS early, substantial rains in October and December 2021 gave way to the driest January-February-March period in over 100 years in California, leading the October 2021 to September 2022 water year to end with statewide precipitation at 76 percent of average, with statewide reservoir storage at 69 percent of average, and with Lake Oroville—the State Water Project's largest reservoir—at 64 percent of average; and

WHEREAS in January 2023, the State experienced one of the wettest three-week periods on record, yielding a snowpack that was at 205 percent of average on February 1, 2023, yet to date February has been drier than average; and

WHEREAS the current snowpack has not reduced stresses upon the State's water resources, including low storage levels, depleted aquifers, and diminished local water supplies; and

WHEREAS the State can expect continued swings between extreme wet and extreme dry periods that can present risks of severe flooding and extreme drought in the same year; and

WHEREAS California must adapt to a hotter, drier future in which a greater share of rain and snowfall during the wetter months will be absorbed by dry soils, consumed by plants, and evaporated into the air, leaving less water for communities, species, and agriculture; and

WHEREAS the frequency of hydrologic extremes experienced in the State is indicative of an overarching need to continually reexamine policies to promote resiliency in a changing climate; and

WHEREAS Californians continue to make progress conserving water, with urban water users conserving 17.1 percent statewide in December 2022 compared to December 2020 and agricultural producers continuing to invest in more efficient irrigation; and

WHEREAS despite this progress, the uncertainty of precipitation during the remainder of the winter and spring, and the potential of dry conditions next

winter and of drought conditions extending to a fifth year, make it necessary for the State to continue water-conservation measures and drought-resilience actions to extend available supplies, protect water reserves, and maintain critical flows for fish and wildlife; and

WHEREAS as directed in "California's Water Supply Strategy: Adapting to a Hotter, Drier Future," the State plans to stretch water supplies by storing, recycling, de-salting, and conserving the water it will need to keep up with the increasing pace of climate change; and

WHEREAS multiple regions of the State, such as the Klamath Basin and the Colorado River system, face severe water shortage conditions, and groundwater basins in the Central Valley continue to be depleted from years of drought and overdraft; and

WHEREAS groundwater use accounts for 41 percent of the State's total water supply on an average annual basis but as much as 58 percent in a critically dry year, and approximately 85 percent of public water systems rely on groundwater as their primary supply; and

WHEREAS capturing and storing storm and snowpack runoff underground to recharge aquifers is an important strategy to help regions stabilize water supplies in the face of hydrologic extremes; and

WHEREAS state agencies have created streamlined permitting pathways to enable groundwater recharge that augments natural aquifer recharge, while protecting the environment and other water users, but more opportunities exist to facilitate groundwater recharge; and

WHEREAS coordination between local entities that approve permits for new groundwater wells and local groundwater sustainability agencies is important to achieving sustainable levels of groundwater in critically overdrafted basins; and

WHEREAS to protect public health and safety, it is critical the State take certain immediate actions without undue delay to prepare for and mitigate the effects of the drought conditions, and under Government Code section 8571, I find that strict compliance with various statutes and regulations specified in this Order would prevent, hinder, or delay the mitigation of the effects of the drought conditions.

NOW, THEREFORE, I, GAVIN NEWSOM, Governor of the State of California, in accordance with the authority vested in me by the State Constitution and statutes, including the California Emergency Services Act, and in particular, Government Code sections 8567, 8571, and 8627, do hereby issue the following Order to become effective immediately:

IT IS HEREBY ORDERED THAT:

1. The orders and provisions contained in my State of Emergency Proclamations dated April 21, 2021, May 10, 2021, July 8, 2021, and October 19, 2021, and Executive Orders N-10-21 (July 8, 2021) and N-7-22 (March 28, 2022), remain in full force and effect, except as modified by those proclamations and orders and herein. State agencies shall

continue to implement all directions from those proclamations and orders and accelerate implementation where feasible.

2. To maximize the extent to which winter precipitation recharges underground aquifers, the Department of Water Resources, the State Water Resources Control Board (Water Board), and the Department of Fish and Wildlife shall continue to collaborate on expediting permitting of recharge projects and shall work with local water districts to facilitate recharge projects.

3. Paragraph 4 of my State of Emergency Proclamation dated May 10, 2021 and Paragraph 4 of my State of Emergency Proclamation dated July 8, 2021 are withdrawn, and each is replaced with the following text:

   To ensure adequate water supplies for purposes of health, safety, the environment, or drought resilient water supplies, the Water Board shall consider modifying requirements for reservoir releases or diversion limitations in Central Valley Project or State Water Project facilities to: (i) conserve water upstream later in the year in order to protect cold water pools for salmon and steelhead, (ii) enhance instream conditions for fish and wildlife, (iii) improve water quality, (iv) protect carry-over storage, (v) ensure minimum health and safety water supplies, or (vi) provide opportunities to maintain or to expand water supplies north and south of the Delta. The Water Board shall require monitoring and evaluation of any such changes to inform future actions. For any actions taken pursuant to this paragraph and any approvals granted in furtherance of this paragraph, Water Code Section 13247 and Public Resources Code, Division 13 (commencing with Section 21000) and regulations adopted pursuant to that Division are suspended. Nothing in this Paragraph affects or limits the validity of actions already taken or ongoing under Paragraph 4 of my May 10, 2021 Proclamation or Paragraph 4 of my July 8, 2021 Proclamation.

4. Paragraph 9 of Executive Order N-7-22 is withdrawn and replaced with the following text:

   To protect health, safety, and the environment during this drought emergency, a county, city, or other public agency shall not:

   a. Approve a permit for a new groundwater well or for alteration of an existing well in a basin subject to the Sustainable Groundwater Management Act and classified as medium- or high-priority without first obtaining written verification from a Groundwater Sustainability Agency managing the basin or area of the basin where the well is proposed to be located that groundwater extraction by the proposed well would not be inconsistent with any sustainable groundwater management program established in any applicable Groundwater Sustainability Plan adopted by that Groundwater Sustainability Agency and would not decrease the likelihood of achieving a sustainability goal for the basin covered by such a plan; or

b. Issue a permit for a new groundwater well or for alteration of an existing well without first determining that extraction of groundwater from the proposed well is (1) not likely to interfere with the production and functioning of existing nearby wells, and (2) not likely to cause subsidence that would adversely impact or damage nearby infrastructure.

This Paragraph shall not apply to permits for wells (i) that will provide less than two acre-feet per year of groundwater for individual domestic users, (ii) that will exclusively provide groundwater to public water supply systems as defined in section 116275 of the Health and Safety Code, or (iii) that are replacing existing, currently permitted wells with new wells that will produce an equivalent quantity of water as the well being replaced when the existing well is being replaced because it has been acquired by eminent domain or acquired while under threat of condemnation.

5. No later than April 28, 2023, state agencies shall send me their recommendations for what further actions, if any, are necessary for on-going emergency drought response, and their views on whether any existing provisions in my proclamations and executive orders related to the drought emergency are no longer needed to prepare for and mitigate the effects of the drought conditions.

IT IS FURTHER ORDERED that as soon as hereafter possible, this Order be filed in the Office of the Secretary of State and that widespread publicity and notice be given of this Order.

This Order is not intended to, and does not, create any rights or benefits, substantive or procedural, enforceable at law or in equity, against the State of California, its agencies, departments, entities, officers, employees, or any other person.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 13th day of February 2023.

GAVIN NEWSOM
Governor of California

ATTEST:

SHIRLEY N. WEBER, PH.D.
Secretary of State

XIII.

Response to executive order by John McManus, Golden State Salmon Association

"Californians saw a very low number of salmon in last year's returns following years of water management clearly aimed at aiding a handful of wealthy factory farm operators at the expense of the rest of us. There's a good chance the tens of thousands of Californians who work in the salmon fishery and related businesses will be out of work this year if the decision is made to close the fishery. We've got 205 percent of the normal snowpack in the Sierras, most of which will flow into the state's reservoirs so why is Gavin Newsom telling his water managers to make things worse for every family in California that depends on salmon to make a living? Why is Newsom acting to divert more water to a handful of his powerful friends at the expense of the rest of us? Newsom claims he's using his emergency authority. What emergency is he responding to? The emergency is the disappearance of the salmon a statewide industry revolves around. We've asked repeatedly to share our concerns with the governor, why does he ignore our needs? …

Why are families and communities on the coast being told they alone have to absorb more economic pain, especially when water projects like San Francisco's Hetchy Hetchy and others are almost overflowing right now? Everyone saw the heavy rains we got in January and there's lots more water trapped in snow that will add to those reservoirs in the months to come so why is Newsom encouraging his water managers to cut the spring river flows needed to get baby salmon from the Central Valley to the ocean? The past several years have been horrible for California's native salmon runs and this spring we were hoping for a reprieve when we might finally see the river flows needed to move baby salmon to the ocean. Now Newsom is stepping in to kill our salmon runs, as well as other wildlife that were hoping to catch a break.

Why does Gavin Newsom bend over backwards to give the corporate factory farms, many in the western San Joaquin desert, anything and everything they ask for while driving California's native wildlife extinct and coastal and inland communities into poverty?

The history of California is one of big wealthy landowners controlling politicians to seize the state's water. This executive order is Exhibit A that this dynamic still controls California water policy and politicians like Gavin Newsom.

In addition to those wondering how they'll pay the bills this year if salmon fishing is cut off, all Californians who care about responsible stewardship of our natural resources should let this governor hear loud and clear that he is not serving us.

XIII.

Policy group warns of steep ag losses without coordinated action on water

- BY JOHN COX jcox@bakersfield.com

- Feb 11, 2023

Agriculture in the San Joaquin Valley may be able to blunt a sharp decline in the years ahead if policymakers and the industry can come together on a series of strategies for reducing demand for irrigation while also increasing water supply, according to a new assessment from a prominent policy organization.

The report this month from the Public Policy Institute of California examined the biggest challenge confronting the state's ag industry — a one-fifth decline in annual water supply expected by 2040 because of groundwater sustainability measures and climate change — then recommended softening the impact by loosening water-trading rules, incentivizing farmland reuse and investing in storage, including groundwater recharge.

If consensus cannot be found to address the coming water shortfall, the study predicted, 900,000 acres of farmland will be fallowed at a cost of 50,000 jobs and a 2.3 percent drop in the valley's economic output.

Neither the gist of the PPIC's findings nor its suggestions are entirely new, but the renewal of their urgency resonates with a local industry anxious for progress.

"We've talked enough. Now we need action," President Ian LeMay of the California Fresh Fruit Association said Friday. "The end result of inaction, which is what got us to

this place, sadly, will be ... massive fallowing of acreage, tens of thousands of jobs lost and, quite frankly, irreparable economic damage to the San Joaquin Valley."

There are potential drawbacks to the measures the PPIC proposed, and the policy brief went through them before suggesting ways to guard against unintended consequences.

Unregulated water trading risks harming water users and ecosystems, it said, and so there would need to be a transparent, well-run market to protect small communities' drinking water wells. New caps on groundwater pumping may be in order, the report says.

Dairy and beef producers could be hurt, too, the study said, as water flows away from feed crops like alfalfa toward specialty, perennial crops like grapes and pistachios. The PPIC concluded communities affected by that may require what it termed transitional support.

At best, PPIC estimated, half a million acres will come out of production by 2040 — 11 percent of the San Joaquin Valley's total as of 2018. That much farmland going idle will increase dust and decrease air quality, exacerbate weeds, invite pests and degrade soils. Or not, if opportunities open in the areas of solar development, water-limited agriculture and habitat restoration.

"This will require both careful planning and financial and regulatory incentives," said the report by Alvar Escriva-Bou, Ellen Hanak, Spencer Cole and Josué Medellín-Azuara, with research support from Annabelle Rosser. "Progress will be hindered if these lands become a liability to growers."

Ag represents 14 percent of the valley's economic output, 17 percent of its employment (340,000 people) and 19 percent of its total income, the report estimated.

By itself, making surface- and groundwater trading rules more flexible won't increase supply, but it could cut the economic costs of adjusting to less water by one-third, while

limiting employment losses to perhaps 44 percent and reducing the impact on gross economic output by as much as half, according to the study.

It said expanding the supply of irrigation water through investment in new storage would cut the total land that will have to be fallowed by between 25 percent and 45 percent.

The policy brief threw in a hopeful note: If farming efficiency gains continue at even half the rate they have increased during the past 40 years, then half the expected economic costs would be avoided by 2040.

Disagreement was the caveat.

"Achieving successful outcomes will require unprecedented coordination and cooperation among local and regional parties," the report said, "with strong partnership and support from state and federal agencies."

Local farmland appraiser and broker Michael G. "Mike" Ming expressed confidence water trading can be done in a fair way that maximizes production across the valley.

"I think that that's something that a lot of our water districts in the valley are looking at," he said. "I just think that everybody kind of is in their corner and I think there should be an equitable water-trading platform."

He added local farmers are heavily invested in increasing irrigation efficiency and look forward to increased state and federal flows to local water banks.

LeMay viewed the PPIC report as continuing a conversation about where California finds itself on water policy. He said investments need to be made on water infrastructure and that permitting needs to be expedited on the $5.2 billion Sites Reservoir water storage project in Northern California.

Progress also needs to be made on water recycling in urban areas, LeMay said, as well as decisions on the future of water through the Sacramento-San Joaquin Delta. He said state leadership needs to treat the situation as the crisis it is

XIII.

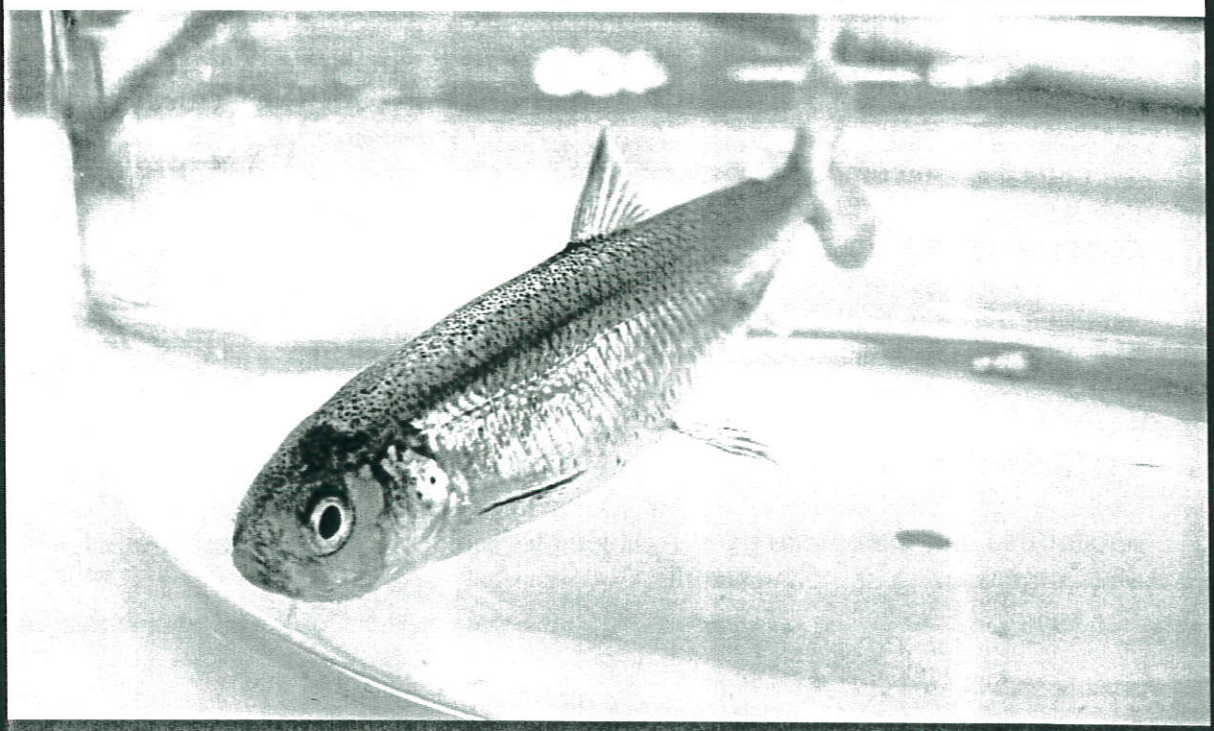
Anthea Hansen

From: FISHBIO <fishreport@fishbio.com>
Sent: Monday, February 13, 2023 8:31 AM
To: Anthea Hansen
Subject: Fish Report: Salt and Smelt — Assessing the Effect of the Fall X2 Outflow Action on Endangered Delta Smelt

FISHBIO

Fish Report

Fisheries Research, Monitoring, and Conservation



Salt & Smelt: Assessing the Effect of the Fall X2 Outflow Action on Endangered Delta Smelt

February 13, 2023

Recent research has revealed that the habitat needs of endangered delta smelt (*Hypomesus transpacificus*) may be more complex than what is accounted for in current management efforts. One ongoing effort intended to aid delta smelt recovery is the "Fall X2 Outflow Action," which is a strategic increase in outflow into the Sacramento-San Joaquin Delta to improve habitat for delta smelt during a key life history period when adult fish are maturing prior

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to their spawning migration. This increase in outflow is thought to improve the quantity and quality of delta smelt habitat by maintaining flows to sustain a low-salinity zone, in this case, a region with an average salinity less than 2 parts per thousand (a location referred to as X2). The position of X2 depends on the previous water year. Following a wet year or normal year, X2 is located approximately 74 kilometers to 81 kilometers upstream of the Golden Gate Bridge. However, the findings of a recent study suggest that managing delta smelt habitat by adjusting the position of X2 may not be as effective as previously thought (Hendrix et al. 2022).

The study used 35 years of data from the California Department of Fish and Wildlife's Fall Midwater Trawl surveys to examine which factors may have an impact on delta smelt occupancy – or their presence in different habitats – during the fall. They found that delta smelt movement and behavior patterns were most closely associated with salinity and temperature. Although there is complex variation in salinity levels within the X2 region, the study revealed that the position of X2 was not a good predictor of delta smelt occupancy. In fact, they found that patterns of occupancy were similar in both wet and dry years, suggesting that utilizing the position of X2 as a management tool may be an oversimplification of the habitat requirements of the species. Additional factors that were found to influence delta smelt occupancy patterns, albeit to a lesser degree, were the presence of threadfin shad (*Dorosoma petenense*, a non-native competitor) as well as an index of predation intensity developed by fisheries experts. Further, the study utilized unique methods to examine factors that affected the ability of the trawling surveys to detect delta smelt. Detection probability is important to consider when using physical capture sampling gears, because it results in less biased estimates of occupancy. They were able to determine that decreased water clarity in the Sacramento-San Joaquin Delta, a hypothesized contributor to the species' decline, likely does not affect habitat use, but may make it more difficult for biologists to effectively detect delta smelt during sampling events.

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FISHBIO vessel in front of the Golden Gate Bridge in San Francisco, California.

This is not the only recent study to examine the role of X2 as a management tool for delta smelt. Given the precipitous decline in the population over the last few decades despite intensive management efforts, it appears that additional data collection efforts and management tools may be warranted. Due to their rarity, delta smelt are notoriously difficult to capture in typical trawl samples. This study suggests that it may be beneficial to further investigate changes to existing methods for capturing delta smelt that provide a more accurate representation of population status and habitat occupancy. The authors of this study also suggest continuous monitoring of food web dynamics in the Bay-Delta to assess how predation, competition, and the presence of invasive species impact delta smelt. More importantly, future management strategies should focus on increasing habitat quality in regions where delta smelt occupancy probabilities have been consistently high in spring and autumn, including Cache Slough, the lower Sacramento River, and Suisun Bay. Shifting focus from X2-centered management and exploring other factors influencing habitat availability and quality may ultimately be the best path forward for delta smelt recovery and research efforts.

Header Image: Delta smelt individual in a glass jar.
Image by Laura Mahoney, USFWS.

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Blank