

CITY OF SANTA CRUZ
City Hall
809 Center Street
Santa Cruz, California 95060



WATER COMMISSION

Regular Meeting

May 1, 2023

Updated May 1, 2023 - Item 5

7:00 P.M. GENERAL BUSINESS AND MATTERS OF PUBLIC INTEREST, COUNCIL
CHAMBERS

Please note: As of March 1, 2023, participation in meetings for City Advisory Bodies is in-person only. Members of the public can continue to stream the audio for the meetings from the City's website, however public comment will no longer be taken virtually and those wishing to address the board must be in attendance at the location provided on the agenda.

The City of Santa Cruz does not discriminate against persons with disabilities. Out of consideration for people with chemical sensitivities, please attend the meeting fragrance free. Upon request, the agenda can be provided in a format to accommodate special needs. Additionally, if you wish to attend this public meeting and will require assistance such as an interpreter for American Sign Language, Spanish, or other special equipment, please call Water Administration at 831-420-5200 at least five days in advance so that arrangements can be made. The Cal-Relay system number: 1-800-735-2922.

APPEALS: Any person who believes that a final action of this advisory body has been taken in error may appeal that decision to the City Council. Appeals must be in writing, setting forth the nature of the action and the basis upon which the action is considered to be in error, and addressed to the City Council in care of the City Clerk. Appeals must be received by the City Clerk within ten (10) calendar days following the date of the action from which such appeal is being taken. An appeal must be accompanied by a fifty dollar (\$50) filing fee.

Agenda and Agenda Packet Materials: The City Council agenda and the complete agenda packet containing public records, which are not exempt from disclosure pursuant to the California Public Records Act, are available for review on the City's website: <https://www.cityofsantacruz.com/government/city-departments/water/city-water-commission> and at the Water Department located at 212 Locust Street, STE A, Santa Cruz, California, during normal business hours.

Agenda Materials Submitted after Publication of the Agenda Packet: Pursuant to Government Code §54957.5, public records related to an open session agenda item submitted after distribution of the agenda packet are available at the same time they are distributed or made available to the legislative body on the City's website at: <https://www.cityofsantacruz.com/government/city-departments/water/city-water-commission> and are also available for public inspection at the Water Department, 212 Locust Street, STE A, Santa Cruz, California, during normal business hours, and at the Council meeting.

Need more information? Contact the Water Department at 831-420-5200.

Call to Order

Roll Call

Statements of Disqualification - Section 607 of the City Charter states that...All members present at any meeting must vote unless disqualified, in which case the disqualification shall be publicly declared and a record thereof made. The City of Santa Cruz has adopted a Conflict of Interest Code, and Section 8 of that Code states that no person shall make or participate in a governmental decision which he or she knows or has reason to know will have a reasonably foreseeable material financial effect distinguishable from its effect on the public generally.

Oral Communications

Announcements

Consent Agenda (Pages 1.1 - 4.2) Items on the consent agenda are considered to be routine in nature and will be acted upon in one motion. Specific items may be removed by members of the advisory body or public for separate consideration and discussion. Routine items that will be found on the consent agenda are City Council Items Affecting Water, Water Commission Minutes, Information Items, Documents for Future Meetings, and Items initiated by members for Future Agendas. If one of these categories is not listed on the Consent Agenda then those items are not available for action.

1. City Council Actions Affecting the Water Department (Pages 1.1 - 1.2)
Accept the City Council actions affecting the Water Department.
2. Water Commission Minutes from March 6, 2023 (Pages 2.1 - 2.8)
Approve the March 6, 2023 Water Commission Minutes.
3. Recommendation on 2023 Peak Season Water Supply Outlook (Pages 3.1 - 3.11)
Recommend no water restrictions for the 2023 Demand Season.
4. Updated Working Draft 2023 Water Commission Work Plan (Pages 4.1 - 4.2)
Accept the 4/14/2023 updated working draft of the Water Commission's 2023 Work Plan.

Items Removed from the Consent Agenda

General Business (Pages 5.1 - 6.13) Any document related to an agenda item for the General Business of this meeting distributed to the Water Commission less than 72 hours before this meeting is available for inspection at the Water Administration Office, 212 Locust Street, Suite A, Santa Cruz, California. These documents will also be available for review at the Water Commission meeting with the display copy at the rear of the Council Chambers.

5. FY2024 O&M Budget and Capital Program First Look (Pages 5.1 - 5.31)

1) That the Water Commission review and provide feedback to staff on the Water Department's Proposed Fiscal Year (FY) 2024 Operating and FY 2024-28 CIP Budgets (Budgets), including an updated multi-year Pro Forma integrating information about the Water Department's Budgets and financial position.

2) That the Water Commission recommend the Chair work with staff to finalize a letter to the City Council related to the Water Department's FY 2024 Budgets and financial position recommending the Water Department's Budgets to the City Council based on Commission input. This letter will accompany other budget-related materials and will be included in the June 2023 agenda packet when the City Council is scheduled to adopt the FY 2024 Operating and FY 2024-28 CIP Budgets.

6. Water Supply Augmentation Implementation Plan Update (Pages 6.1 - 6.13)

A. Overview of Mid-County Groundwater Agency Groundwater Modeling and Project and Basin Optimization Study.

Receive information on work project modeling and optimization work underway under a GSP Implementation Grant for the Mid-County basin and provide feedback to staff.

B. Updated quarterly report format and content on water supply augmentation activities being undertaken in the development of the Water Supply Augmentation Implementation Plan (WSAIP)

Receive information about updated quarterly report format for water supply augmentation work, provide feedback to staff and take action to accept the new approach to quarterly reporting.

Subcommittee/Advisory Body Oral Reports

7. Santa Cruz Mid-County Groundwater Agency

8. Santa Margarita Groundwater Agency

Director's Oral Report

Information Items

9. Information Items (Pages 9.1 - 9.72)

Adjournment



WATER COMMISSION INFORMATION REPORT

DATE: 05/01/2023

AGENDA OF: 05/01/2023
TO: Water Commission
FROM: Rosemary Menard, Water Director
SUBJECT: City Council Actions Affecting the Water Department

RECOMMENDATION: That the Water Commission accept the City Council actions affecting the Water Department.

BACKGROUND/DISCUSSION:

March 14, 2023

3rd Quarter FY 2023 Water Department Capital Investment Program Transfer – Budget Adjustment (WT)

Resolution No. NS-30,118 was adopted amending the FY 2023 budget and transferring budget appropriations within the Water Department Capital Investment Program (CIP) to update various project budgets with current cost forecasts.

Newell Creek Instream Habitat Restoration – Large Woody Debris Project – Approval of CEQA Exemption, Plans and Specifications, and Authorization to Advertise for Bids and Award Contract (WT)

Motion **carried** to:

Motion carried to approve the Plans and Specifications for the Newell Creek Instream Habitat Restoration – Large Woody Debris Project (c701606) and authorize staff to advertise for bids and find the Project exempt under the California Environmental Quality Act. The City Manager is hereby authorized and directed to execute the contract as authorized by Resolution No. NS-27,563. The Water Director is authorized to execute change orders within the approved project budget.

March 28, 2023

Approval of \$127,730,000 Loan for Water Infrastructure and Finance Innovation Act Loan to Support Implementation of Approved Water Capital Investment Projects (WT)

Resolution No. NS-30,129 was adopted authorizing the City to enter into a loan agreement with the United States Environmental Protection Agency up to the amount of \$127,730,000 for projects in the Council-approved capital investment plan (Graham Hill Water Treatment Plant (GHWTP) Facility Improvements Project, Newell Creek Pipeline Replacement (Felton to GHWTP) Project, University Tank 4 Project, and Aquifer Storage and Recovery (ASR) Project) and authorize the City Manager to execute the loan agreement and related documents, in forms approved by the City Attorney, and pay all closing costs.

April 11, 2023

Meter Replacement Project – Notice of Completion (WT)

Motion **carried** to accept the work of Utility Partners of America, Inc. (Greenville, SC) as complete per the agreement and authorize the filing of a Notice of Completion for the Meter Replacement Project and to authorize the Water Director to sign the Notice of Completion as the Owner’s Authorized Agent.

Ratify Purchase Orders with Core & Main LP, Ferguson Enterprises, Iconix Waterworks, and Pace Supply for Water Distribution Parts and Materials (WT)

Motion **carried** to ratify purchase orders exceeding the formal bid limit for Core & Main LP (St Louis, MO), Ferguson Enterprises LLC (Newport News, VA), Iconix Waterworks Inc. (Snohomish, WA), and Pace Supply (Santa Clara, CA) for Water Distribution parts and materials as needed.

April 25, 2023

Approval of Contract Amendment No. 1 – Soquel Avenue Main Replacement with MNS Engineers, Inc. for Construction Management Services (WT)

Motion **carried** to:

- Approve Contract Amendment No. 1 - Soquel Avenue Main Replacement with MNS Engineers, Inc. (Santa Barbara, CA) in the amount of \$151,740 and to authorize the City Manager to execute Contract Amendment No. 1 in a form approved by the City Attorney; and

Authorize the Water Director to approve change orders with MNS Engineers, Inc. in a form to be approved by the City Attorney and for amounts that are within the approved adjusted budget.

PROPOSED MOTION: Accept the City Council actions affecting the Water Department.

ATTACHMENTS: None.



Water Department

Water Commission
7:00 p.m. – March 6, 2023
Council Chambers
809 Center Street, Santa Cruz

Summary of a Water Commission Meeting

Call to Order: 7:00 PM

Roll Call

Present: J. Burks (Chair); T. Burns; M. Duncan-Merrell; D. Engfer (Vice Chair); A. Paramo; G. Roffe; and S. Ryan.

Absent: None

Staff: R. Menard, Water Director; D. Baum, Water Chief Financial Officer; Z. Bean, Associate Planner II; C. Berry, Watershed Compliance Manager; H. Cagliero, Administrative Assistant III; C. Coburn, Deputy Director/Operations Manager; K. Fitzgerald, Management Analyst; M. Kaping, Principal Management Analyst; H. Luckenbach, Deputy Water Director/Engineering Manager; and Sarah Perez, Principal Planner.

Others: D. Mitchell, Consultant at M. Cubed

Presentation: None.

Statements of Disqualification: None.

Oral Communications: None.

Announcements:

Water Director Menard announced Holly Cagliero as the new administrative staff person to the Commission.

Consent Agenda:

Item 3 was pulled for further discussion.

1. City Council Items Affecting the Water Department
2. Water Commission Minutes from February 6, 2023

Commissioner Ryan moved approval of the Consent Agenda, with the minutes of the February 6th meeting revised as suggested by Chair Burks' comments as amended. Commissioner Burns seconded.

VOICE VOTE: MOTION CARRIED
AYES: All
NOES: None
DISQUALIFIED: None

Items removed from the Consent Agenda

3. 2nd Quarterly FY 2023 Financial Report (Pages 3.1 – 3.3)

The fund balance in Fund 711 is significantly less than last year at this time, can you please explain the variability between years and how \$8.6 million target for Fund 711 will be reached by the end of the fiscal year?

- There are a few reasons that the fund balance in Fund 711 is lower than last year at this time. The most significant is that the line of credit was paid down by \$5 million in December using fund balance. This payment was made because the short-term interest rate market had increased to about 5% from 0.6% when we first took out the line of credit in June 2021. We felt it was a good time to use funds available in Fund 711 to reduce the draw on the revolving line of credit, recognizing that we still have about \$30 million in funds in other reserve funds.
- An additional reason is that the Long-Term Financial Plan calls for covering about 85% of our planned capital expenditures for our Capital Investment Program using debt, which means that if we're using debt instruments that are based on being reimbursed following expenditures, our cash balances will vary over time. For example, we are in the process of completing a WIFIA loan application with the EPA for \$125 million. The WIFIA loan has a more favorable interest rate of 3.6% for long-term financing than market rate debt, which currently carries interest rates of about 5%. As is the case with state revolving loan funds, WIFIA is a reimbursement-based loan, and we have about \$15 million in costs related to the projects proposed for funding via the WIFIA loan that we can recover once the WIFIA loan closes.

Is the \$15 million of reimbursable costs in the CIP owed from claims we have already filed on the SRF loans or is that an additional \$15 million?

- The \$15 million are costs that have been incurred for the WIFIA loan. They are eligible for reimbursement from the WIFIA loan proceeds.

Is the \$6.3 million in Fund 715, system development charges, an ongoing cumulative number or is it funds we have received in this fiscal year?

- That is a cumulative number-it builds up over time from new development in the community and connection fees. The funds generated are to be used for expansion of the water system and also funds rebates for water conservation.

How are staff vacancies affecting operations?

- We've been actively working to fill our vacancies and have filled many positions by promoting existing employees. This is really great for those promoted, but produces vacancies that then have to be filled.

We also have a couple of staff out on long-term disability and that has been somewhat challenging, particularly in one of the Operations positions. We just received approval last month in the mid-year update to double-fill a key operating position that has been vacant due to a long-term disability for a year already and is expected to be vacant for at least another year.

Finally, some of the biggest challenges we have been facing have been in the IT area. We lost our SCADA Network Systems Administrator last year and haven't yet backfilled that position so we are trying a slightly different approach and have recently added a more generalist position of Network Systems Administrator and created a new SCADA Analyst position that we're going to be filling in the next few months.

How are the vacancies affecting department morale or otherwise impacting staff?

- It's been a rough three months with the storms, especially coming over the winter holiday-that's been a really big challenge. People are feeling stretched very thin and there is a certain level of exhaustion, but staff also find the work very engaging-it's diverse and it's challenging. We find that these characteristics are helping keep people going even when times are tough.

No public comments were received.

Vice Chair Engfer made a motion to support staff's recommendation on item 3. Commissioner Ryan seconded.

VOICE VOTE: MOTION CARRIED
AYES: All
NOES: None
DISQUALIFIED: None

General Business

4. Updated Water Demand Forecast

R. Menard introduced Sarah Perez and David Mitchell from M-Cubed for the presentation and discussion of revised housing assumptions that have been integrated into an updated 2020-2045 Long Term Water Demand Forecast.

How do the Regional Housing Needs Allocation (RHNA) Plan numbers fit into this?

- The RHNA Plan assigns minimum housing allocations that must be zoned for by local jurisdictions to accommodate new housing units during the 6th RHNA cycle. The demand forecast did not use the actual number of housing units assigned to Santa Cruz and its water service area. This is because RNHA Plan allocations do not dictate that housing units be developed, rather, jurisdictions have to demonstrate that they have adequate zoning to accommodate the number of housing units assigned.

The housing numbers used in updating the water demand forecast were pulled from existing plans such as the Downtown Expansion Plan, the Capitola Mall and 38th Avenue redevelopment plans, the University of California Santa Cruz (UCSC) 2021 Long Range Development Plan (LRDP), and the County's recently completed Environmental Impact Report for its Sustainability Plan Update. Also included are housing figures from other projects that are pending, planned, approved, or under construction.

Is it correct that 6th cycle 2022 RHNA numbers were already included in the base 2020 numbers? If the 6th cycle RHNA numbers are built into your base, are these numbers being counted twice?

- We didn't build the RHNA Plan allocations into our base or count them twice. We used existing housing units as our base. We then calculated the housing projection by adding all the units that have been identified in current planning documents over the timeline of the demand forecast. Based on coordination with local jurisdictions, we understand that the units identified in the planning documents are consistent with the 6th cycle RHNA Plan.

Is the reference made to the AMBAG 2022 Regional Growth Forecast referring to the population forecast or did it include the RHNA numbers?

- The AMBAG 2022 Regional Growth Forecast population forecast used in the previous demand forecast update was developed before the 6th cycle RHNA Plan's housing allocations were finalized.

When creating a forecast like this, do you base calculations on population, AMBAG projections of population change, and housing units?

- The previous forecast was based on the AMBAG Regional Growth Forecast population numbers, while this forecast was based on planned development. Population and housing units come together in these projections.

How is all of this new growth going to be accommodated?

- Most likely through multi-family housing.

Did you use the same water use factor per residence when it was single-family versus multi-family?

- No, multi-family uses less water which is why we can have this increase in dwelling units but we don't have a proportionate increase in water use.

Did you use the same water factor for ADUs as for multi-family residences?

- Yes. We don't have a lot of information on ADU water use so for this update we have assumed they are using the same water per unit as multi-family residences.

Is there an advantage in splitting ADU and multi-family into separate categories in light of the fact there isn't much data available on ADUs?

- In general, when looking at data, it is better to start with disaggregated numbers and then reaggregate as needed. It is very difficult to disaggregate data after the fact. The ADU and multi-family data was aggregated together because it was easier to put into tables that

way. For the purposes of the housing stock, part of this large increase is associated with estimates of how ADU development will occur in the future.

One of the challenges with respect to ADUs is that in order to keep the cost of ADU development down, separate services are not set up for them. In most cases, the property's current meter capacity is more than adequate to serve the original home and the ADU. Individual property owners may choose to submeter the ADU on their property, but the City's policy is not to become involved in submetering, so collecting data on ADUs will not be an easy thing to do.

Is there a way to get data on ADUs in the case of future drought curtailment calls? If ADUs become popular here, could it affect or complicate rate design?

- The residential drought curtailment program is currently based on an average household size of three. This program is structured so that water allocation is dependent on the number of residents, not on the number of housing units per meter. The resident can file to request additional water if the total number of people on the property exceeds the base average household size, and this allows for adjustment of the allocation per meter so that it is reflective of the number of people living at that location. The question regarding rate structure is a different question.

Can you explain the assumption for zero ADUs in unincorporated County?

- The information provided to us didn't have estimates for ADUs in unincorporated County.

On page 4.11 of the agenda packet, it appears you used a vacancy rate of about 7%, is this correct? What difference would changes in the vacancy rate calculation have on the water demand projection?

- The vacancy rate assumption comes straight from the California Department of Finance for the City of Santa Cruz, City of Capitola, and unincorporated County. The rates for this area are somewhat high, but they are consistent in the Department of Finance projections and estimates for the vacancy rates of this area of California.

The Commission will be provided an updated demand forecast report including a sensitivity analysis of the vacancy rates assumptions when the Downtown Expansion Plan Environmental Impact Report is released.

Has the benchmark used for calculating hotel room water use per year been updated since 2000 to take into account plumbing code changes and changes to other rules and guidelines?

- That benchmark has not been updated. The amount of variance on hotel room water usage is probably quite large. If hotel room water use is a desired area of focus, the best thing would be to identify and pull meter records from hotels in City of Santa Cruz and then find out the number of hotel rooms for each hotel respectively in order to calculate estimates of local hotel room usage. We were provided a water factor, and we back checked that water factor against industry standards since the hotel room usage did seem high.

Is UCSC projecting an increase in student enrollment of 10,000 with no net-increase in water use in their 2021 LRDP?

- In the 2021 LRDP used for this demand forecast update, UCSC is projecting an additional 192 million gallons of annual water use over their 20-year horizon, mostly driven by new housing on campus-the projection includes approximately 3000 new units of campus housing. The reference to no net-increase in water use may be from the 2005 LRDP which had a base number of around 160 million gallons per year and projected 349 million gallons per year by 2020. In this instance, there was an increase of 10,000 students and usage did not change at all due to modifications such as advanced meters to better identify leaks and retrofitting older facilities with low-volume shower heads and faucets.

What was the purpose of performing this update? Are you using these numbers for the Water Supply Augmentation Projects?

- We performed this update because there is much development being discussed in the community and we wanted to be prepared with this information as we knew that the question of water demand and growth would be raised. Additionally, this information will be used for the Downtown Expansion Plan Environmental Impact Report which under development at this time.

How were the water factors developed for the commercial spaces?

- The commercial and office space water factors were provided to us and are consistent with the factors that the City's Planning and Community Development Department use for environmental analyses.

Can you explain why the miscellaneous loss category went up in the updated projections?

- The losses were adjusted in proportion to total production-it is fairly standard to scale losses by production, and since production went up, the losses went up by the same percentage amount.

How do the various City departments and staff work together to ensure that codes get implemented?

- The Planning and Community Development Department as well as Water Department staff review plans for compliance with a whole range of plumbing, building, and landscaping codes. In addition, inspections are performed to ensure code compliance and various other departments and utilities providers also perform plan checks and inspections. Staff performing these reviews are well versed in current codes and the codes are routinely updated-a significant effort is made on an ongoing basis to ensure code compliance.

No public comments were received.

5. Update on the 2023 San Lorenzo River and North Coast Watersheds Sanitary Survey

R. Menard introduced Zeke Bean for the presentation and discussion of work on the 2023 San Lorenzo River and North Coast Watersheds Sanitary Survey.

Regarding the CZU Fire, you indicated in the report that drinking water sources so far are uncontaminated in large part due to proactive cleanup and erosion control response by the EPA, the County, Santa Cruz County Resource Conservation District, San Lorenzo Valley Water District, and the City-is this an ongoing effort to replace or maintain any of the erosion control?

- In immediate response to the fires, the EPA came in and did a one-time assessment on the level of contaminants and performed a two-phase clean up—first they performed an initial cleanup and then came back and did a more focused cleanup.

Santa Cruz County Resource Conservation District, a nonregulatory government agency, has an ongoing program to work with property owners on erosion control as well. It is incentive-based and works with landowners. We as a City do not go in and do cleanup events or focused surveys of areas where there may be contaminants.

Do we deploy or use any nitrate-specific treatment processes at the water treatment plant in response to the level of nitrates present in this report?

- No, it's not a target-nitrates aren't really a problem for us since our numbers have never reached the 10 mg/L MCL (Maximum Contaminant Level). The nitrate issues we have are more related to impacts to the aquatic ecosystem and to taste and odor concerns for treated drinking water if nitrates are present but below the 10 mg/L MCL.

Is it possible to quantify the impacts of homeless encampments on water quality? Was there any difference between this Sanitary Survey and the one from 5 years ago regarding impacts from encampments?

- This report specifically looked at existing data. It can be speculated that when there are encampments with latrines right in the riparian zone that they are having an impact but we haven't done specific measures of them at this time.

Even though we have met our source water protection program goals over time, is there an area that could be a potential future concern?

- With all the homes that were destroyed in the CZU fire, there is a strong desire to rebuild at as low a cost as possible and one potential area of concern is the rebuilding of structures without replacement of older septic systems. Many of the septic systems in that area were initially installed 50-60 years ago and it is really important to update them and make them modern systems.

Another concern is that many of those homes were also built right in the riparian zone and there is pressure to allow these to be rebuilt, which is a challenge to allow without impact to the watershed.

Do you perform sanitary surveys for the other source watersheds?

- This sanitary survey includes San Lorenzo and North Coast watersheds. The focus of this presentation was primarily on the San Lorenzo watershed because it is our largest watershed and is the most impacted.

Can staff share the document on slide 13, the San Lorenzo River Conservation Program report?

- We can provide that report to the Commission.

No public comments were received.

Subcommittee/Advisory Body Oral Reports

8. Santa Cruz Mid-County Groundwater Agency (MGA)

The Santa Cruz Mid-County Groundwater Agency is meeting next week on Thursday, March 16th and the agenda will be focused mainly on administrative matters and will include initial planning to process the update to the Mid-County Groundwater Plan which is due for submittal to the State by January 2025.

9. Santa Margarita Groundwater Agency (SMGWA)

The next meeting for the Santa Margarita Groundwater Agency will be on March 23rd and the agenda will mostly be administrative and will include the annual report.

Director's Oral Report:

The Department is working with Representative Panetta and the two Senate offices in the coming weeks to put together earmark proposals for Congressionally Designated Spending.

The Water Supply Forecast will be provided to the Commission at the April 3rd meeting as an informational item and it will be going to Council as an FYI since the Department is not proposing or recommending any water use restrictions this year.

Information Items: The Commission received and discussed informational items from Water Director Menard that were included in the agenda packet.

Adjournment: The meeting was adjourned at 9:04 PM.



Water Commission Staff Report

DATE: March 22, 2023

AGENDA OF: May 1, 2023
DEPARTMENT: Water
SUBJECT: 2023 Annual Water Supply and Demand Assessment
PREPARED BY: Benjamin Pink, Environmental Programs Analyst

RECOMMENDATION: Recommend no water restrictions for the 2023 Demand Season.

BACKGROUND:

Every year during the winter season, the Water Department monitors local rainfall, runoff, and reservoir storage levels and prepares near-term water supply assessments that describe current water conditions and discuss the water supply outlook for the year ahead. Towards the end of winter, an analysis is conducted to forecast water supplies, compare supplies with expected demands, and project how much water would be available in Loch Lomond Reservoir at the end of the dry season given anticipated fish flow releases, demand, and available supply. The reason for performing this exercise is to determine whether any restrictions on water use are needed in the current year to help preserve reservoir storage in case of a subsequent dry year. For example, such restrictions were put in place as recently as 2021 and 2018 as well as every year between 2012 through 2015 in response to historic drought conditions at that time.

In stark contrast to the above-mentioned drought years, water year 2023 (WY2023) is turning out to be historically wet. As of the date of this report, California has been hit by a total of twelve atmospheric river (AR) events so far this water year. A total of fourteen major storm events (including the ARs) have hit the Santa Cruz region thus far. The twelfth AR hit the area starting Monday, March 20th and brought intense wind and rain again to our region which had already been inundated from previous storm events. This latest event caused major power outages and caused wind-related damage across the San Francisco Bay Area. The previous AR event which hit our region March 10th through March 13th resulted in serious flood damage including a levee breach on the Pajaro River, the flooding of thousands of homes, and forcing mass evacuations. While the water year 2017 may have seen higher rainfall in certain months (January and February in particular), WY2023 has been notable for the persistent nature of rainfall, spanning

December through the present (late March). The wet season is not over yet and total precipitation for this water year, 47.33 inches, is nearing the water year total (51.1 inches) for 2017.

This water supply and demand assessment is using the starting point of having a reservoir that is 100% full in late March. This represents approximately 2.86 billion gallons (BG) in stored water that can be used later in the season if flowing surface water sources are diminished. The amount of water that is expected to be used from the reservoir this peak season is approximately 175 million gallons. Given these facts, even a very conservative modeling of supply and demand produces a result in which the reservoir is not likely to go below approximately 88% of capacity by the end of the peak season (October 31st).

DATA INPUTS:

The key data inputs to the annual water supply and demand assessment include the following:

1. Monthly and cumulative rainfall, both in the City and the watershed area;
2. Reservoir storage, specifically the lake elevation at the time of forecast;
3. Cumulative runoff for the San Lorenzo River and the corresponding water year classification;
4. The instream flows that the City has voluntarily committed to provide on the North Coast sources and the San Lorenzo River to maintain habitat for protected fisheries, which governs the diversion, availability, and use of water from these sources for municipal purposes; and
5. Projected water demand.

All the factors described above are incorporated into a model that produces one of the key results of the analysis: a projection of Loch Lomond reservoir elevation at the end of the water year (Figure 6). The result of the water supply scenario from the model is also attached (Figure 5).

HYDROLOGIC DATA:

In terms of monthly precipitation, as of March 22nd, for the month of March Santa Cruz has received 8.29” of rain, compared to the long-term average for the month of 4.56” (Figure 1). Cumulative precipitation thus far is 47.33” (Figure 2) which represents 175% of the long-term average for the water year to date. As of March 22nd, the watershed station at Loch Lomond Reservoir has received a total of 63.48” inches of rainfall.

Mean monthly stream flow for the San Lorenzo River is shown in Figure 3. In this figure, you can see the differences in the current water year compared to WY2017 and also compared to the long-term average. The cumulative runoff amount as of March 23rd was 206,630 acre-feet and this is shown in Figure 4. This amount puts the water year squarely in the wet category. Will the end of this water year total eclipse the total for the very wet year 2017, which had a total of 293,221 acre-feet? It remains to be seen, but it is indeed possible.

DISCUSSION AND PRODUCTION CONSIDERATIONS:

On the production side, the amount of water predicted to be available this summer from North Coast sources is better than in the past few years. The most notable difference this year is that surface water availability is overall much better than recent years, and this will enable us to utilize water from Laguna Creek. For the last several years, the final water supply and demand assessment has not included any water from Laguna Creek or Majors Creek. This year, Laguna may be available as a source of supply. Majors, however, will likely be unavailable again this year. The reason for this is that it has been reported that there is a lot of sediment behind the dam and supply won't be available until the diversion has been dug out. This may occur in mid-August, but for the sake of this assessment, no water will be counted from this source. Additionally, while water will likely be available from Laguna Creek, this assessment takes a conservative modeling approach and does not include any of that water either. If Laguna is used as a source, the outcome of the assessment will be even better in terms of overall supply and end of year reservoir level.

Water availability from flowing sources should be particularly good compared to recent years. The City relies on river and stream flows for the majority of its water supply and the yield of those sources typically tends to slowly decline over time once the wet season ends and the season progresses into summer and early fall. This year, surface water should generally be available quite far into the summer as there will still be considerable base flow in the watershed of the San Lorenzo River even when the rain ends. In terms of instream flow releases on San Lorenzo River at Tait Diversion, for this assessment, we used a projected flow requirement for the wettest hydrologic condition. This equates to a rearing base flow of 18 cubic feet per second (CFS) in April going down to 13 CFS in October.

In terms of reservoir storage, in contrast to March of 2021 when reservoir storage was about 71% of capacity, this year we are starting with a completely full reservoir at 100%. The reservoir drawdown forecast model predicts that the reservoir will drop only to about 88% of capacity by the end of October, leaving approximately 2.6 billion gallons as carryover storage (Figure 6). This is clearly a much better situation than was the case in the last two years. Additionally, it should be noted that this is conservative modelling. As noted previously, no water was counted in the model from Laguna Creek, despite that it may be available. Additionally, only a relatively small amount of groundwater supply was used for the purpose of the model. This is because Beltz 12 well will not be operational this summer, and the Beltz water treatment plant will not be utilized until about July. Finally, no water was counted in the model as a supply from withdrawing Aquifer Storage and Recovery (ASR) water over the course of the summer. This is due to some uncertainty about the timing and quantity of both water to be injected over the next few months and then water to be withdrawn later in the season. Again, it is possible that ASR water will be available and withdrawn, but for conservative modelling no ASR water was used as a source of supply in this assessment.

Given these very conservative assumptions, the actual outcome in terms of end of year reservoir level may be even better than predicted here.

In terms of projected water demand, peak season demand in 2022 was higher than it had been the prior two years 2021 and 2020. Demand rebounded in 2022 from those two prior years in which demand was suppressed due to the Covid Pandemic. For the purposes of this assessment, peak season demand from 2022 was used to project demand for this upcoming peak season. There is no reason to believe that demand would be as low as it was during the Covid years, so 2022 seems like the most reasonable proxy for what to expect this year.

Figure 7 shows US Drought Monitor outlook dated 3/16/23. The outlook shows that a large part of California, including all of the central coast and Bay Area is now completely out of drought conditions entirely. This is a stark contrast from one year ago when the central coast and Bay Area was in classification D2 “Severe Drought.”

The 2023 Water Supply and Demand Assessment is provided in Figure 5, and projected reservoir drawdown is illustrated in Figure 6. The forecast from these water supply indicators is the basis for staff’s recommendation that no water restrictions be implemented for the upcoming 2022 peak demand season.

Overall, the water supply outlook for WY2023 is looking very good. Even with the very conservative modelling used in this supply and demand assessment, the end of season reservoir level is predicted to drop to only 88%. It may well end up being higher than that. In the water classification scheme that the Department uses for classification of hydrologic year type, WY2023 will go down as one of the wettest years on record and may end up exceeding the wettest year on recent record 2017.

ATTACHMENTS:

1. Figure 1 - WY2023 Monthly Rainfall
2. Figure 2 - WY2023 Cumulative Rainfall
3. Figure 3 - WY2023 Mean Monthly Stream Flow
4. Figure 4 - WY2023 Cumulative Runoff
5. Figure 5 - FY2023 Supply and Demand Assessment
6. Figure 6 - Projected Reservoir Drawdown
7. Figure 7 - Drought Monitor 3.16.23

Figure 1- Monthly Rainfall, City of Santa Cruz 3/22/2023

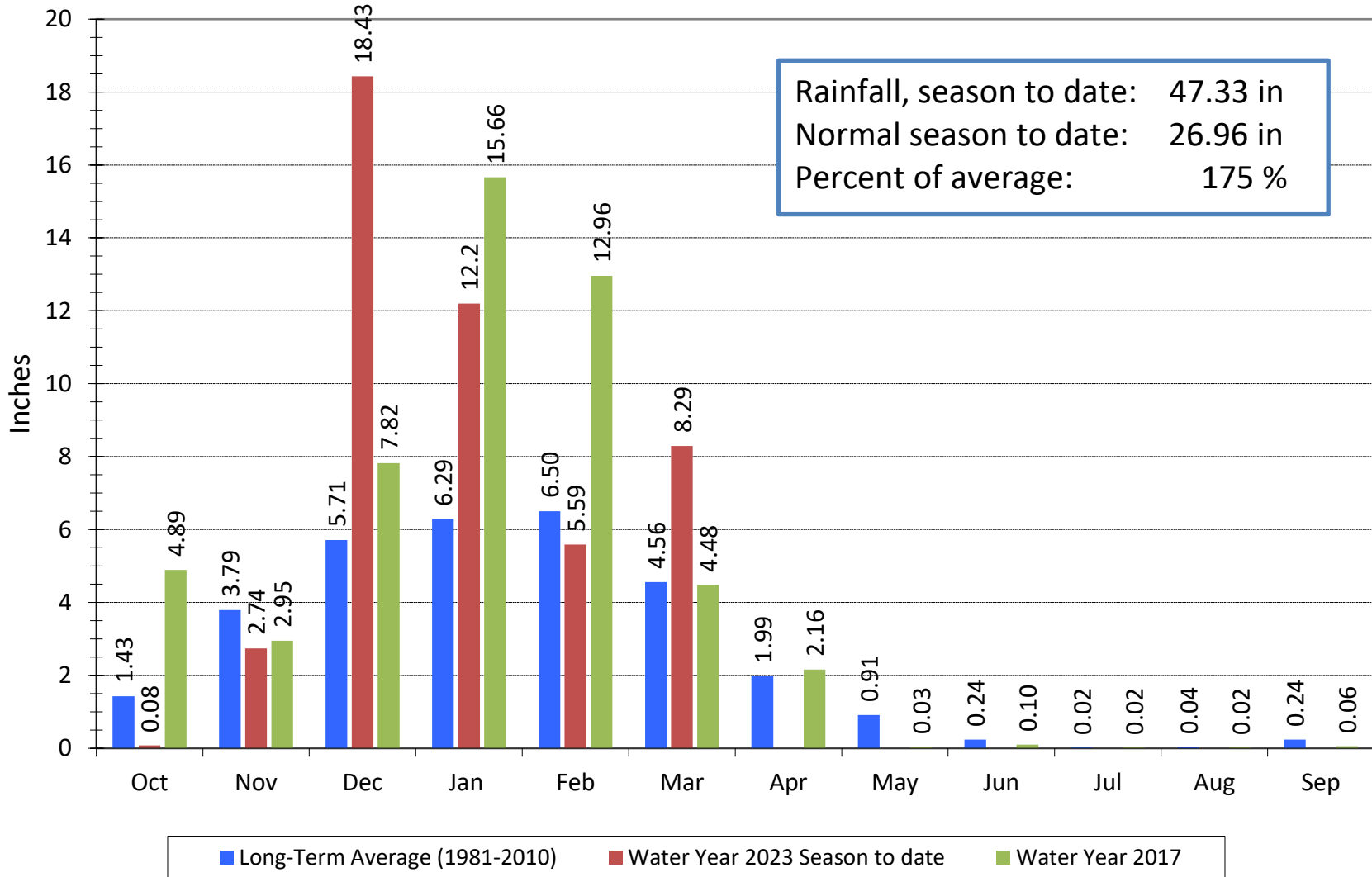
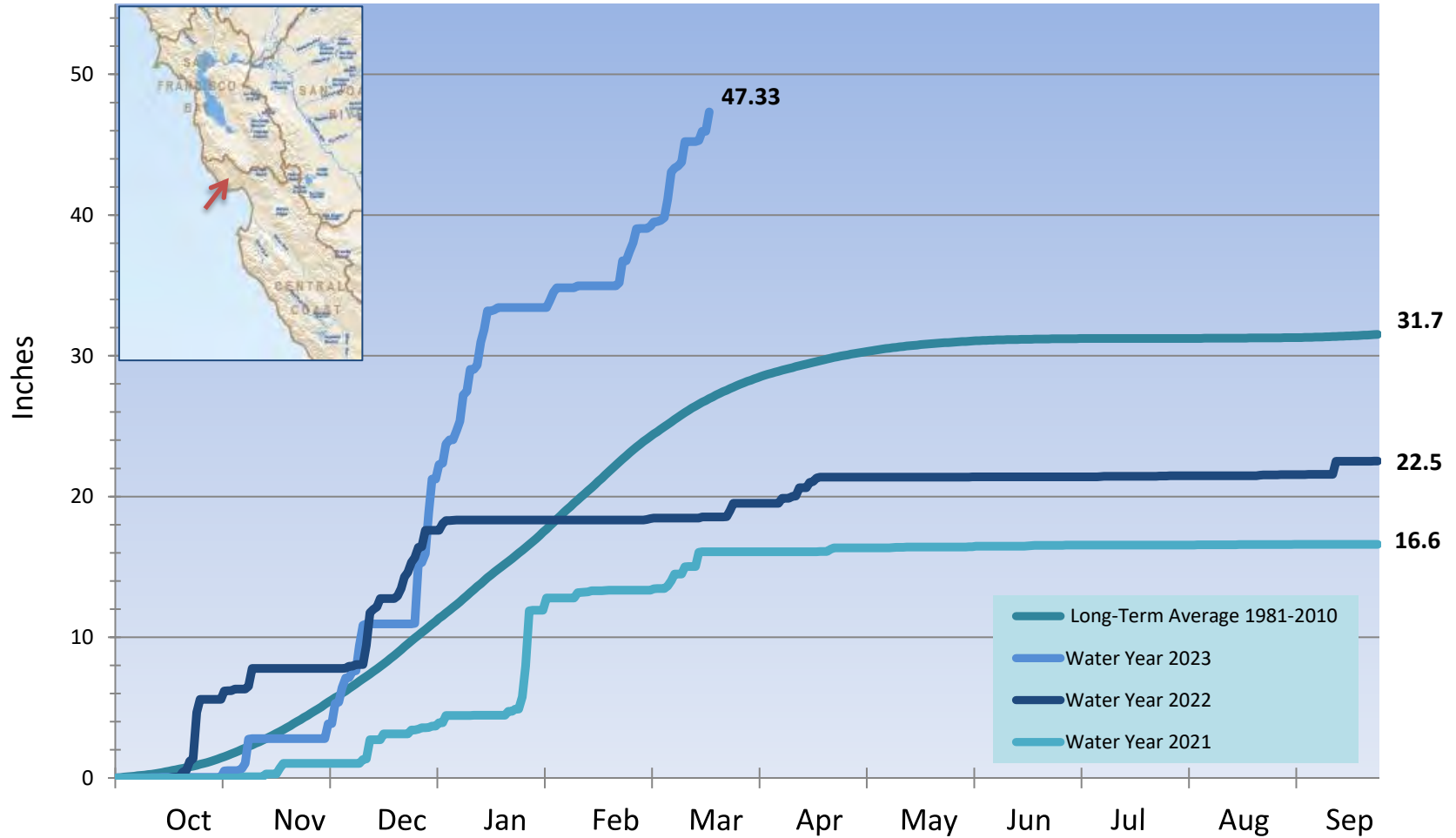
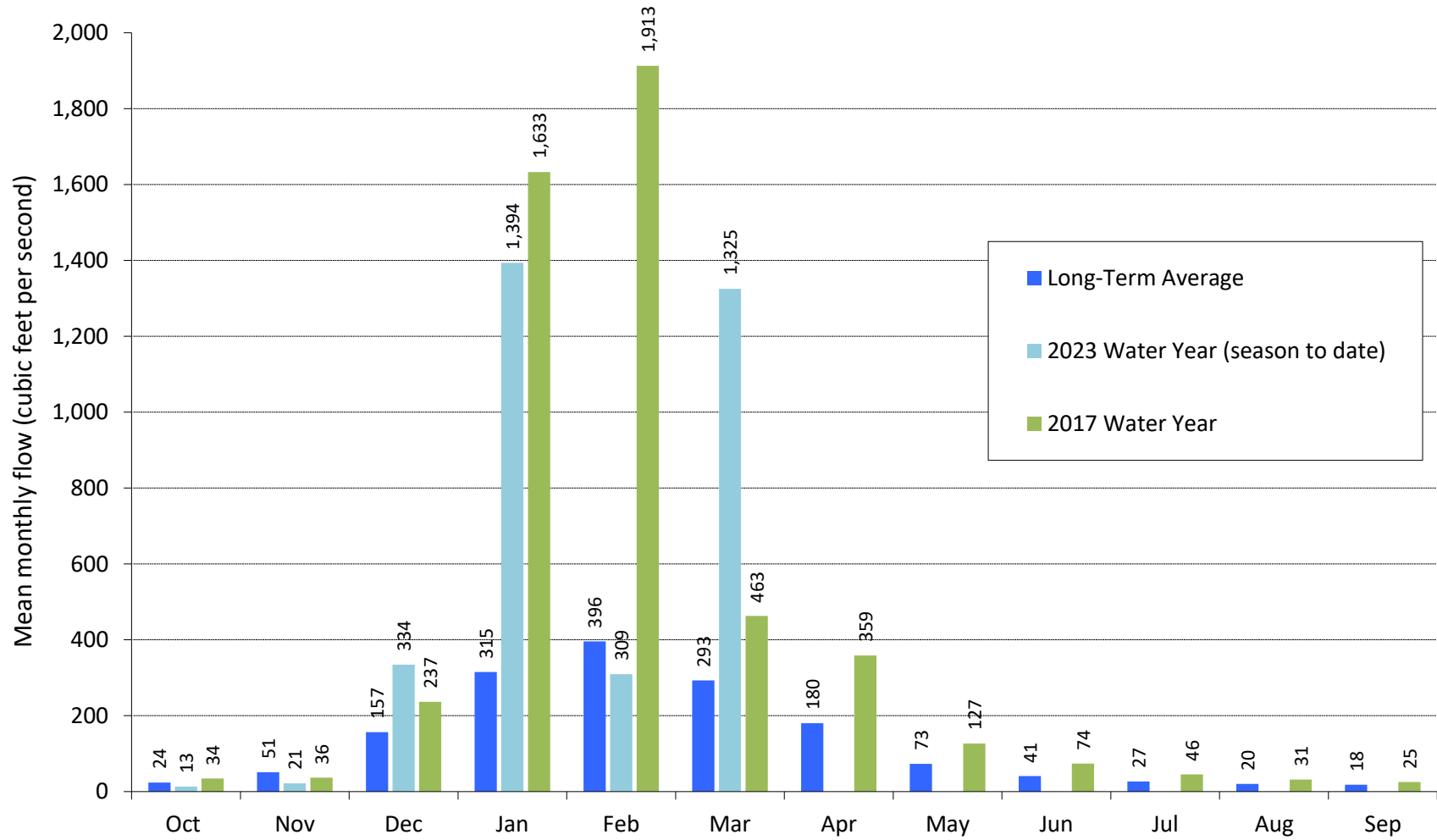


Figure 2- Cumulative Precipitation Santa Cruz, CA Water Year 2023

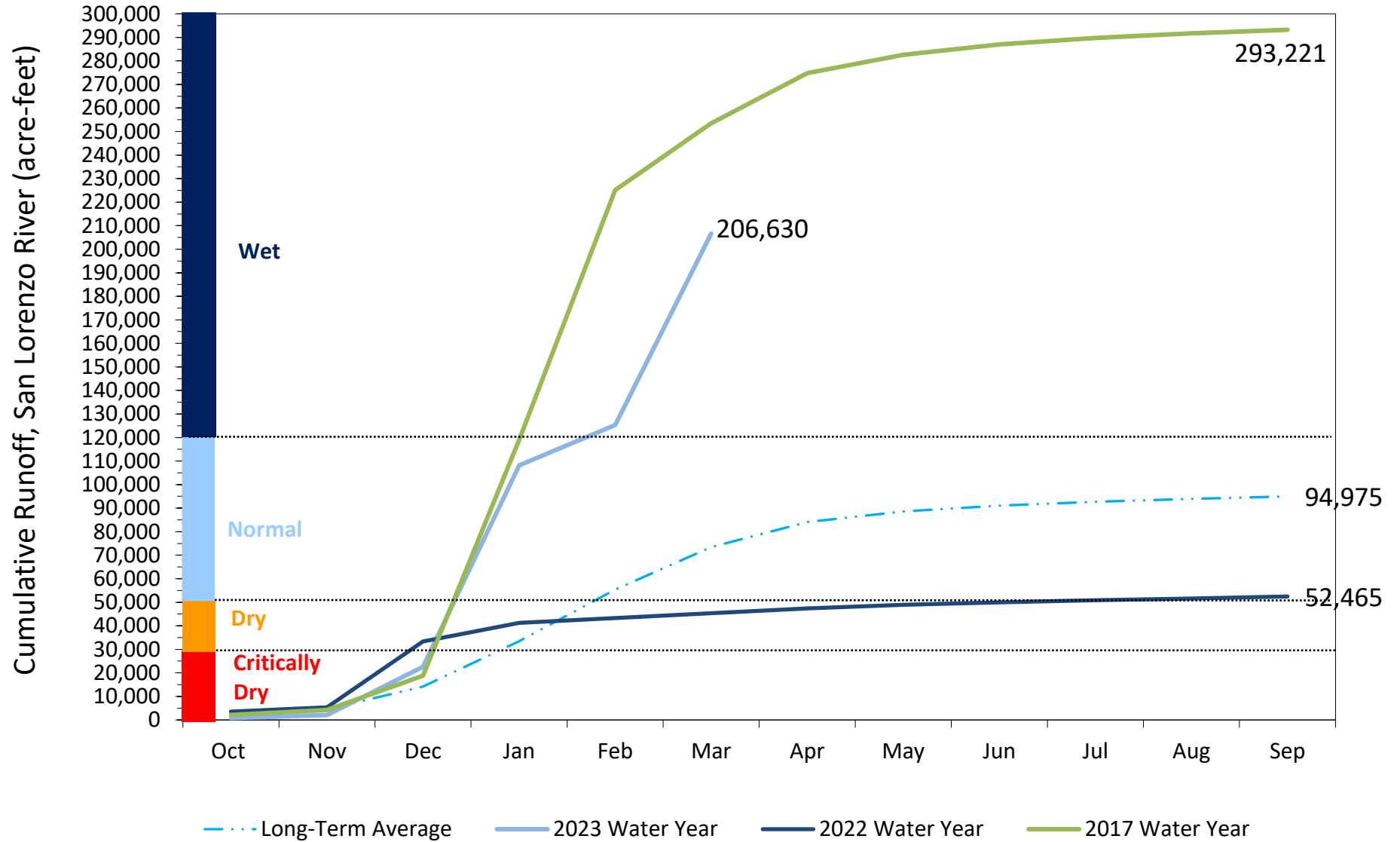
Rainfall, season to date (3-22-2023): **47.33 inches** (Percent of average: 175%)



**Figure 3-Mean Monthly Streamflow, San Lorenzo River at Big Trees
(cubic feet per second) -3/23/23**



**Figure 4- Cumulative Runoff and Water Year Classification, 3-23-2023
(acre-feet)- year to date**



2023 Water Supply Scenario No. 1

SCWD Production Forecast (million gallons)	April	May	June	July	August	September	October	Total
	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
North Coast (gross production)								0
North Coast (net production)	30	30	30	30	30	30	30	210
San Lorenzo River	225	225	225	225	130	130	50	1,210
Beltz WTP	0	0	0	15	15	15	15	60
Beltz 12	0	0	0	0	0	0	0	0
Ground Water Total	0	0	0	15	15	15	15	60
ASR Injected Water	0	0	0	0	0	0	0	0.0
Total Production without Lake	255	255	255	270	175	175	95	1,480
Projected System Demand (row 48)	197	198	209	221	210	219	192	1,445
Curtailed System Demand	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Beginning Lake Volume	2,860	2,830	2,804	2,774	2,741	2,671	2,596	
Projected Inflow from Newell Creek	12	7	3	4	3	2	6	38
Lake Production Needed to Meet Demand	0	0	0	0	35	44	97	175
Evaporation (feet)	0.2	0.3	0.3	0.4	0.4	0.3	0.2	2.1
Evaporation (mil gal)	9	13	13	18	18	13	9	93
Fish Release (mil gal)	20	20	20	20	20	20	20	140
End of Month Lake Volume	2,830	2,804	2,774	2,741	2,671	2,596	2,476	
End of Month Lake Elevation (ft above msl)	576.6	576.1	575.5	574.9	573.6	572.2	569.9	
Monthly change in elevation	-1.6	-0.5	-0.6	-0.6	-1.3	-1.4	-2.3	
Cumulative change in elevation	-1.6	-2.1	-2.7	-3.3	-4.6	-6.0	-8.3	
2023 Reservoir Storage - For Percent of capacity (%)	100	99	98	97	94	92	88	
2023 Reservoir Storage - Actual Storage, percent of capacity								

Date Forecast Finalized: Month __, 2022 By: **578.20 3/23/2023**

1 **Beginning lake level:**
 North Coast Gross: Assume 2020 gross production equal to Liddell Spring production in 2018, Laguna and Majors both unavailable this year due to fish bypas requirements and pipeline damage
 North Coast: North coast **net production** at coast pump station is 25% less than gross production due to leakage and sales

2 San Lorenzo River forecast flow **W 50**
 3 Releases at Tait Diversion: Hydrologic condition: **1**

Live Oak Wells: ASR injection through end of April. Then, May break. Beltz well system begin pumping June 1 per Terry. 450 gpm in June & July, 200 gpm Aug. Off in Sept&Oct. Beltz treatment plant 1MGD for 200 days

4 Level of Curtailment Imposed (May thru October): **None**
Projected unconstrained system demand: % of 2022: 100%

Assumptions for Newell Creek inflow into Loch Lomond Reservoir, (Line 17): **WET**
 Newell Creek Fish Release (line 15) - Normal release - 1.0 cfs

Actual

	April	May	June	July	August	September	October
Projected San Lorenzo River stream flow at Felton	246	105	60.5	40.1	27.4	23.3	21.1
Additional Inflow between Big Trees and Tait Diversion	1.0	1.0	0.5	0.5	0.0	0.0	0.0
Flow at Tait St Diversion (cfs)	247.0	106.0	61.0	40.6	27.4	23.3	21.1
Instream rearing flow release at Tait Diversion (cfs)	18.4	18.5	18.5	18.2	16.4	13.3	13.3
Release Buffer (cfs)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Available Flow (cfs)	228.1	87.0	42.0	21.9	10.5	9.5	7.3
Production (mg)	225.0	232.0	225.0	232.0	210.4	184.2	146.2
Bypass Release as % Total Flow @ Tait	7%	17%	30%	45%	60%	57%	63%

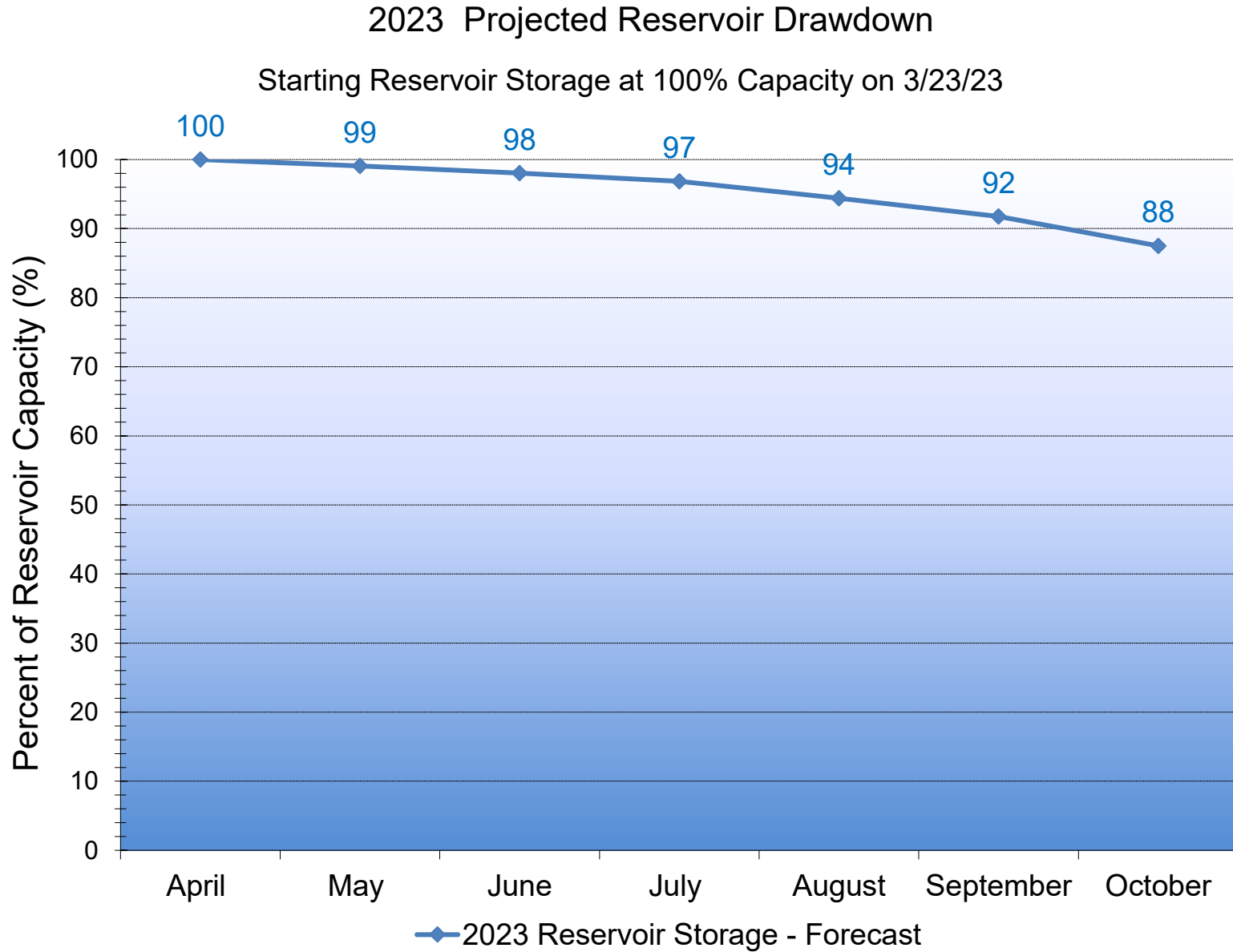
From May 1, 2019 Tolling Agreement Short-Term Flows, San Lorenz

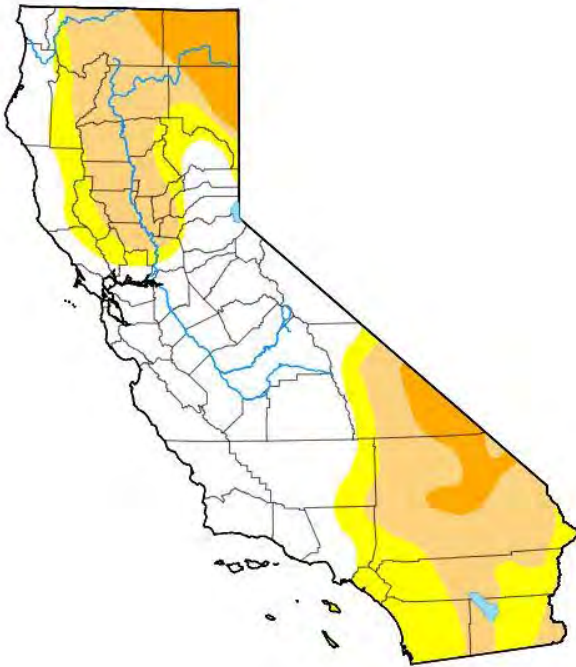
Actual Flow

Pleasure Point Monitoring Well Projected Groundwater Elevation (feet above MSL)

Estimated monthly demand (mg)	197.4	197.7	208.7	220.5	209.5	218.6	192.2	1,445
Estimated daily demand (mgd)	6.6	6.4	7.0	7.1	6.8	7.3	6.2	6.8

Figure 6

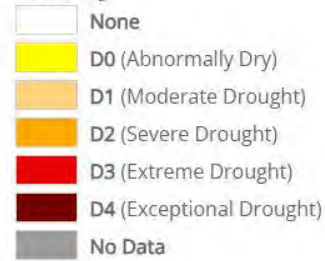




Map released: Thurs. March 16, 2023

Data valid: March 14, 2023 at 8 a.m. EDT

Intensity



Authors

United States and Puerto Rico Author(s):

Brad Rippey, U.S. Department of Agriculture

Pacific Islands and Virgin Islands Author(s):

Denise Gutzmer, National Drought Mitigation Center

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying **text summary** for forecast statements.*

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WORKING DRAFT

Water Commission Work Plan – February 2023 through December 2023

(4/14/2023)

Major Water Commission Work Plan Item	Anticipated City Council Action on Water Commission Recommendations
May 1, 2023	
➤ First Look, FY 2024 Budget and CIP	➤ May 23, 24, 2023 Budget Hearings on FY 2024 Budget
➤ Water Supply Augmentation Plan quarterly report format and content and overview of Mid-County Groundwater Basin modeling and project optimization work	➤ WSAIP anticipated to move forward for Council review and action in late 2024
June 5, 2023	
➤ Recommendation on FY 2024 Budget and CIP	➤ June 13 or 27 – Council action on FY 2024 Budget and CIP
➤ Informational item: Scotts Valley/Santa Cruz Intertie – project status and CEQA	➤
➤ 3 rd Quarter Financial Report	➤
July 17, 2023 (Tentative Rescheduled July 3rd meeting)	
➤	➤
August 21, 2023 (Tentative reschedule August 7 and September 4th meetings)	
➤ Possible Joint Commission with Parks and Recreation Commission and Water Commission to receive annual update on the City’s 2030 Climate Action Plan and work updating the Climate Adaptation and Local Hazard Mitigation plans	➤
➤ 2022 Water Quality Consumer Confidence Report and Santa Cruz Water Quality Lab Update	➤
➤ WSAIP Quarterly Report	➤
September 4, 2023 (Labor Day – Canceled)	
October 2, 2023	
➤ Customer Assistance Program Update	➤
➤ Anadromous Salmonid Habitat Conservation Plan Update and state and federal environmental document reviews	➤ October 24 – Council action on IS/MND and MMRP, and project approval
November 6, 2023	
➤ 4 th Quarter Financial Report	➤
➤ Overview, Santa Cruz Water Department education and interpretive programs, including work on potential repurposing the Department’s Nelson House facility in the Newell Creek Watershed to be an education/outreach/interpretative facility	➤
➤ Meter Replacement Project Final Report	➤
➤ WSAIP Quarterly Report	➤
December 4, 2023	
➤	➤
➤	➤

To Be Scheduled: Informational item on the state’s new Water Efficiency Reporting Framework

MAJOR WATER COMMISSION/WATER DEPARTMENT WORK PLAN ELEMENTS THAT OCCUR ON AN ANNUAL OR 5 YEAR ROUTINE CYCLE

Major Routine Water Commission Work Plan Item	Anticipated City Council or Other Agency Action
Routine Items Occurring Annually	
➤ February and April – Annual Peak Season Water Supply Assessment and recommended water emergency declaration for shortage curtailments if needed	➤ First Council meeting in April: Council action, if emergency curtailment is recommended,
➤ February – Annual review of Department work on the CIP (aka: Parade of Projects)	➤
➤ May and June, Annual review and recommendation on Budget and CIP	➤ Council budget hearings late May and Council budget action in June
➤ Quarterly progress/status reporting on Water Supply Augmentation Implementation Plan through December 2024, then quarterly reporting on plan implementation (includes potential CEQA process)	➤
➤ Quarterly financial reporting	➤
FY 2024 (July 1, 2023 – June 30, 2024)	
➤ Initiate 5-year update of the Santa Cruz Mid-County Groundwater Sustainability Plan (due to DWR January 31, 2025)	➤ See completion and action dates for this work in FY 2025
➤ GHWTP Facility Improvement Project EIR (February 2024)	➤
FY 2025 (July 1, 2024 – June 30, 2025)	
➤ Initiate update of Urban Water Management Plan, including the following key element: <ul style="list-style-type: none"> ○ Long range water demand forecast ○ Water supply reliability analysis ○ Water Shortage Contingency Plan 	➤ See completion and action dates for this work in FY 2026 and 2027
➤ Initiate update American Water Infrastructure Act required Risk and Resiliency Assessment	➤ See completion and action dates for this work in FY 2027
➤ Initiate update of Financial Planning and Initiate Water Ratemaking including: <ul style="list-style-type: none"> ○ Update Long Range Financial Plan ○ Cost of Service Analysis ○ Water Rates 5-year schedule for FY 2028 – FY 2032 	➤ See completion and action dates for this work in FY 2026 and FY 2027
➤ Complete 5-year update of Mid-County Groundwater Sustainability Plan (due to DWR January 31, 2027)	➤ Mid-County Groundwater Sustainability Agency Board approval est. November 2026
FY 2026 (July 1, 2025 – June 30, 2026)	
➤ Complete 2025 Urban Water Management Plan Update	➤ Council action on Urban Water Management Plan, June 2026
➤ Complete work updating Long Range Financial Plan	➤ Council action on Long Range Financial Plan, June 2026
➤ Initiate American Water Infrastructure Act required update of the Water Department’s Emergency Response Plan	➤ See completion and action on this work FY 2027
FY 2027 (July 1, 2026 – June 30, 2027)	
➤ Complete recommendations on 5-year schedule of water rates for FY 2028 - 2032	➤ Council action on proposed FY 2028 – 2032 schedule of water rates, November 2026
➤ Complete American Water Infrastructure Act required Risk and Resiliency Assessment	➤ Certification required by December 31, 2026
➤ Complete American Water Infrastructure Act required update of the Water Department’s Emergency Response Plan	➤ Certification required by June 30, 2027
➤ Complete update of the Santa Margarita Groundwater Sustainability Plan (due to DWR January 31, 2027)	➤ Mid-County Groundwater Sustainability Agency Board approval est. November 2026



WATER COMMISSION INFORMATION REPORT

DATE: 04/26/2023

AGENDA OF: 05/01/2023

TO: Water Commission

FROM: David Baum, Chief Financial Officer
Malissa Kaping, Principal Management Analyst

SUBJECT: Water Department's Proposed Fiscal Year 2024 Operating and Fiscal Year 2024-28 Capital Investment Program (CIP) Budgets

RECOMMENDATIONS:

- 1) That the Water Commission review and provide feedback to staff on the Water Department's Proposed Fiscal Year (FY) 2024 Operating and FY 2024-28 CIP Budgets (Budgets), including an updated multi-year Pro Forma integrating information about the Water Department's Budgets and financial position.
 - 2) That the Water Commission recommend the Chair work with staff to finalize a letter to the City Council related to the Water Department's FY 2024 Budgets and financial position recommending the Water Department's Budgets to the City Council based on Commission input. This letter will accompany other budget-related materials and will be included in the June 2023 agenda packet when the City Council is scheduled to adopt the FY 2024 Operating and FY 2024-28 CIP Budgets.
-

BACKGROUND: As outlined in the Water Commission's Bylaws, the Commission's role includes the duty to "make recommendations concerning the proposed annual Water Department (SCWD or the Department) budget and CIP." To that end, the Department is presenting the proposed FY 2024 Budget materials to the Water Commission and seeking a recommendation to the Council in the form of a signed letter along with related materials to submit to the City Council.

The Water Department’s Operating and Capital Investment Budgets authorize the necessary appropriation amounts for the Department to fulfill its mission to “ensure public health and safety by providing a clean, safe, reliable supply of water to its customers.”

The Budgets have been specifically developed to support the continuing operations and maintenance of the water system and its ability to serve the community with high quality and reliable water supply, to provide the resources needed to finance major capital investments for the rehabilitation and replacement of water infrastructure, make further investments in improving the reliability of the Santa Cruz water supply, and prepare the water system to be more resilient and reliable in the face of the significant uncertainty that arises from climate change.

Updates to the budget will continue to change through budget release on May 10, 2023; information in this report is based on the budget effective April 16, 2023. The final FY 2024 budget proposal will be provided for final review with the Water Commission at its meeting scheduled for June 5, 2023.

Santa Cruz City Council will hold its FY 2024 Operating and CIP budget hearings on May 23 and 24 and is currently scheduled to adopt the budget on June 13, 2023. The Water Department’s budget presentation is scheduled for Wednesday, May 24 at 1:20 pm.

DISCUSSION: A number of documents related to the Department’s FY 2024 Budget and Pro Forma are provided as part of the package of materials for Water Commission consideration and transmittal to the City Council as part of the Water Commission’s recommendation. Included are the Water Department’s:

1. FY 2024 Proposed Operating Budget
2. Budget Analytics
3. FY 2024-28 CIP Summary by Category
4. FY 2023-28 Financial Pro Forma

Proposed FY 2024 Operating Budget

	FY 2022 Budget	FY 2023 Adj Budget	FY 2024 Proposed
Personnel Services	16,714,151	17,911,780	17,839,963
Services, Supplies & Other	16,402,854	16,884,897	18,120,142
Capital Outlay	762,898	570,524	510,732
Debt Service(1)	4,098,626	5,090,698	6,185,926
	<u>37,978,530</u>	<u>40,457,899</u>	<u>42,656,763</u>

- (1) An extra \$5 million debt principal payment is omitted in FY 23, as it was a reimbursement from the State Revolving Fund loan. Another \$7 million is owed from SRF and the remaining \$9 million owed on the bank line of credit will be paid by converting short-term debt to long-term debt through use of the Water Infrastructure Finance and Innovation Act (WIFIA) loan proceeds or liquidating outstanding short-term debt with cash on-hand.

The FY 2024 Proposed Operating Budget is \$42.7 Million and is 5.4% higher than FY 23 This is an improvement compared to the FY 23 budget which was 6.5% higher than FY 22. The City separates the budget into four major categories:

- 1) Personnel Services;
- 2) Services, Supplies, and Other Charges;
- 3) Capital Outlay (non-CIP); and
- 4) Debt Service.

The FY 24 budget is higher by 8.6% for Services and Supplies and Capital Outlay compared to the FY 22 budget. The main drivers for this are chemicals, power, supply chain disruption, regulatory requirements, training costs, security upgrades, liability insurance and increased City overhead. For example, supply chain shortages have caused managers to stockpile some parts to avoid disruption to water service.

In the area of Personnel Services, a variety of factors including scheduled merit increases, cost of living adjustments, pension benefits and healthcare cost increases is resulting in a 6.8% increase in spending for personnel services over the FY 22 budget.

Detailed information about the FY 24 proposal is provided in Attachment 1.

Five-Year Budget Analytics

Attachment 2 is a historical analysis comparing budgeted to actual expenditures at the Department and Section/program level beginning with FY 2019 and includes the FY 2024 Proposed Budget. The “adjusted budget” column represents the approved budget for a specific year plus any budget adjustments approved administratively or by the City Council. The following are highlights of expenditure trends and notes on the larger year-to-year changes:

- 1) FY 2023 Year-End Estimates are lower than the FY 2023 Amended Budget by 13% comparable to budget versus actuals in previous years. This is the result of deliberate efforts on the part of management to budget more conservatively. The continuing difference between the FY 23 budget and the complete year-end estimate is the result of some lingering pandemic impacts, slower-than-anticipated implementation of projects, recruitment delays, equipment delivery delays, and others.
- 2) Personnel costs in the FY 2024 Proposed Budget are based on 121.25 budgeted positions. Merit increases, health insurance and pension costs are primary factors driving costs higher. Salary savings assumptions are now included in the Proposed Budget, totalling \$1.7 million

to acknowledge the ongoing vacancies in SCWD’s workforce. Similar salary savings occurred in previous years but were not incorporated into the adopted budgets. The future salary savings, as we have discussed previously, will help us to provide a more transparent spending plan and reduce the underspending.

- 3) Services, supplies, and other costs and capital equipment are increasing 8.6% from the FY 2022 Amended Budget which is largely the result of increasing regulatory compliance, chemicals, electricity, insurance premiums and City overhead charges.
- 4) Overall, FY 2024 expenditures are increasing when compared to FY 2022 Actuals and FY 2023 Year-End Estimates. Year-end FY 2023 operating expenses are based on the current operating environment, which includes higher inflation, fuel prices, chemicals, supply chain issues and labor costs.
- 5) The budget for debt service continues to increase as the Department issues more debt to fund the CIP. A summary of the various debt instruments and the FY 2024 proposed debt service amounts are listed in the table below:

<u>FY 2024 Debt Service</u>	<u>All Funds</u>
2014 Refinancing	\$706,538
2016 IBank	\$1,370,588
2019 Green Bonds	\$1,380,000
2020-21 SRF Loans	\$1,610,000
2021 Line of Credit	\$938,800
2023 WIFIA Loan	\$180,000
Total	\$6,185,926

The 2020 and 2021 State Revolving Fund (SRF) loans, which total \$149.4 million, will not commence the repayment of principal until after the projects are completed. Accordingly, the first principal payment is likely due on October 31, 2024.

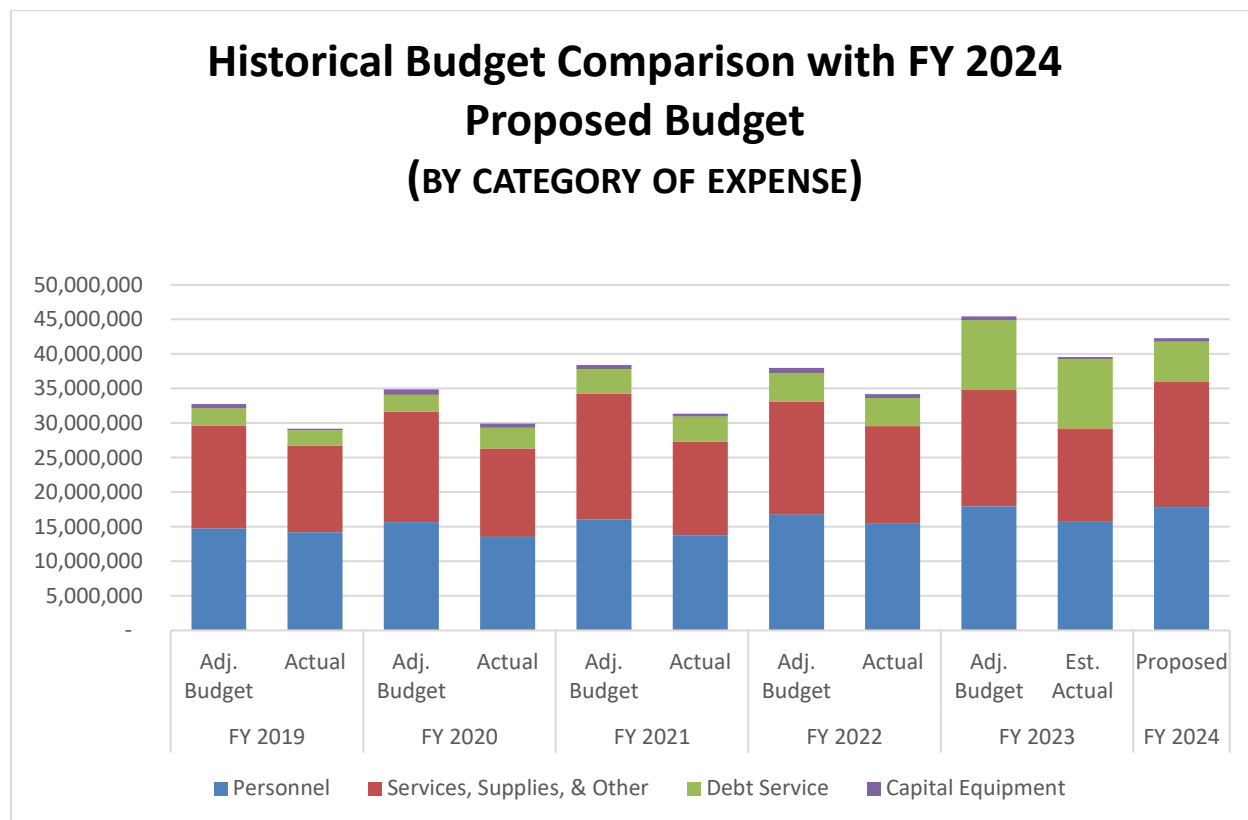
- 6) Capital Outlay purchases continue to fluctuate from year to year based on identified capital equipment needs and capital purchases (such as utility vehicles) planned for FY 2024. During FY 2023, durable equipment purchases, primarily utility trucks, have been funded from the Water Equipment Replacement Fund (719).
- 7) In regard to the individual sections and the overall increase from FY 2023 Year-End Estimates to FY 2024 Proposed Budget, there are common themes that contribute to increases: merit increases, increased costs of health insurance, pension costs, and increased funding for training and travel. In some cases, these increases are offset for noteworthy reasons discussed below:
 - a) Administration – FY 2024 costs have increased due to the larger volume of debt applications and reimbursement claims for federal and state loan programs.

- b) Engineering – Staff seek to charge its labor to the CIP, if appropriate, thereby limiting the rise in operating costs.
- c) Meter Shop – Increased costs for FY 2024 can be attributed to additional temporary workers to support the Meter Replacement project and new meter reading costs. Meter installations will be complete in the summer of 2023. There are still hundreds of meters to be installed by the highly skilled SCWD staff, as the contract installer (Utility Partners of America) was limited to routine installations. Once the meters are fully installed, a per meter monitoring fee is paid to the meter manufacturer, which is a new cost.
- d) Conservation – staffing resources previously focused on Conservation are shifting to developing and implementing Customer Assistance programs. Water efficiency messaging and some ongoing conservation programs focused on indoor and outdoor water-use efficiency will continue.
- e) Operations Management – Cost increases are related to expanded support for section managers involved in developing and implementing various programs and projects to respond to regulatory requirements and operating needs.
- f) Water Resources – FY 2024 proposed costs have increased as compared to the FY 2023 Year-End Estimates due to implementation of the Anadromous Salmonid Habitat Conservation Plan, which requires an additional \$455,000 to be added to agreed upon Non-Flow Mitigation projects. Funds are also added for a forest management consultant with the possibility of some revenue generated from timber sales that would be used to help fund forest health and fire preparedness work.
- g) Production – Increased costs for FY 2024 are largely due to increased energy and chemical costs as well as increased security patrols, well assessment/testing/rehabilitation and vegetation management services at SCWD’s various facilities. With the increased engagement of Production staff in various CIP project work, employee costs associated with this work are not captured as part of CIP project costs rather than being reflected in the Operating budget.
- h) Quality Lab – Increased costs include an increase in chemicals as two extra algaecide treatments are expected at Loch Lomond in FY 24, outside laboratory testing, and support for implementation of new regulations, which require additional consultants.

To provide a larger perspective, the following chart highlights the difference between operating budget and actual expenses from FY 2018 through FY 2023. For each fiscal year in the chart, the first bar is the budget and the second bar is actual expenses. Over the past five years, the actual expenses were an average of 86% of budgeted amounts. In FY 21, the actual expenses were lower by 18% due to 10% salary reduction for the first 10 ½ months from furloughs imposed as part of the City’s response to the pandemic.

In FY 23, we made a \$5 million budget adjustment to pay down outstanding principal on the short-term debt due to the extraordinary rise in interest rates this year. The \$5 million used to pay down the loan came from the State Revolving Fund, which provides 30-year, fixed-rate debt at 1.4%. The remaining \$16 million of the line of credit will be repaid from SRF reimbursements, WIFIA loan proceeds, and cash on-hand.

The chart below also indicates that we have gradually improved budgeting the past two years. In FY 22, actuals were 86% of budget; in FY 23, actuals are projected at 87% of budget. In FY 24, actuals should be closer to budget because salary savings totaling \$1.7 million as requested by SCWD staff, have reduced the projected budget to align with typical staff vacancies.



As mentioned above, revenues continue to be under projections due to lower residential consumption and lower overall consumption during the COVID pandemic. This trend may improve due to a wet year, increasing consumption, and a stable rate base.

Proposed FY 2024-2028 CIP Budget

Attachment 3 is the FY 2024-2028 Proposed CIP Budget Summary organized by project category. Staff is recommending \$373 million in new funding over the 5-year CIP window, with the bulk of the money for Infrastructure Resiliency and Climate Adaptation projects. Current revenue projections have been approved by City Council through FY 27.

Before setting any kind of rate for FY 28, we will be completing a cost-of-service analysis that is the foundation of a Proposition 218 compliant rate-setting process.

The FY 2024 new appropriation of \$31.9 million and a significant carryforward is expected from previously budgeted, unspent funds. Supply chain disruptions have delayed projects, especially during the past three years due to COVID. During this time, these impacts have resulted in routine rollovers of underspending from one fiscal year to the next.

Prudent budgeting would include the expectation that the amount spent would remain below the budget each year (which would result in some carryforward each fiscal year); however, the large carryforward from FY 2023 is due in part from current volatile market conditions causing scheduling changes and is not expected to be experienced in the future.

Working Draft FY 2023-2028 Pro Forma

The updated Financial Pro Forma is provided (Attachment 4) and includes an overview of the Water Department's financial performance for the FY 2024 Proposed Operating Budget and a five-year CIP. The Pro Forma is based on running the financial model developed for the 2021 Long Range Financial Plan (LRFP) as appropriately updated over time. There are a number of assumptions incorporated into the Pro Forma which include:

- 1) Sales of 2.37 billion gallons of water each fiscal year;
- 2) Inflation factors of:
 - a) 16.4% for rate increase FY 2024;
 - b) 7% for salaries;
 - c) 7% for benefits;
 - d) 5% for services and supplies;
 - e) 5% for Capital Outlay;
- 3) That the CIP is based upon an updated 5-year plan; and
- 4) Interest rate for future debt is up to 5.4% through 2028.

The updated Financial Pro Forma reflects FY 2024 estimated total revenues of \$51.7 million and total operating expenditures of \$33.2 million, debt service of \$7.4 million as well as \$53.4 million in capital expenditures.

The Department obtained a \$50 Million Line of Credit (LOC) at the end of FY 2021 to help meet short-term financing needs for FY 2022 through FY 2024 and provide a financial bridge to planned long-term debt financing. As of April 25, 2023, SCWD has submitted claims totaling \$102 million and have received reimbursements totaling \$95 million with a balance due of \$7 million. The wait time to receive reimbursements is averaging 106 days.

Staff are also expecting funding from the Environmental Protection Agency (EPA) WIFIA loan, which is currently reflected in the Pro Forma as well as grant opportunities as available. Closing should occur this month. Due to rising interest rates, we will seek to complete the loan expeditiously. As of April 25, the WIFIA loan rate for 40 years would be 3.72%.

The projected size and timing of debt issues to finance these capital projects is summarized in Attachment 4. These figures include the additional Drinking Water State Revolving Fund (DWSRF), WIFIA, and grant funding for projects that may defer or replace projected borrowing shown on the next page. The total anticipated debt issues total \$336 million over the next five years.

Financial Reserves amounts reflected in the Financial Pro Forma include Fund 711 (Water Operations), Fund 713 (Rate Stabilization), Fund 716 (90-Day Operating Reserve), Fund 717 (Emergency Reserve), and Fund 715 (System Development). The current established reserves and target funding levels include the following:

- Rate Stabilization Reserve (Fund 713) of \$10 million;
- Water Emergency Reserve Fund (Fund 717) at minimum level of \$3 million; and
- An Operating Reserve equal to 180 days of operating expenses, with 90 days of operating cash in Water Operating Cash Reserve Fund (Fund 716) and the remaining 90 days of operating cash in the Water Operating Fund (Fund 711). The annual funding targets for these reserves are based on the Department's annual operating budget and the metric is to have both Fund 716 and Fund 711 meet the annual 90-days operating cash criterion by the fiscal year's June 30 closing date.

The reserves in the Long Range Financial Plan (LRFP) set forth above are all met in the proposed budget. Similarly, the debt service coverage ratio is a minimum of 1.5 net revenue for each \$1 of debt service as established in the LRFP.

FISCAL IMPACT: Funds are available to support the FY 2024 Proposed Budgets as demonstrated in the Financial Pro Forma.

ATTACHMENTS:

1. FY 2024 Proposed Operating Budget
2. Budget Analytics
3. FY 2024-28 CIP Summary by Category
4. FY 2023-28 Financial Pro Forma

Attachment 1.

FY 2024 Proposed Operating Budget

Water Department Overview

Accomplishments and Goals

Workload Indicators and Performance Measures

Budget Summary

Organization Chart



Water Department

The mission of the Water Department is to ensure public health and safety by providing a clean, safe, and reliable supply of water. We strive to serve the community in a courteous, efficient, cost-effective, and environmentally sustainable manner.

We are passionate about our work and try to instill our values of integrity, innovation, objectivity, professionalism, teamwork, and transparency in everything we do. We collect water, treat, and test it, move it, store it, distribute it, track how much is used, and bill our customers for their use. We are at the end of the phone when customers call, and the smiling faces customers see when they visit the department. We educate our customers about the quality of their water and how to use less. Our work includes maintenance and operation of the Loch Lomond Recreation area as well as the protection of Majors, Liddell, Newell Creek, Zayante, and Laguna watersheds. We are stewards of an important community asset - the water system and all it entails- as well as a range of natural resources and ecosystems that many species depend on. We take pride in meeting the diverse needs of the broad region we serve and value our partnerships with neighboring agencies to develop long range solutions to the regions drinking water needs.

Core Services

Every day, department staff work hard to produce and deliver millions of gallons of water to nearly 98,000 customers and perform all the related utility, land and natural resource management activities that often happen behind the scenes, but play a part in providing reliable, high quality water service to our community. In addition to the department's daily duties, the department is undergoing a major reinvestment in water infrastructure from upgrades to the water treatment plant, improvements to the Loch Lomond dam and the replacement of all system meters, to mention a few. To perform this work, the Water Department is organized into four areas: Operations; Engineering; Customer Service; and Administration.

Operations - The Operations group is responsible for managing the watersheds; collecting, treating and testing untreated and treated water; and storing and distributing treated water to our customers and consists of the following sections: Water Resources; Water Production; Water Quality Control (laboratory); Distribution; and the Water Recreation Facility (Loch Lomond).

- The Water Resources Management section is responsible for the drinking water source protection, environmental regulatory compliance, and general natural resource management. The section coordinates environmental projects related to water rights, water supply, habitat conservation, and environmental resource protection.
- The Water Production section is responsible for production, operation, and maintenance of water storage, diversion, collection, pumping, and treatment facilities from all sources throughout the system. This 24/7 work is made more challenging with the Concrete Tank Replacement project underway and planned upgrades to the Graham Hill Water Treatment Plant soon.
- The Water Quality Control (laboratory) section performs all water quality testing and oversees matters pertaining to water quality control to maintain compliance with State and federal standards and for planning for future treatment needs.
- The Water Distribution section is responsible for the maintenance and operation of all transmission mains, distribution mains, service lines, and hydrants in the service area. Distribution staff also replace significant segments of distribution mains as part of the Capital Investment Program (CIP).
- The Water Recreation Facility section operates and maintains Loch Lomond Recreation Area. This section is also responsible for patrolling watershed property and protecting source water quality. We are pleased our ranger staff are, once again, providing in-person, watershed education program for local elementary school children at Loch Lomond.

Engineering - The Water Engineering section is composed of two main functions: Engineering and Utility and Environmental Planning.

- The Water Engineering section provides engineering, planning, project design and construction management necessary for water facilities, as well as evaluation and installation of water saving technologies. The section keeps current with new technologies and water quality issues, remaining sensitive to mitigation of environmental impacts; reviews all

requests for water services; maintains record of facilities, installations and maps; and oversees the Backflow Prevention Program. In 2017, the department embarked on an ambitious system-wide reinvestment with the Engineering section at the helm. This program includes the replacement of storage tanks, transmission lines, and the exploration of increasing storage in underground aquifers in partnership with neighboring agencies.

- The Utility and Environmental Planning group helps the department to plan adequately for a 21st century drinking water system. Foundational documents such as the Urban Water Management Plan, serves as a guide to future projects by ensuring there are adequate water supplies. In addition, there are numerous federal, State and local environmental laws the department must comply with to complete the planned infrastructure investments in the water system.

Customer Service - The Customer Service group consists of three sections: Customer Service; the Meter Shop; and Water Conservation. These three sections interface with the public frequently and we strive to provide consistently excellent customer service.

- The Customer Service section (Santa Cruz Municipal Utilities - SCMU) provides customer service for water, sewer, refuse, and recycling services to the residents and businesses of the City of Santa Cruz, and only water services to the unincorporated surrounding areas. This section manages utility accounts and billing, processes opening and closing of accounts, and provides service in response to customer requests.
- The Meter Shop section is responsible for reading, inspecting, installing, maintaining, and replacing water meters in the service area that covers the City of Santa Cruz and the unincorporated surrounding areas. As part of a large capital project, all water meters in the service area are being replaced. The new meters will give water customers more timely and accurate usage information as well as improve the billing process.
- The Water Conservation section is responsible for promoting efficient water use and for implementing management practices that reduce customer demand for water, including public information and education activities, water budgets for large landscape customers, plumbing fixture replacement and appliance rebate programs, technical assistance, administration of landscape, and water waste regulations. The Conservation section has been instrumental to teaching customers about the new metering system and how to use it to their advantage.

Administration - The Water Administration section coordinates and manages department business by focusing on the following operational areas: human resources, finances, public relations, safety, and regulatory compliance. Administration is responsible for maintaining a rate structure that reflects cost of service, solicits federal, state, and other funds to finance the department's Capital Investment Program, and ensures adequate reserves. This section also facilitates the communication and interaction with the Water Commission, City Council, City Manager's Office, and regulatory agencies.

Accomplishments and Goals

FY 2023 Accomplishments	Infrastructure	DT & Other Business Sectors	Fiscal Sustainability	Core Services	Equity, Health & Well-Being, Sustainability	New & Improved Funding Sources	Green Economy
Completed construction of the \$102 million Newell Creek Dam Inlet Outlet project to renew major infrastructure	X			X			
Completed installation of the system-wide Meter Replacement Project	X		X	X			
Advanced design of the \$160 million Graham Hill Water Treatment Project to modernize and enhance treatment and water quality	X			X	X		
Secured over \$9M in grant funding for regional projects to build an intertie between the City of Santa Cruz and the Scotts Valley Water District to increase opportunities for conjunctive use of surface and groundwater resources, support opportunities for regional collaboration, and achieve Santa Margarita Basin Groundwater Sustainability Plan recommendations	X		X		X	X	
Responded to, and repaired, 47 main leaks through the end of December 2022, the largest of these in front of Bay Street Elementary School, where the 14” cast iron main failed	X		X	X	X		
Repaired or replaced 161 City-owned service laterals to date	X		X	X			
Completed an ASR Demonstration Study on Beltz Wells 8 and 12 to determine feasibility in achieving the City’s water supply reliability goal	X		X				
Improved fire suppression capability at the Loch Lomond Recreation Area by installing two 10,000-gallon water storage tanks	X		X	X			

<p>FY 2023 Accomplishments (continued)</p>	<p>Infrastructure</p>	<p>DT & Other Business Sectors</p>	<p>Fiscal Sustainability</p>	<p>Core Services</p>	<p>Equity, Health & Well- Being, Sustainability</p>	<p>New & Improved Funding Sources</p>	<p>Green Economy</p>
<p>Finalized replacement of the Ocean Street water main by replacing a fire hydrant that required the longest GHWTP shut down on record: 20 hours (a record previously set at 12 hours)</p>	<p>X</p>						
<p>Developed and proposed Securing Our Water Future to the City Council to guide towards achieving a reliable water supply</p>			<p>X</p>	<p>X</p>	<p>X</p>		
<p>Provided \$579,582 in federal/state program funding to 858 low-income water service customers and \$175,778 in program funding to 546 low-income wastewater customers</p>				<p>X</p>	<p>X</p>	<p>X</p>	
<p>Completed the loan application and approval process for a \$125 Million EPA WIFIA (Water Infrastructure Finance and Innovation Act) Loan, a low-interest, flexible-term funding source from USEPA</p>	<p>X</p>		<p>X</p>	<p>X</p>		<p>X</p>	



FY 2024 Goals	Infrastructure	DT & Other Business Sectors	Fiscal Sustainability	Core Services	Equity, Health & Well-Being, Sustainability	New & Improved Funding Sources	Green Economy
Improve water system reliability by converting Beltz 8 and 12 wells into full-scale and permanent injection and retrieval sites	X			X			
Commence construction on two pipelines (Brackney Landslide Risk Reduction project and the Newell Creek Pipeline Felton to Graham Hill WTP project) to enhance resilience of water delivery	X						
Begin construction on an intertie between the City of Santa Cruz and Scotts Valley Water District to augment SCWD's water supply and to facilitate regional collaboration	X						
Secure WIFIA and DWSRF funding agreements			X			X	
Issue a Draft Environmental Impact Report for the project in the summer of 2023: an important GHWTP FIP milestone	X				X		
Initiate a process to adopt a new Enterprise Records Program to replace the Utility Billing System	X			X			
Complete federal and state endangered species act permitting processes	X			X	X		X
Enhance water system infrastructure at Laguna Street Water Main Replacement Project by replacing 350 linear feet of 4" asbestos cement water main with 6" PVC	X						
Upgrade Majors/Allegro Water Main by replacing 1100 linear feet of 4" cast iron with 6" PVC	X						
Optimize the new TESLA Power Pack at the Coast Pump Station to reduce electrical costs			X				

Workload Indicators and Performance Measures

Workload Indicators	Focus Area	FY 2020 Actual	FY 2021 Actual	FY 2022 Actual	FY 2023 Estimate	FY 2024 Goal
Drinking water consumed (billions of gallons)	Core Service	2.31	2.25	2.22	2.3	2.4
Number of phone calls, emails and lobby visits handled by SCMU Customer Service Unit	Core Service	63,653	64,000	49,664	50,000	50,000
Amount of dollars of new construction investments (in millions)	Infrastructure	\$29.7	\$46.0	\$52.7	\$63.4	\$53.4

Performance Measures	Focus Area	FY 2020 Actual	FY 2021 Actual	FY 2022 Actual	FY 2023 Estimate	FY 2024 Goal
Compliance with drinking water standards	Core Service	100%	100%	100%	100%	100%
Number of workers comp claims requiring employee absence greater than 30 days	Core Service	0	0	0	2	0
Maintain excellent bond ratings to ensure favorable borrowing rates thereby reducing cost to customers	Infrastructure	AA-/A+	AA-/A+	AA-/A-	AA-/A-	AA-/A-
Percentage of customer bills paid within 60 days ¹	Fiscal Sustainability	97%	91%	97%	97%	98%

1. The Governor's Executive Order prohibited water shutoff from 4/2/20 to 12/31/21. Accordingly, FY20 and FY21 are higher than normal delinquency rates.

Budget Summary - Water

	Fiscal Year* 2022 Actuals	Fiscal Year 2023			Fiscal Year 2024 Proposed
		Adopted Budget	Amended* Budget	Year-End Estimate	
EXPENDITURES BY CHARACTER:					
Personnel Services	14,449,468	17,691,832	17,911,780	15,865,111	17,721,968
Services, Supplies, and Other Charges	13,601,279	16,156,529	17,223,256	13,462,541	18,381,435
Capital Outlay	375,401	323,000	570,523	352,230	510,732
Debt Service	4,298,354	5,131,706	10,231,706	4,216,429	6,017,146
Total Expenditures	<u>32,724,501</u>	<u>39,303,067</u>	<u>45,937,266</u>	<u>33,896,311</u>	<u>42,631,280</u>
EXPENDITURES BY ACTIVITY:					
Water Administration	7101 6,181,308	6,952,880	7,339,231	6,260,166	7,736,667
Water Engineering	7102 2,143,153	2,929,364	3,057,536	2,739,337	3,076,409
Water Customer Services	7103 2,119,794	2,221,948	2,233,863	2,172,045	2,430,031
Water Conservation	7104 749,419	1,238,471	1,138,750	617,752	1,190,523
Water Resources	7105 1,515,018	2,104,695	2,498,932	1,096,191	2,713,228
Water Production	7106 6,978,055	8,315,225	8,748,102	7,435,136	8,271,435
Water Quality	7107 1,844,413	2,052,893	2,052,893	1,933,993	2,373,577
Water Distribution	7108 4,220,434	5,292,432	5,565,953	4,578,822	5,491,619
Water Recreation	7109 1,281,323	1,399,897	1,399,897	1,308,682	1,467,612
Water Operations	7110 416,866	635,719	635,719	344,036	749,488
Water Meter Shop	7113 803,338	1,027,837	1,027,837	1,168,652	1,293,546
Water Debt Service	7140 4,298,354	5,131,706	10,231,706	4,099,147	5,837,146
Drought Response 2014	7199 173,026	-	6,848	142,351	-
Subtotal Other Funds	<u>32,724,501</u>	<u>39,303,067</u>	<u>45,937,266</u>	<u>33,896,311</u>	<u>42,631,280</u>
Total Expenditures	<u>32,724,501</u>	<u>39,303,067</u>	<u>45,937,266</u>	<u>33,896,311</u>	<u>42,631,280</u>
RESOURCES BY FUND :					
Water	711 38,306,648	38,526,543	38,534,676	40,246,160	46,670,984
Water Rate Stabilization Fund	713 2,816,551	3,058,312	3,058,312	3,082,527	3,082,527
Water System Development Fees Fund	715 1,210,153	472,000	472,000	1,002,512	1,042,612
Total Resources	<u>42,333,353</u>	<u>42,056,855</u>	<u>42,064,988</u>	<u>44,331,199</u>	<u>50,796,123</u>
	FY 2022			FY 2023	FY 2024
TOTAL AUTHORIZED PERSONNEL:	<u>118.25</u>			<u>121.25</u>	<u>121.25</u>

*Sums may have discrepancies due to rounding

Staffing

Positions	2020-21 Revised*	2021-22 Revised*	2022-23 Revised*	2023-24 Proposed	FY 2024 Change
Administrative Assistant I/II	2.00	2.00	2.00	2.00	-
Administrative Assistant III	2.00	2.00	2.00	2.00	-
Assistant Engineer I/II	4.00	4.00	4.00	4.00	-
Associate Planner I/II	3.00	3.00	3.00	3.00	-
Associate Professional Engineer	4.75	4.75	4.75	4.75	-
Chief Ranger	1.00	1.00	1.00	1.00	-
Community Relations Specialist	1.00	1.00	1.00	-	(1.00)**
Customer Service Manager	1.00	1.00	1.00	1.00	-
Deputy Water Director/Engineering Mgr	1.00	1.00	1.00	1.00	-
Deputy Water Director/Operations Mgr	1.00	1.00	1.00	1.00	-
Director of Water Department	1.00	1.00	1.00	1.00	-
Engineering Associate	1.00	1.00	1.00	1.00	-
Engineering Technician	2.00	2.00	3.00	3.00	-
Environmental Microbiologist I/II/III	2.00	2.00	2.00	2.00	-
Environmental Programs Analyst I/II	1.00	1.00	1.00	3.00	2.00
Laboratory Technician	2.00	2.00	2.00	2.00	-
Management Analyst	3.00	3.00	3.00	3.00	-
Principal Management Analyst	1.00	2.00	2.00	2.00	-
Principal Planner	1.00	1.00	1.00	1.00	-
Ranger I/II	3.00	3.00	3.00	3.00	-
Ranger Assistant	3.50	3.50	3.50	3.50	-
Senior Electrician	1.00	1.00	1.00	1.00	-
Senior Professional Engineer	1.00	1.00	1.00	1.00	-
Senior Ranger	2.00	2.00	2.00	2.00	-
Senior Water Distribution Operator	6.00	6.00	6.00	6.00	-
Superintendent of Water Treatment & Production	1.00	1.00	1.00	1.00	-
Superintendent of Water Distribution	1.00	1.00	1.00	1.00	-
Utility Account Specialist	4.00	4.00	4.00	4.00	-
Utility Maintenance Technician	4.00	4.00	4.00	4.00	-
Utility Service Field Technician I/II	2.00	2.00	2.00	2.00	-
Utility Service Representative I/II	6.00	6.00	6.00	6.00	-
Utility Supervisor	1.00	1.00	1.00	1.00	-
Water Chief Financial Officer	1.00	1.00	1.00	1.00	-
Water Conservation Representative	2.00	2.00	2.00	-	(2.00)
Water Distribution Crew Leader III/IV	6.00	6.00	6.00	6.00	-
Water Distribution Operator II/ III	9.00	9.00	9.00	9.00	-
Water Distribution Sup V Chief Distribution Operator	1.00	1.00	1.00	1.00	-
Water Facilities Electrical/Instr Tech II/III	1.00	1.00	1.00	1.00	-
Water Facilities Field Supervisor	1.00	1.00	2.00	2.00	-

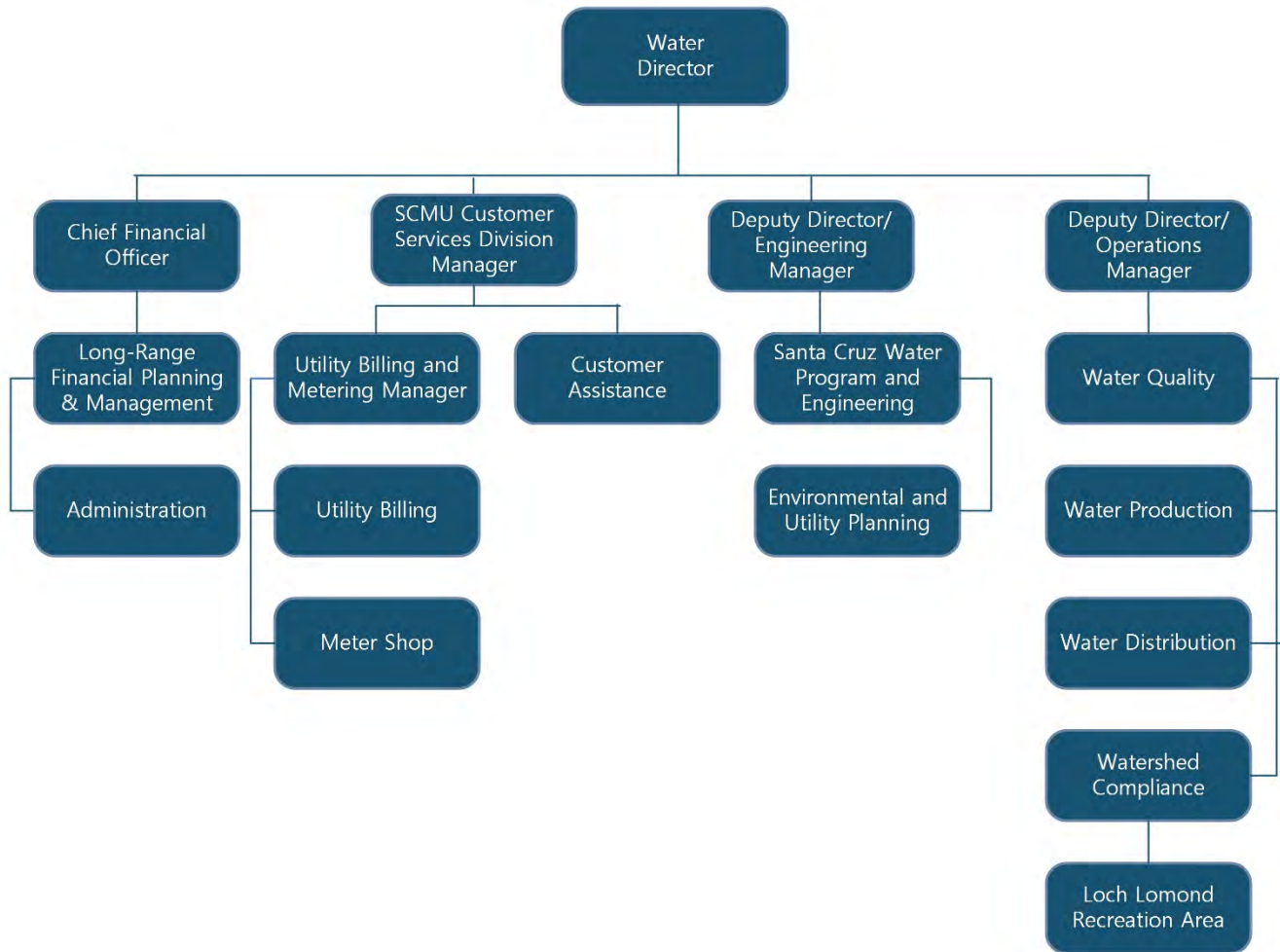
	2020-21 Revised*	2021-22 Revised*	2022-23 Revised*	2023-24 Proposed	FY 2024 Change
Water Facilities Mechanical Tech II/III	2.00	2.00	2.00	2.00	-
Water Facilities Mechanical Supervisor	1.00	1.00	1.00	1.00	-
Water Meter Specialist I/II	3.00	3.00	3.00	3.00	-
Water Meter Specialist Lead	-	-	-	1.00	1.00
Water Meter Supervisor	1.00	1.00	1.00	1.00	-
Water Meter Technician	1.00	1.00	1.00	1.00	-
Water Quality Chemist I/II/III	2.00	2.00	2.00	2.00	-
Water Quality Manager	1.00	1.00	1.00	1.00	-
Water Resources Analyst	3.00	3.00	3.00	3.00	-
Water Resources Supervisor	1.00	1.00	1.00	1.00	-
Water SCADA Analyst	-	-	1.00	1.00	-
Water Treatment Operator II/III/IV	8.00	8.00	8.00	8.00	-
Water Treatment OIT II/III/IV	1.00	1.00	1.00	1.00	-
Water Treatment Sup IV/V-Chief Plant Operator	1.00	1.00	1.00	1.00	-
Watershed Compliance Manager	1.00	1.00	1.00	1.00	-
	<u>117.25</u>	<u>118.25</u>	<u>121.25</u>	<u>121.25</u>	<u>-</u>

*Revised salary authorizations are Adopted staffing plus any Mid-year adjustments

** 1.00 FTE Community Relations Specialist will begin reporting to City Manager's Office



Organization Chart

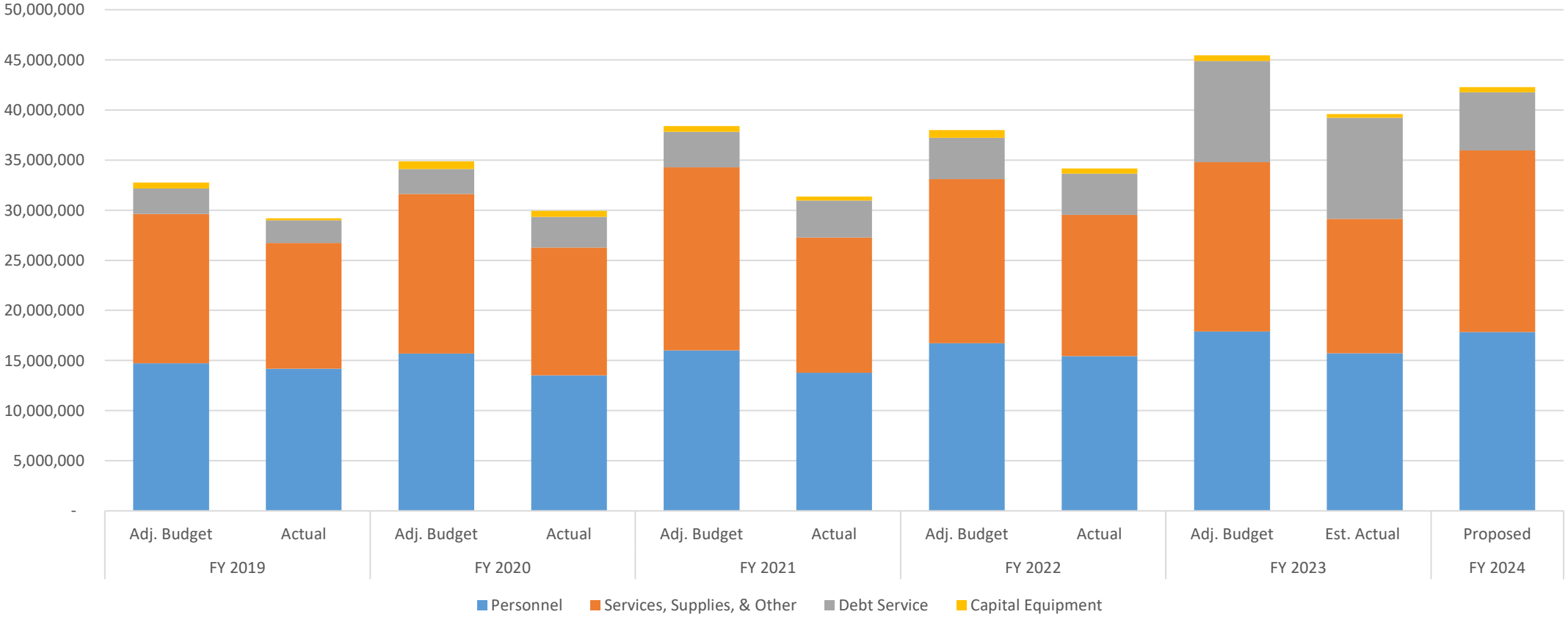


Proposed FY 2024 Operating Budget: Fund 711, 715 & 718

BY CATEGORY OF EXPENSE

	FY 2019		FY 2020		FY 2021		FY 2022		FY 2023		FY 2024
	Adj. Budget	Actual	Adj. Budget	Actual	Adj. Budget	Actual	Adj. Budget	Actual	Adj. Budget	Est. Actual	Proposed
Personnel	14,724,425	14,174,510	15,686,336	13,520,355	16,020,609	13,774,554	16,714,151	15,427,372	17,911,780	15,722,760	17,839,964
Services, Supplies, & Other	14,903,530	12,553,247	15,936,598	12,742,073	18,258,645	13,504,675	16,402,854	14,113,092	16,878,050	13,415,241	18,120,142
Debt Service	2,535,842	2,247,613	2,492,786	3,060,716	3,536,295	3,686,655	4,098,626	4,098,710	10,090,698	10,090,698	5,801,971
Capital Equipment	604,034	212,510	775,246	601,675	573,335	383,593	762,898	537,012	570,523	352,230	510,732
TOTAL Adjusted Budget	32,767,831	29,187,880	34,890,966	29,924,819	38,388,884	31,349,476	37,978,530	32,551,475	45,930,418	39,769,237	42,614,211

**Historical Budget Comparison with FY 2024 Proposed Budget
(BY CATEGORY OF EXPENSE)**



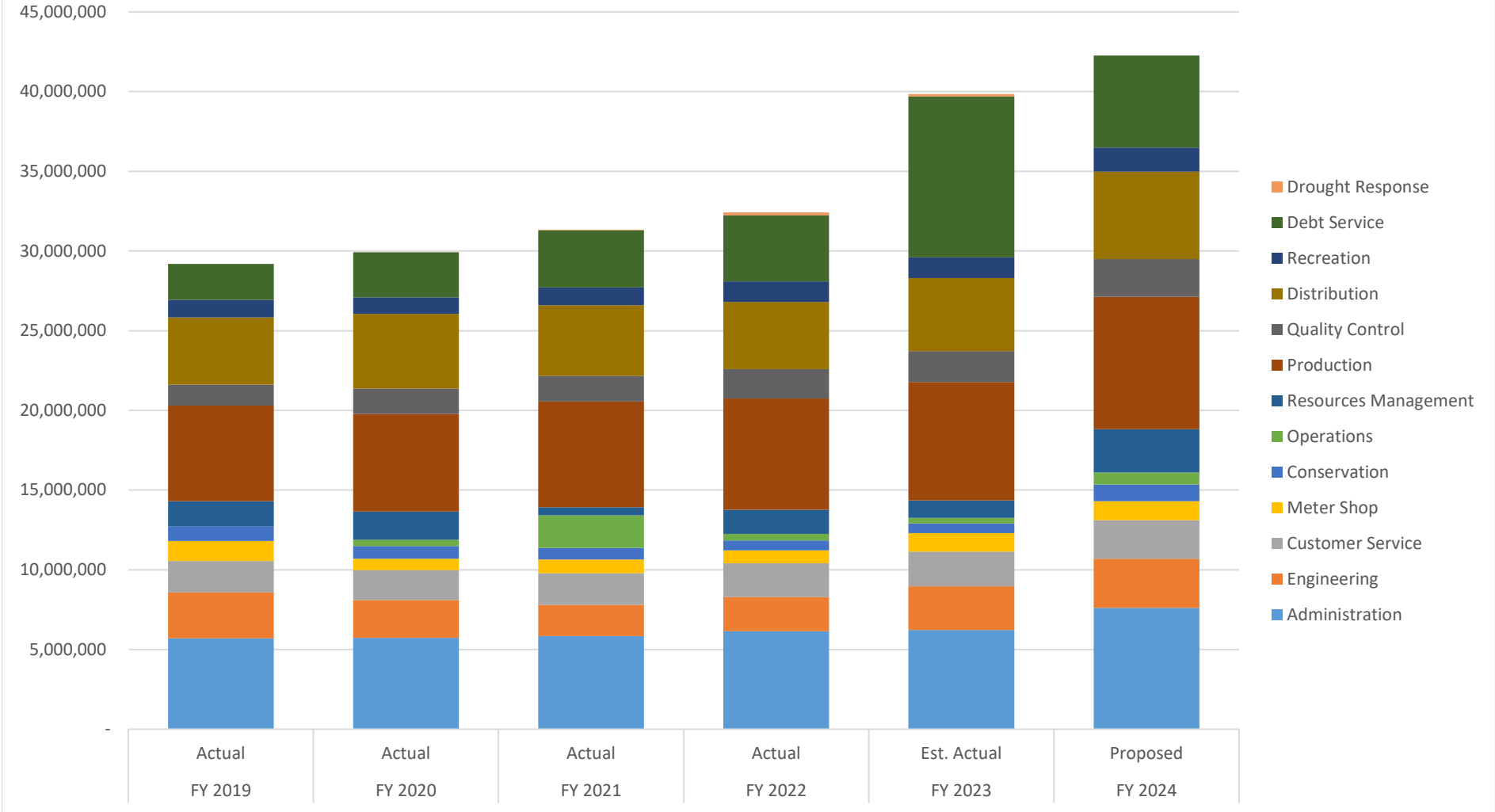
Proposed FY 2024 Operating Budget: Fund 711

BY SECTION

	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2023 to FY 2024
	Actual	Actual	Actual	Actual	Est. Actual	Proposed	% Change
Administration	5,697,441	5,738,169	5,838,628	6,146,609	6,224,148	7,604,290	22.2%
Engineering	2,886,711	2,366,620	1,969,117	2,143,153	2,739,337	3,084,409	12.6%
Customer Service	1,974,229	1,875,267	1,985,247	2,119,794	2,172,045	2,430,031	11.9%
Meter Shop	1,248,169	719,815	861,595	803,338	1,168,652	1,188,899	1.7%
Conservation	913,474	788,015	726,902	624,211	606,470	1,051,350	73.4%
Operations	-	393,104	2,039,642	416,866	344,036	749,488	117.9%
Resources Management	1,581,505	1,780,480	500,959	1,515,018	1,096,191	2,711,128	147.3%
Production	6,002,756	6,122,369	6,641,345	6,978,055	7,435,136	8,298,435	11.6%
Quality Control	1,321,358	1,590,499	1,601,453	1,844,413	1,933,993	2,373,577	22.7%
Distribution	4,212,029	4,680,536	4,428,150	4,220,434	4,578,822	5,491,619	19.9%
Recreation	1,102,595	1,031,970	1,117,544	1,281,323	1,308,682	1,507,612	15.2%
Debt Service	2,247,613	2,837,975	3,604,550	4,157,813	10,090,698	5,781,971	-42.7%
Drought Response	-	-	30,890	173,026	142,351	-	
TOTAL	29,187,880	29,924,819	31,346,021	32,424,053	39,840,562	42,272,808	6.1%

<u>FY 2024 Debt Service</u>	<u>All Funds</u>
2014 Refinancing	\$706,538
2016 IBank	\$1,370,588
2019 Green Bonds	\$1,380,000
2020-2021 State Revolving	\$1,610,000
2021 Line of Credit	\$938,800
2023 WIFIA Loan	\$180,000
<u>Total FY23 Debt Service</u>	\$6,185,926

Historical Budget Comparison with FY 2024 Proposed Budget (BY DEPARTMENT SECTION)



Budget Trends by Percent

	% of Change Comparing Actuals Expenditures					
	FY 2019 to FY 2020	FY 2020 to FY 2021	FY 2021 to FY 2022	FY 2022 to FY 2023	Average	FY 2019 to 2023
Personnel	(4.6%)	1.9%	12.0%	1.9%	2.8%	10.9%
Services, Supplies, & Other	1.5%	6.0%	4.5%	(4.9%)	1.8%	6.9%
Debt Service	36.2%	20.5%	11.2%	146.2%	53.5%	349.0%
Capital Equipment	183.1%	(36.2%)	40.0%	(34.4%)	38.1%	65.7%
TOTAL (w/o transfers)	2.5%	4.8%	3.8%	22.2%	8.3%	36.3%

	% of Change Comparing Budgeted Amounts						
	FY 2019 to FY 2020	FY 2020 to FY 2021	FY 2021 to FY 2022	FY 2022 to FY 2023	FY 2023 to FY 2024	Average	FY 2019 to 2024
Personnel	6.5%	2.1%	4.3%	7.2%	(0.4%)	4.0%	21.2%
Services, Supplies, & Other	6.9%	14.6%	(10.2%)	2.9%	7.4%	4.3%	21.6%
Debt Service	(1.7%)	41.9%	15.9%	146.2%	(42.5%)	32.0%	128.8%
Capital Equipment	28.3%	(26.0%)	33.1%	(25.2%)	(10.5%)	(0.1%)	(15.4%)
TOTAL (w/o transfers)	6.5%	10.0%	(1.1%)	20.9%	(7.2%)	5.8%	30.0%

	Budget vs Actuals				
	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Personnel	(3.7%)	(13.8%)	(14.0%)	(7.7%)	(12.2%)
Services, Supplies, & Other	(15.8%)	(20.0%)	(26.0%)	(14.0%)	(20.5%)
Debt Service	(11.4%)	22.8%	4.3%	0.0%	0.0%
Capital Equipment	(64.8%)	(22.4%)	(33.1%)	(29.6%)	(38.3%)
TOTAL (w/o transfers)	(10.9%)	(14.2%)	(18.3%)	(14.3%)	(13.4%)

	Percent of Total Budget					
	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Administration	19.5%	19.2%	18.6%	19.0%	15.6%	18.0%
Engineering	9.9%	7.9%	6.3%	6.6%	6.9%	7.3%
Customer Service	6.8%	6.3%	6.3%	6.5%	5.5%	5.7%
Meter Shop	4.3%	2.4%	2.7%	2.5%	2.9%	2.8%
Conservation	3.1%	2.6%	2.3%	1.9%	1.5%	2.5%
Operations	-	1.3%	6.5%	1.3%	0.9%	1.8%
Resources Management	5.4%	5.9%	1.6%	4.7%	2.8%	6.4%
Production	20.6%	20.5%	21.2%	21.5%	18.7%	19.6%
Quality Control	4.5%	5.3%	5.1%	5.7%	4.9%	5.6%
Distribution	14.4%	15.6%	14.1%	13.0%	11.5%	13.0%
Recreation	3.8%	3.4%	3.6%	4.0%	3.3%	3.6%
Debt Service	7.7%	9.5%	11.5%	12.8%	25.3%	13.7%
Drought Response	0.0%	0.0%	0.1%	0.5%	0.4%	0.0%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Attachment 3.

FY 2024-28 CIP Summary by Category

Water Department CIP Summary by Project Type (FY24-28)

	FY 2024 Request	FY 2025 Estimate	FY 2026 Estimate	FY 2027 Estimate	FY 2028 Estimate	FY 2024 - FY 2028 Budget
Water Supply Resiliency & Climate Adaptation Projects						
Water Supply Augmentation Strategy	7,817,006	30,158,462	18,871,347	12,853,223	13,303,162	83,003,200
ASR Planning, ASR Mid County Existing Infrastructure, ASR Mid County New Wells, Santa Margarita Groundwater, Water Supply Augmentation, Recycled Water Feasibility Study, and Intertie 1: SVWD & SCWD						
Infrastructure Resiliency & Climate Adaptation Projects						
Raw Water Storage Projects	-	560,737	571,471	465,971	349,433	1,947,612
Newell Creek Dam Inlet/Outlet Replacement Project and Aerators at Loch Lomond						
Raw Water Diversion and Groundwater System Projects	-	59,106	583,516	1,523,694	3,581,672	5,747,988
Tait Diversion Retrofit and Felton Diversion Pump Station Improvements						
Raw Water Transmission	2,115,516	26,032,567	15,774,712	3,668,262	7,665,017	55,256,073
Newell Creek Pipeline Rehab/Replacement (Felton/GHWTP & Felton/Loch Lomond), Brackney Landslide Area Pipeline Risk Reduction, and North Coast Pipeline Repair/Replacement (Phase 4)						
Water Treatment	16,193,998	35,841,816	51,486,522	40,725,195	38,416,069	182,663,601
GHWTP Concrete Tanks Replacement, GHWTP Facilities Improvement Project, Facility & Infrastructure Improvements, and River Bank Filtration Study, Beltz 12 Ammonia Removal, and Beltz Water Treatment Plant Upgrades						
Distribution System Storage, Water Main, & Metering Projects	858,572	6,109,384	1,019,676	973,320	1,007,392	9,968,345
University Tank No. 4 Rehab/Replacement, Engineering and Distribution Main Replacement Projects, Distribution System Water Quality Improvements, and Facility & Infrastructure Improvements						
Other Risk Management & Risk Reduction Projects						
Site Safety & Security	12,036	200,790	-	-	-	212,826
Graham Hill WTP Entrance Improvements, Security Camera & Building Access Upgrades, GHWTP SCADA Radio System Replacement, GHWTP SCADA I/O Comm Replacement, CMMS Software Replacement (Water share)						
Staff Augmentation -Water Program Administration	1,695,840	2,614,352	2,607,524	2,601,461	2,583,750	12,102,926
Emergency Facility Improvements and System Repair	591,502	-	-	-	-	591,502
Union/Locust Admin Building Back Up Power Generator and Branciforte Streambank Restoration						
Contingency - Water Program Management Reserve	2,626,394	8,001,620	8,607,346	1,776,219	330,044	21,341,623
TOTAL	31,910,865	109,578,835	99,522,114	64,587,345	67,236,538	372,835,696

Attachment 4.

FY 2023-28 Financial Pro Forma

FY 2023-28 Financial Pro Forma

City of Santa Cruz Water Department Pro-Forma Projections						
Year	2023	2024	2025	2026	2027	2028
Revenues						
Fixed Fee Revenue	\$ 3,849,280	\$ 4,474,198	\$ 5,201,497	\$ 5,562,041	\$ 5,947,543	\$ 6,179,256
Volumetric Revenue	\$ 40,092,547	\$ 46,116,668	\$ 53,549,702	\$ 56,572,432	\$ 60,288,764	\$ 62,637,577
Elevation Surcharges	\$ 352,788	\$ 352,788	\$ 352,788	\$ 352,788	\$ 352,788	\$ 352,788
Rate Stabilization Revenue	\$ 3,163,368	\$ 3,163,368	\$ 3,163,368	\$ 3,163,368	\$ 3,163,368	\$ 3,163,368
Manual Adjustment to approved water reven	\$ (4,850,000)	\$ (4,511,330)	\$ (6,261,317)	\$ (5,780,174)	\$ (5,275,368)	\$ -
Total Rate Revenue	\$ 42,607,984	\$ 49,595,693	\$ 57,729,386	\$ 61,712,714	\$ 65,970,891	\$ 72,332,989
Non-Rate Revenue						
Other Income	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000
Investment Income	\$ 562,044	\$ 562,044	\$ 562,044	\$ 562,044	\$ 562,044	\$ 562,044
Total Non-Rate Revenue	\$ 2,062,044	\$ 2,062,044	\$ 2,062,044	\$ 2,062,044	\$ 2,062,044	\$ 2,062,044
Total Revenues	\$ 44,670,028	\$ 51,657,737	\$ 59,791,431	\$ 63,774,758	\$ 68,032,936	\$ 74,395,033
Operating Expenses						
Personnel	\$ 16,582,877	\$ 17,623,252	\$ 18,734,656	\$ 19,922,352	\$ 21,192,020	\$ 22,549,790
Services, Supplies & Other	\$ 14,407,688	\$ 15,128,073	\$ 15,884,476	\$ 16,678,700	\$ 17,512,635	\$ 18,388,267
Capital Outlay	\$ 394,171	\$ 413,880	\$ 434,574	\$ 456,302	\$ 479,117	\$ 503,073
Other Operating Expenses	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Operating Expenses	\$ 31,384,737	\$ 33,165,204	\$ 35,053,706	\$ 37,057,355	\$ 39,183,772	\$ 41,441,131
Net Operating Revenues	\$ 13,285,291	\$ 18,492,533	\$ 24,737,724	\$ 26,717,404	\$ 28,849,163	\$ 32,953,902
Capital Expenditures						
Grant Funded	\$ 63,437,941	\$ 53,448,020	\$ 109,578,833	\$ 99,522,116	\$ 64,587,345	\$ 67,240,538
SRF Funded	\$ 490,020	\$ 5,043,995	\$ 7,964,084	\$ 1,030,000	\$ -	\$ -
WIFIA Funded	\$ 36,150,813	\$ 12,580,383	\$ 6,295,419	\$ 652,975	\$ 465,971	\$ 349,433
Currently Funded	\$ 4,000,000	\$ 16,491,999	\$ 58,517,320	\$ 54,898,833	\$ 40,739,034	\$ 2,565,960
Pay-Go Funded	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Debt Funded (Bonds or Line of Credit)	\$ 15,113,966	\$ 10,186,901	\$ 12,333,159	\$ 14,253,192	\$ 11,093,588	\$ 10,026,066
Debt Service	\$ 7,683,142	\$ 9,144,742	\$ 24,468,851	\$ 28,687,116	\$ 12,288,752	\$ 54,299,079
Net Income	\$ 5,201,605	\$ 7,392,912	\$ 11,402,037	\$ 11,400,749	\$ 13,794,998	\$ 18,823,618
Total Cash Balances	\$ (7,030,280)	\$ 912,720	\$ 1,002,528	\$ 1,063,463	\$ 3,960,578	\$ 4,104,218
Ending Cash Balances by Fund						
Fund 717 (Emergency Reserve)	\$ 3,014,540	\$ 3,000,000	\$ 3,000,000	\$ 3,000,000	\$ 3,000,000	\$ 3,000,000
Fund 713 (Rate Stabilization)	\$ 10,000,000	\$ 10,000,000	\$ 10,000,000	\$ 10,000,000	\$ 10,000,000	\$ 10,000,000
Fund 716 (90 Day Operating Reserve)	\$ 7,738,702	\$ 8,177,722	\$ 8,643,380	\$ 9,137,430	\$ 9,661,752	\$ 10,218,361
Fund 711 (Water Operations)	\$ 7,738,702	\$ 8,226,943	\$ 8,763,813	\$ 9,333,226	\$ 12,769,481	\$ 16,317,090
Coverage and Targets						
Debt Service Coverage (W/Out Reserves)	2.55x	2.50x	2.17x	2.34x	2.09x	1.75x
Debt Service Coverage Target	1.50x	1.50x	1.50x	1.50x	1.50x	1.50x
Days' Cash (Includes only Funds 711 & 716)	180	181	181	182	209	234
Days' Cash Target	180	180	180	180	180	180



WATER COMMISSION INFORMATION REPORT

DATE: 04/26/2023

AGENDA OF: 05/01/2023
TO: Water Commission
FROM: Heidi Luckenbach, Deputy Director/Engineering Manager
SUBJECT: Water Supply Augmentation

RECOMMENDATION: Receive information on the water resource optimization study and groundwater modeling underway through the Groundwater Sustainability Plan Implementation Grant for the Mid-County Groundwater Basin and provide feedback.

Receive information about updated quarterly report format for water supply augmentation work and provide feedback.

BACKGROUND and DISCUSSION: This item covers two elements of ongoing water supply efforts including A) an overview and update of the work being performed in the Mid-County Groundwater Basin (MCB) funded through the 2021 Sustainable Groundwater Management (SGM) Grant Program, and B) a draft template for future quarterly reporting on water supply augmentation. A presentation will be provided at the meeting; feedback on both items is welcome.

A. Santa Cruz Mid-County Groundwater Agency Grant-Funded Work

The City of Santa Cruz is a member agency of the joint powers agency responsible for the Santa Cruz Mid-County Groundwater Agency (MGA), the sole source of water for the Soquel Creek Water District (District or SqCWD) as well as the basin supporting the City of Santa Cruz's (City or COSC) Beltz wellfield. Created in 2016 following the passage of the 2014 Sustainable Groundwater Management Act (SGMA), the MGA is responsible for the development and implementation of a Groundwater Sustainability Plan (GSP). The GSP, submitted January 31, 2020, includes a variety of projects and management actions (PMAs) designed to support achieving groundwater sustainability in the basin by 2040 and to maintain sustainability for an additional 50 years.

State funding for the development of GSPs in critically over-drafted basins such as the MGB has been an important source of financial resources; the initial PMA implementation funding is the 2021 Sustainable Groundwater Management (SGM) Grant Program. In February 2022, City Council adopted a resolution supporting an application to the California Department of Water Resources (DWR) Sustainable Groundwater Management Grant Program to support

implementation of the PMAs. Also in February 2022, the MGA submitted a grant funding proposal to DWR and was subsequently awarded \$7.6 million.

In September 2022, MGA entered into an Agreement with DWR under which MGA will be the Grantee to receive funds authorized under the SGMA Implementation Grant. The Grant Agreement presents the work as five distinct Components, each with a scope of work, budget, and schedule. The five Components, the implementing agency and the amount of the award are as follows and shown in more detail in Attachment 1

- Component 1: Cunnison Lane Groundwater Well; Soquel Creek Water District; \$1.675 million;
- Component 2¹: Aquifer Storage and Recovery (ASR) in the Beltz Well Field; City of Santa Cruz; \$1.65 million;
- Component 3: Park Avenue Transmission Main/Bottleneck Improvements; Soquel Creek Water District; \$800,000;
- Component 4: Technical Development of GSP Projects and Management Actions (Optimization Study); \$1.9 million;
 - Optimization Study less Groundwater Modeling; Soquel Creek Water District; \$950,000;
 - Groundwater Modeling; City of Santa Cruz; \$950,000; and
- Component 5: Sustainable Groundwater Management Evaluation and Planning; MGA and County of Santa Cruz; \$1.575 million.

MGA, as Grantee, will receive and administer the distribution of Grant funds to each local project sponsor pursuant to the Grant Agreement. While this is a zero-match grant, any additional funds required to complete the various components would be the responsibility of the member agencies leading project components or sub-tasks, as appropriate. The grant funds at least \$2.6 million in activities that will have a direct benefit to the Water Department and will replace Water Enterprise-funding for this work.

Staff from both the City and District have and will continue to participate collaboratively for all efforts associated with Component 4, although SqCWD is leading Component 4 and the City is leading Sub-Task 2, Groundwater Modeling.

The Optimization Study conducts a water resources optimization study for the MGB to inform the water agencies on longer-term projects and operational strategies that will meet the sustainable management criteria (SMC) of the GSP while meeting water supply needs of water agencies in the most efficient manner possible. PMAs include, but are not limited to, the relocation of coastal wells, increased aquifer recharge through ASR and the expansion of the Pure Water Soquel Project (PWS), and water transfers and exchanges, as well as portfolios of these projects. As shown in Attachment 1, the study includes groundwater and hydraulic modeling, environmental and feasibility considerations, as well as capital, operating and unit costs of water. Evaluation criteria developed over the years of supply planning for the City and most recently with the Water Commission during the development of the Securing our Water Future (SOWF) policy will be used in the evaluations.

¹ Component 2 will fund the design and construction of two ASR wells, Beltz 8 and 12, to permanent facilities. Proposals are currently being solicited for design.

With respect to the groundwater modeling, the City and District have been engaged for many years on water supply planning and groundwater management efforts and have worked on the groundwater modeling with Errol L. Montgomery & Associates, Inc. (aka Montgomery & Associates or M&A) and formerly HydroMetrics Water Resources, Inc. (acquired by M&A in 2018) since the mid-2000s. In addition, M&A provided the groundwater modeling support to the MGA to develop the GSP.

M&A has committed to provide the negotiated scope of work (SOW) for a not-to-exceed amount of \$467,000. Funding of this effort is included in the Fiscal Year (FY) 2022-23 Budget. As discussed, this is a zero-match grant, and the MGA will distribute grant funds to the City.

The SOW is organized as follows.

- Task 1: Validate Model
- Task 2: Re-Calibrate Model (As-Needed Task)
- Task 3: Initial Groundwater Simulations
- Task 4: Develop Alternate Climate Scenario
- Task 5: Reporting
- Task 6: Coordination and Meetings
- Task ML: Optional Machine Learning Development, Use and Documentation

Below are some of the more significant questions being addressed in the M&A groundwater modeling effort.

- How much water (through ASR and/or recycled water) can the MGB hold?
- How much of the City's supply gap can be filled while maintaining sustainable management criteria?
- What are the opportunities and constraints of operating the Pure Water Soquel and ASR projects together? How could their operations be optimized?
- How can the agencies efficiently build on PWS and/or ASR to meet water reliability goals and SMC?
- What role can water transfers/exchanges (passive recharge) between SqCWD and COSC play?
- Similarly, how much additional capacity do existing groundwater wells owned and operated by SqCWD and COSC have?
- Would SqCWD's O'Neill Ranch Well be a good candidate for ASR?
- For PWS and ASR, what are long-term sustainable injection and extraction (for ASR only) rates?
- What project(s) can efficiently meet the SMCs?

The term of the grant is through May 2025 and all Components are on schedule for completion December 2024.

B. Water Supply Quarterly Report Template and Content

The Water Commission has played a key role in advancing the recommendations of the Water Supply Advisory Committee (WSAC) since November 2015 when the City Council and the Water Commission held a joint meeting at which the citizen-led Water Supply Advisory Committee's Final Report on Agreements and Recommendations (October 2015) was presented and discussed. At their November 24, 2015 meeting, City Council accepted the Final Report, directed staff to integrate the WSAC-recommended water supply packaged strategy into the Urban Water Management Plan update, directed the Water Commission to assume policy-level oversight of the implementation of the agreements and recommendations, and supported staff's continuing public information and engagement on water supply strategy.

Recognizing that significant progress has been made in the intervening years, and that the Optimization Study will be completed in December 2024 supporting the Water Supply Augmentation Implementation Plan² (WSAIP), it is appropriate to modify the report structure. The goal remains the same, to support the Commission's ongoing participation in moving the SOWF policy objective forward. The report structure (Attachment 2) will be less exhaustive than previous versions but will include brief narratives to summarize activities performed in the prior quarter and anticipated activities in the next quarter, schedules and delays, project issues or risks, and budget status. Reports will be supplemented with detailed General Business items over the next 18-24 months including the following tentative schedule of items:

- June 2023: Review Groundwater Sustainability Plans, including Santa Margarita and Mid-County groundwater basins and PMAs for both basins; revisit water supply gap with updated customer demands.
- August 2023: Review initial water supply alternatives and evaluation criteria; review of recycled water supply volumes and source reliability; groundwater model preliminary results.
- January/February 2024: Update on direct potable reuse regulations; review potential for combined Direct Potable Reuse (DPR)/desalination treatment process.

FISCAL IMPACT: None.

PROPOSED MOTION: Regarding Item A, Santa Cruz Mid-County Groundwater Agency Grant-Funded Work, no motion is required and staff recommend the Commission receive information and provide feedback to staff on the material presented.

Regarding Item B, Water Supply Quarterly Report Template and Content, no motion is required and staff recommend the Commission receive information and provide feedback to staff on the proposed revised format and content for quarterly water supply augmentation work.

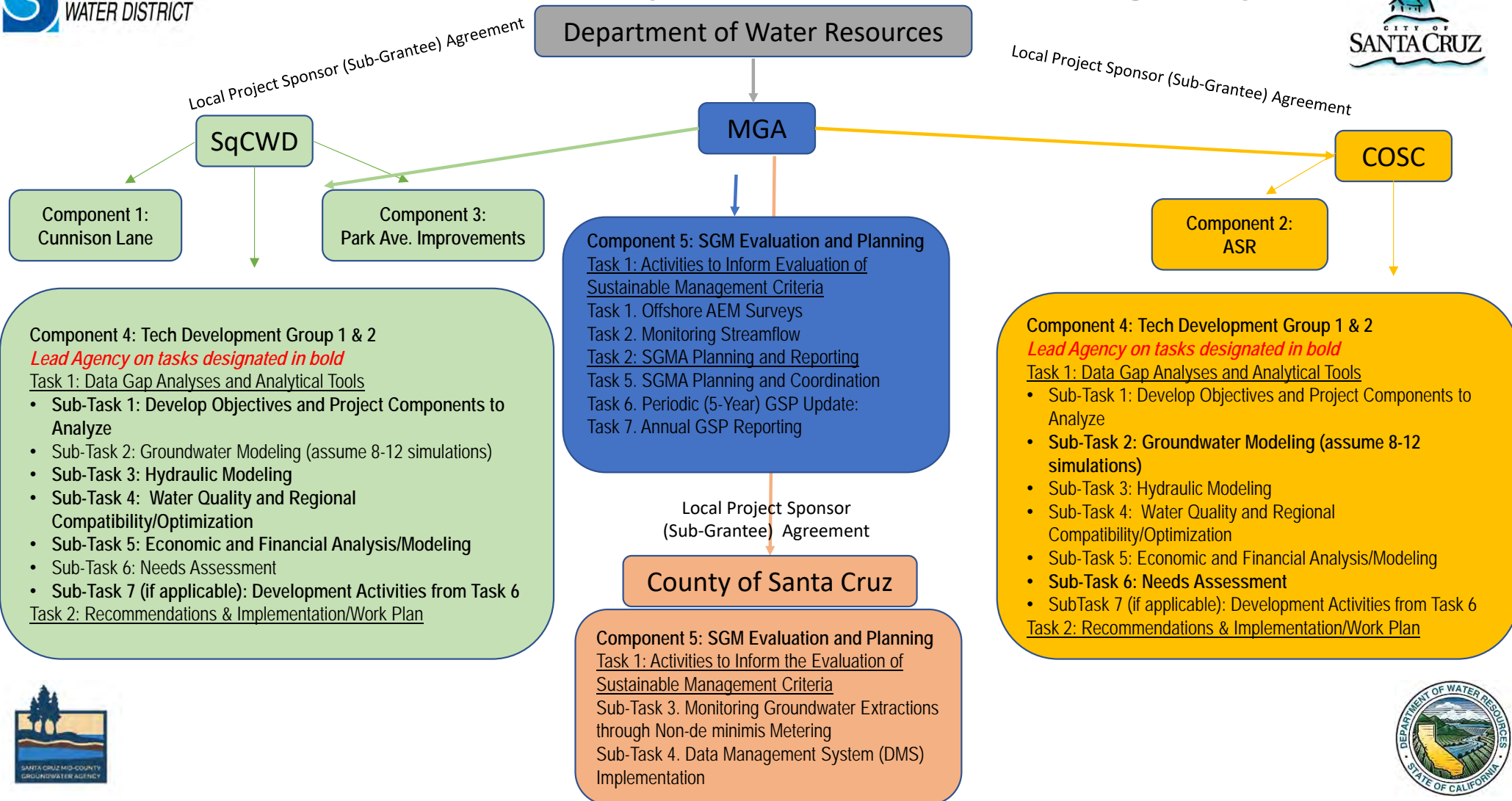
ATTACHMENT(S):

1. DWR Grant Components and Lead Agency
2. Quarterly Reporting Template

² At the meeting staff will review the relationship with the Commission between the various work efforts including but not limited to the SOWF, WSAIP, and Optimization Study.



DWR Grant Components and Lead Agency





Progress Report

Accomplishments & Work Completed in the Reporting Period

Water Supply Augmentation (Program # 3.1)	<input checked="" type="checkbox"/>	<i>WSA Program Level</i>	<input type="checkbox"/>	<i>WSA Project</i>
<ul style="list-style-type: none"> Completed: Hired Montgomery for groundwater modeling for the SGMA grant optimization study. Kick-off on Thursday. Accomplishment: WIFIA application approved by City Council 3/28, includes U4 tank replacement, WTP improvements, NCP pipeline replacement and ASR. \$127M Completed: Demand forecast update by D Mitchell. Presentation to Water Commission March 6. 				
Aquifer Storage & Recovery (Program #3.3)	<input checked="" type="checkbox"/>	<i>WSA Program Level</i>	<input type="checkbox"/>	<i>WSA Project</i>
<ul style="list-style-type: none"> Accomplishment: Released RFQ for Beltz 8 & 12 ASR Design (part of SGMA grant). Completed: Shut down ASR Demonstration Study Year 2 injection Accomplishment: Reviewed Beltz 9 Pilot Test Work Plan and began preparing for the start of piloting in November Accomplishment: Progress on BCE for 4th ASR well 				
Recycled Water (Program # 3.2)	<input type="checkbox"/>	<i>WSA Program Level</i>	<input checked="" type="checkbox"/>	<i>WSA Project</i>
<ul style="list-style-type: none"> Accomplishment: Collaboration with Public Works Department to establish project team 				
Regional Collaboration (Program # NA)	<input type="checkbox"/>	<i>WSA Program Level</i>	<input checked="" type="checkbox"/>	<i>WSA Project</i>
<ul style="list-style-type: none"> Completed: Kick off meeting with KJ for design of intertie with Scotts Valley Water District (grant funded separately) 				

Schedule Updates **On Schedule?** **Yes** **No (If no, detail corrections/implications below)**

Attached and linked:
https://santacruzwater.sharepoint.com/sites/cosc/Program_Controls/Forms/AllItems.aspx?FolderCTID=0x0120004F366B480B28A44280D68D1AF4EE3C5F&viewid=f56f40e1%2Dac98%2D4772%2D9448%2D069754bc36cd&id=%2Fsites%2Fcosc%2FProgram%5FControls%2FSchedules

- Water Supply Augmentation
- Alternatives determination: May 2023
 - Groundwater modeling complete: to be confirmed following kick-off meeting
 - Draft report: Aug 2024
 - Final report: Dec 2024
- Aquifer Storage & Recovery
- Demonstration Project Year 2 Beltz Wells 8 & 12: March 2023 – Oct 2023
 - Proposal for Beltz 9 Infrastructure Improvements: April 2023
 - Complete Beltz 8/ 12 Permanent Design: December 2023
 - Complete Beltz 8/ 12 Permanent Construction: December 2024
 - BCE on “4th” ASR well – May 2023 (tentative)

Project Name: Water Supply Augmentation Program
 City Program Manager: H. Luckenbach
 PDM Stage: P1

Reporting Date: April 27, 2023
 Work Performed Through: April 18, 2023

Financial Status **On budget?** **Yes** **No (If no, detail corrections/implications below)**
Attached and linked [WSA 3-series spending updates Sept 2022.xlsx \(sharepoint.com\)](#)

This information should be viewed within the context of work to be performed through FY26.

- On budget.

New Opportunities Identified (technical or regional partnership)? **Yes (If yes, provide detail)** **No**

None at this time.

Near Term Activities (Next Quarter):

Project	Activity	Responsible Party
WSA 3.1	<ul style="list-style-type: none"> Revisit supply alternatives for GW model and WSAIP Confirm UMass model assumptions Planning for Supply Modeling Workshops –April 2023 (delayed due to staffing at UMass) Risk meeting: Revisit risk register and plan for timing of next risk meeting 	Heidi, Taylor, Sarah, SqCWD, KJ
ASR 3.3/3.4	<ul style="list-style-type: none"> Evaluate SOQs for Beltz 8 & 12 ASR Design & negotiate contract with selected consultant Scoping for HDR hydraulic modeling of existing Beltz Train City staff for year two of demonstration study at Beltz 8 and 12 Beltz 9 Pilot Test: prepare for start of injection in November 2023 (tentative) Developing criteria and plan for selecting 4th ASR well to pilot Quarterly reports for RWQCB Monitoring and Reporting Program Ongoing coordination with Ops, Beltz 12 Ammonia Treatment, and Intertie teams regarding ammonia in the distribution system Ongoing coordination with Beltz WTP Upgrades team regarding treatment plant upgrades (10% design) and Beltz 8 & 12 permanent ASR facilities design 	Leah, Jillian, Heidi, Pueblo
Recycle d Water 3.4	<ul style="list-style-type: none"> None 	
Reg Collab	<ul style="list-style-type: none"> SOP for water transfers with SqCWD through the intertie; follow up to confirm complete MGA <ul style="list-style-type: none"> Ongoing grant coordination with Soquel and IRWM for Optimization Study SMGWA – no new report, awaiting status of grant application 	Terry M, Chris C, Jason S

Project Name: Water Supply Augmentation Program
City Program Manager: H. Luckenbach
PDM Stage: P1

Reporting Date: April 27, 2023
Work Performed Through: April 18, 2023

Additional Support Needed?	<input checked="" type="checkbox"/> Yes (If yes, provide detail)	<input type="checkbox"/> No
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1. Evaluating need for additional hydrogeologist (broader than WSA- continue conversation city vs county-wide initiative)

Project Risks:
Attached and linked:
https://santacruzwater.sharepoint.com/sites/cosc/Risk_Mgmt/Forms/AllItems.aspx?viewid=0e1afe46%2D0700%2D44d4%2D8772%2Df6b9950b0039&id=%2Fsites%2Fcosc%2FRisk%5FMgmt%2FPROJECT%20Risk%20Registers

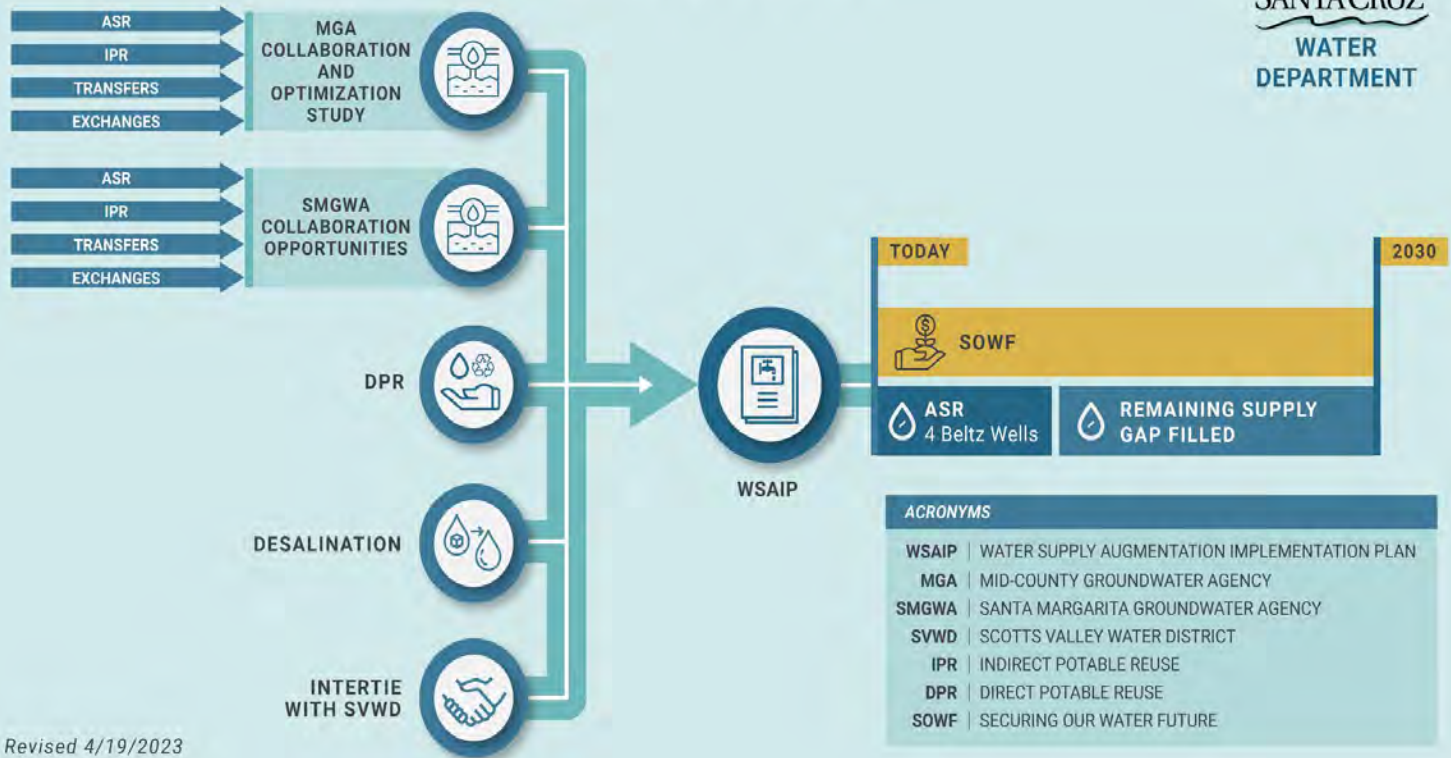
Status of Potential Changes
<https://santacruzwater.sharepoint.com/sites/cosc/Lists/Change%20Log/AllItems.aspx>

Relevant Links:

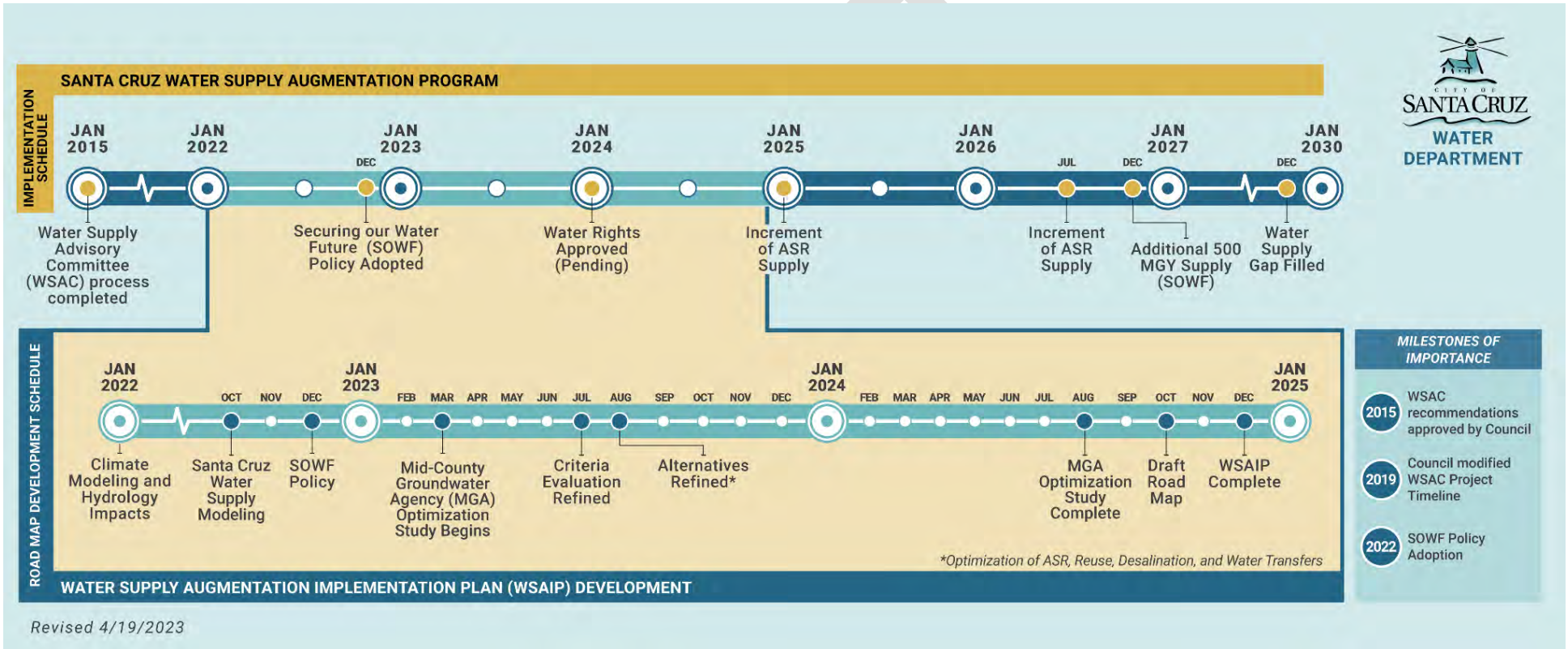
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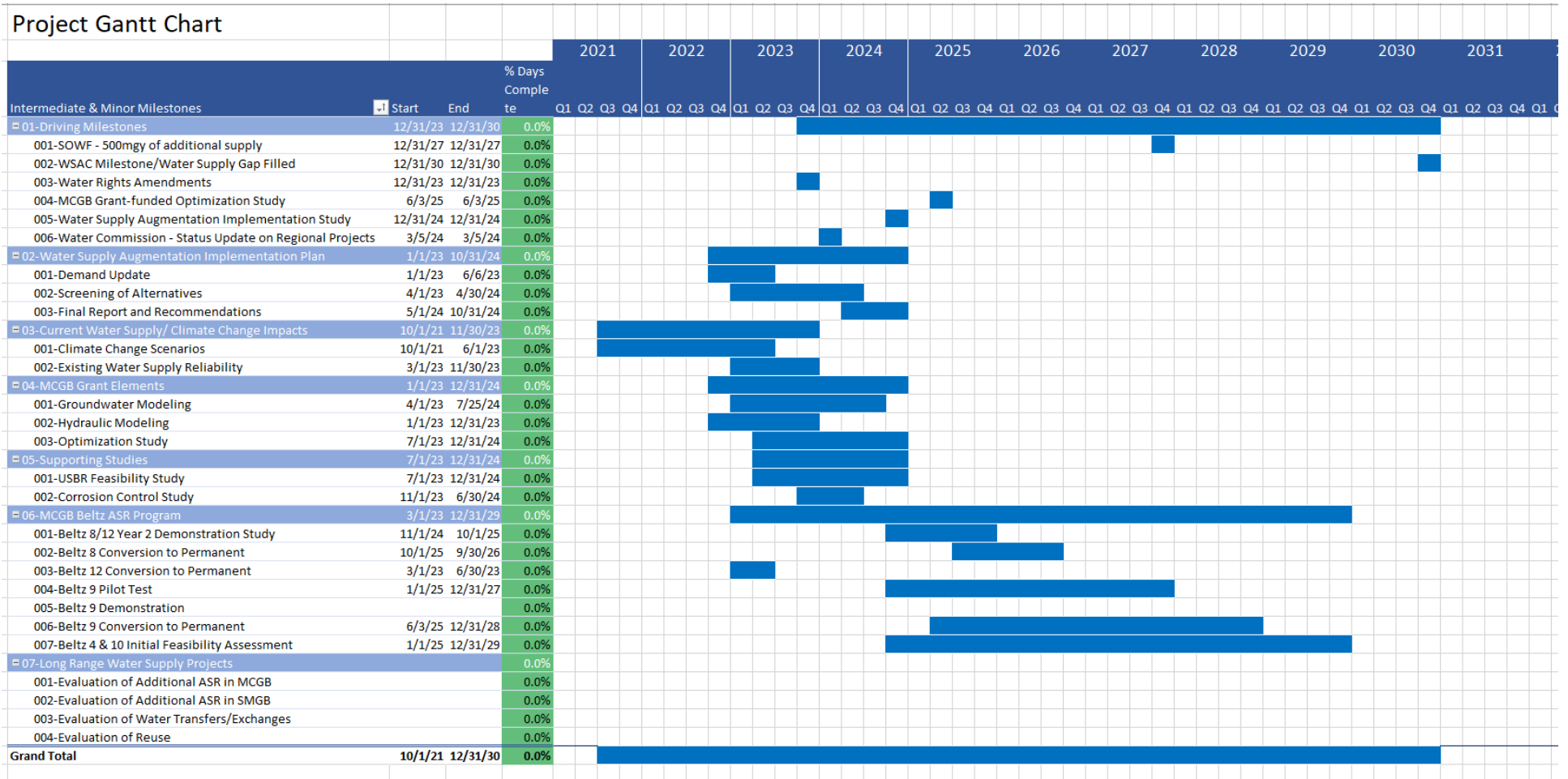


WATER SUPPLY AUGMENTATION PROGRAM COMPONENTS



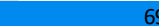

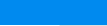



Revised 4/19/2023





As of 04/10/2023

Water Program Number	City Project Number	FY22 Balance	FY23 Budget	FY23 Encumbered	FY23 Actual Spent	FY23 Projected for New POs/ Amendments/ Contract Rev	Available for New POs	Vendors
3.1	c701705 – Water Supply Augmentation (O) <i>Includes: analysis of non-specific supply alternatives, planning level work, modeling Umass, Raucher, Fiske, etc) WSAIP, SOWF</i>	\$ 618,676	\$ 2,119,721	\$ (1,521,211)	\$ (481,859)		\$ 735,327	City staff HDR Gary Fiske Kennedy Jenks/ Umass Simon Fraser University David Mitchell Montgomery & Assoc Black & Veatch
3.2	c701611 – Recycled Water Feasibility Study <i>Includes: recycled water study design & construction of 6" tertiary line at WWTF</i>	\$ 738,417	\$ -	\$ (520,723)	\$ (15,441)		\$ 202,253	Kennedy Jenks Soquel Creek Water District
3.2	c701612 – Recycled Water - SDC	\$ 205,923	\$ -	\$ (202,944)	\$ -		\$ 2,979	Soquel Creek Water District
3.3	c701609 – ASR Planning (O) <i>Includes: evaluation of ASR alternatives through piloting , water quality analyses (e.g., ammonia), new well siting MW, rehab, site prep, well capacity analysis, BOD</i>	\$ 1,222,703	\$ 718,540	\$ (311,979)	\$ (612,657)		\$ 1,016,607	Pueblo Water Resources Kennedy Jenks Consort (Nathan Nutter) Montgomery & Assoc Pacific Surveys Montgomery & Assoc Dudek
3.3	c701610 – ASR Planning- SDC	\$ 398,375	\$ -	\$ -	\$ -		\$ 398,375	Pueblo Water Resources
3.3.1	c702101 ASR Mid County Existing Infrastructure (C) <i>Includes: efforts leading to full scale operation of specific ASR alternative using existing infrastructure SWRCB or RWQCB Permit Fees</i>	\$ 1,021,502	\$ 1,261,950	\$ (321,138)	\$ (187,089)		\$ 1,775,225	Pueblo Water Resources Precision Hydro
3.3.2	c702102 ASR Mid County New Wells (C)	\$ 219,000	\$ 45,541	\$ -	\$ -		\$ 264,541	TBD
3.4	c702103 ASR and SMGWB (currently O) <i>Includes: efforts in the SMGWB, ASR, IPR, other</i>	\$ 165,000	\$ 36,306	\$ (23,382)	\$ -		\$ 177,924	

Issues							
Issue	Comments	Status	Issue Age	Consequence#	Likelihood#	Priority Score	
Beltz 12 Ammonia Treatment	Could impact extraction rates or volumes	Open	 69	5	5	25	
Beltz WTP Upgrades	Small site may limit production volumes	Open	 46	4	4	16	
ASR impacts to Private Wells	May limit injection and extraction rates	Open	 46	3	5	15	
Corrosion Study	Study underway to better understand issue and impact	Open	0	4	2	8	
Water Rights Amendments	Possible delays to ASR and other regional projects	Open	 62	5	1	5	
Permitting	Status of DPR permitting unknown	Open	 18	1	5	5	
Source Water Reliability- Climate Change	Impact to source water availability unknown	Open	 24	3	1	3	
Source Water Reliability- Infrastructure	Impact to water available for diversion to ASR	Open	0	2	1	2	
Funding	Watchlist	Ignore	0	4	2	0	
ASR impacts to coastal MW levels or WQ	May require modifications to ASR operations	Closed	0	5	4	0	

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Capital News & Notes

For Clients & Friends of The Gualco Group, Inc.

IN THIS ISSUE – "...the fish are the senior right holders of the water. Remember that. Not humans."

Karuk tribal elder on water rights

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- [**Legislature Dives Into Water Rights Inquiry: "Not An Easy Conversation"**](#)
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Capital News & Notes (CN&N) harvests California policy, legislative and regulatory insights from dozens of media and official sources for the past week. Please feel free to forward this unique client service.

FOR THE WEEK ENDING MAR. 10, 2023

Newsom's Road Trip – Governor Breaks Tradition with Traveling State of the State Speech

Politico's California Playbook

Breaking with decades of tradition, Newsom will forgo a formal State of the State address in Sacramento and instead embark on a multi-day tour of California next week to unveil his policy agenda for the year, according to his office.

Rather than the usual remarks before elected leaders at the Capitol, Newsom plans to subsequently submit to the Legislature a letter summarizing his announcements from the tour, which is scheduled for March 16-19. **The governor's office declined to provide a detailed itinerary.**

Anthony York, **Newsom's senior advisor for communications and strategy, in a statement:** "Building on his inaugural address and January budget, the Governor looks forward to fulfilling his constitutional obligation to update the Legislature on the state of the state — and joining lawmakers across California to outline transformative policy proposals that will strengthen **our communities.**"

The State of the State address developed from a requirement in the [California Constitution](#) that **"the Governor shall report to the Legislature each calendar year on the condition of the State and may make recommendations."**

For a long time, this was accomplished through a written report, according to Alex Vassar, communications manager for the California State Library.

Then in the 1940s, news reports indicate that then-Gov. Earl Warren began accompanying the report with a speech.

Depending on the governor, the State of the State address has been a high-profile platform to launch major new endeavors or a bothersome afterthought. Sometimes both.

Newsom's first two State of the State addresses, in the Assembly chamber, featured pronouncements about the high-speed rail and homelessness. Then he went even bigger, delivering slickly produced remarks from Dodger Stadium that served as the kickoff to his recall defense campaign. Last year, he spoke for an uncharacteristically brief 18 minutes in the auditorium of the state natural resources agency headquarters. Former Gov. Gray Davis praised Newsom for taking his message out of the Capitol and directly to Californians. With technology changing how citizens engage with their government and people less likely to tune in for a speech, Davis added, the tour gives Newsom a better opportunity to connect with his constituents — as long as he listens as much as he speaks.

Davis: "Bringing the dialogue to communities up and down the state is wise. It engages the communities."

Legislature Dives Into Water Rights Inquiry: "Not An Easy Conversation"

LA Times

It's an arcane system of water law that dates back to the birth of California — an era when 49ers used sluice boxes and water cannons to scour gold from Sierra Nevada foothills and when the state government promoted the extermination of Native people to make way for white settlers.

Today, this antiquated system of water rights still governs the use of the state's supplies, but it is now drawing scrutiny like never before.

In the face of global warming and worsening cycles of drought, a growing number of water experts, lawmakers, environmental groups and tribes say the time has finally come for change. Some are pushing for a variety of reforms, while others are calling for **the outright dismantling of California's contentious water rights system.**

Calls for reform were heightened recently when the environmental group Restore the Delta released an analysis that concluded that the people who make decisions about **California's water are overwhelmingly white and male.**

"The whole water rights system sits on a foundation of racism and violence," said Max Gomberg, a former State Water Resources Control Board staffer who has sharply **criticized the Newsom administration and now works with the environmental group. "It needs to be abolished."**

The report was released as state lawmakers held a hearing on several reform proposals that would address longstanding problems within the water rights system.

"This is not an easy conversation, but I think it's long overdue," said Assemblymember Rebecca Bauer-Kahan (D-Orinda), who chairs the Water, Parks and Wildlife Committee. **Bauer-Kahan said there are many signs the existing system is "not functioning well and equitably," including the "inability to halt illegal diversions."**

During the hearing, experts such as Richard Frank, a UC Davis law professor, argued for a **“more nimble system,”** while Ellen Hanak, director of water policy for the Public Policy Institute of California, said the changing climate is stressing the water rights system. **“We’re confronting 21st century climate change, drought and water supply problems with a 20th century system of California water infrastructure and a 19th century system of water rights, and that’s a problem,”** said Frank, director of the California Environmental Law and Policy Center.

Hanak and other researchers urged the Legislature to clarify that the State Water Board has the authority to enforce and curtail all water rights, including the oldest **“senior”** water rights, called riparian rights and pre-1914 rights. They also called for enabling the board to respond more quickly to dry conditions by relaxing requirements that limit when the agency can curtail diversions from rivers and streams.

The researchers recommended renegotiating senior water users’ contracts for supplies from the Central Valley Project and the State Water Project, California’s two main systems that transport water from the Sacramento-San Joaquin River Delta. They said the current contracts promise larger water deliveries than the delta can support in dry years.

Felicia Marcus, a researcher at Stanford University and former chair of the State Water Board, warned that **“the crises ahead will make our crises today look like a picnic. So we need to invest in a system that will work for everyone.”**

For example, she noted, senior water rights holders do not have to obtain a permit and do not pay any fees to administer the system, while others with more junior rights are required to do both. She said enforcement is complex and unwieldy, and the state **needs a system that is “more transparent and implementable.”**

Bauer-Kahan has introduced a bill that she says would help the State Water Board effectively enforce water rights and curb illegal water diversions. The legislation, AB 460, would authorize the board to issue larger fines of up to \$10,000 per day for violations, plus additional amounts for water illegally diverted.

Other recently introduced bills would expand the State Water Board’s enforcement authority or its authority to investigate whether water is being legally diverted under a valid right.

Environmental advocates and tribal leaders have supported the proposals but are also calling for deeper changes, citing entrenched inequities.

Recently, two Department of Water Resources employees used software that analyzes **people’s surnames in an attempt to determine their race and applied it to state water records** in an analysis titled “Who makes decisions about California’s water?”

They analyzed the names of about 1,500 directors of local water agencies, and estimated — for those whose names could be classified — that approximately 86% were white and 78% were male. They found lack of diversity was especially pronounced for agricultural water districts, estimating that 92% of the directors are white and 92% are male.

They also analyzed state water rights data. Although the rights to much of the state's water are controlled by institutions, such as agricultural irrigation districts and urban water districts, an estimated 1% to 2% of water diversions are listed under the names of individuals. Of nearly 14,000 water rights holders, an estimated 91% are probably white, they said.

They posted the analysis and data online on a state server, and the information was circulated on LinkedIn. The Department of Water Resources later removed the data. Margaret Mohr, a DWR spokesperson, said the department removed the demographic **data on water rights and local water agencies "because it was analyzed using predictive racial and gender modeling that can misidentify people and the data included a collection of personal information that should not have been posted publicly in that manner."**

"DWR is working to develop and determine a more appropriate method of collecting and reporting equity data as part of the 2023 update to the California Water Plan," Mohr said in an email.

Barbara Barrigan-Parrilla, executive director of Restore the Delta, said the agency's decision to suppress the analysis was alarming.

"California water rights were created by taking away land and water from tribes. And as the water rights system developed, you had a parallel set of laws, customs and practices in California that redlined people of color out of land ownership near water," Barrigan-Parrilla said. **"It is just a continuation of the discriminatory practices that began in the creation of a system that was racist, and now it's institutionalized discrimination that continues."**

During the 1800s, as white settlers staked their water claims, they sometimes simply nailed a notice to a tree. California still recognizes water rights based on those old claims, as well as riparian rights based on land ownership next to rivers and streams. **Rights to surface water under the state's prior-appropriation system follow a "first-in-time, first-in-right" order. And rights since 1914 fall under a state permit process.**

Groundwater remained unregulated until 2014, when the state passed the Sustainable Groundwater Management Act, which is intended to combat widespread problems of overpumping.

Restore the Delta is part of a coalition of tribes and environmental groups that in December filed a federal civil rights complaint against the State Water Board, alleging discriminatory water management practices. They have called for overhauling the rights system, pointing to a legacy of racism that long prevented tribes and people of color from securing water rights.

Malissa Tayaba, vice chair of the Shingle Springs Band of Miwok Indians, said the **findings of the data analysis reflect California's history of removing tribes from their homelands through colonization and state-supported genocide.**

Tayaba said that although the current water rights system "excluded us and continues to do so to this day, we know that tribes have inherent and sovereign water rights that we will continue to fight for."

During last week's legislative hearing, some argued that reexamining the system must address the effects of systemic racism.

"The system is deeply flawed in addressing equity. We need to examine the degree to which water rights are linked with wealth, power and privilege," said Elizabeth Salomone, manager of the Russian River Flood Control and Water Conservation Improvement District.

Others discussed the difficulty of enforcing rules under such an antiquated system. Last summer, one agricultural irrigation district defied drought regulations and drained water from the Shasta River, violating flow requirements intended to protect salmon. The State Water Board fined the Shasta River Water Assn. the maximum amount for the violation: \$4,000.

"The maximum total penalty that the state board could impose for these violations, these intentional violations of their curtailment regulations, was clearly not a deterrent," said Yvonne West, director of the board's office of enforcement. **"It demonstrated a lot of the enforcement challenges that we face."**

The illegal taking of water from the Shasta River was devastating for struggling fish species in the Klamath River and its tributaries, where ash-filled runoff from the McKinney fire had just recently killed tens of thousands of fish, said Arron "Troy" Hockaday, a Karuk Tribe council member.

"I cried. I'm so emotional right now," Hockaday said. **"Seeing what they did is devastating. It's our future. It's our future for our children, our culture, our way of life."** He said the Karuk Tribe supports the measures to strengthen enforcement in Bauer-Kahan's bill.

"We're not against the farmers," Hockaday said. **"But at the same time, the fish are the senior right holders of the water. Remember that. Not humans. The fish are the senior right holders."**

https://www.latimes.com/environment/story/2023-03-06/is-californias-antiquated-water-rights-system-racist?utm_id=88836&sfmc_id=623456

[Open the Floodgates – Serial Atmospheric Rivers Challenge California's Complex Water Management](#)

CalMatters

Two winters' worth of snow has already fallen in the Sierra Nevada since Christmas, pulling California from the depths of extreme drought into one of its wettest winters in memory.

But as a series of tropical storms slams the state, that bounty has become a flood risk **as warm rains fall on the state's record snowpack, causing rapid melting and** jeopardizing Central Valley towns still soggy from January's deluges.

The expected surge of mountain runoff forced state officials today to open wider the **"floodgates" of Lake Oroville and other large reservoirs that store water for millions of** Southern Californians and Central Valley farms. Releasing the water will make room for **the storm's water and melted snow, prevent the reservoirs from flooding local** communities — and send more water downstream, into San Francisco Bay.

The increased flows in the Sacramento-San Joaquin Delta could help endangered salmon migrate to the ocean.

So what's the downside? These same storms are prematurely melting a deep and valuable snowpack that ideally would last later into the spring and summer, when farmers and cities need water the most.

The storms have created a tricky situation for officials who manage state and federal reservoirs in California, since they have to juggle the risk of flooding Central Valley communities with the risk of letting too much water go from reservoirs. They must strike a balance between holding as much water in storage, as long as they can, while maintaining room in reservoirs for more water later in the season.

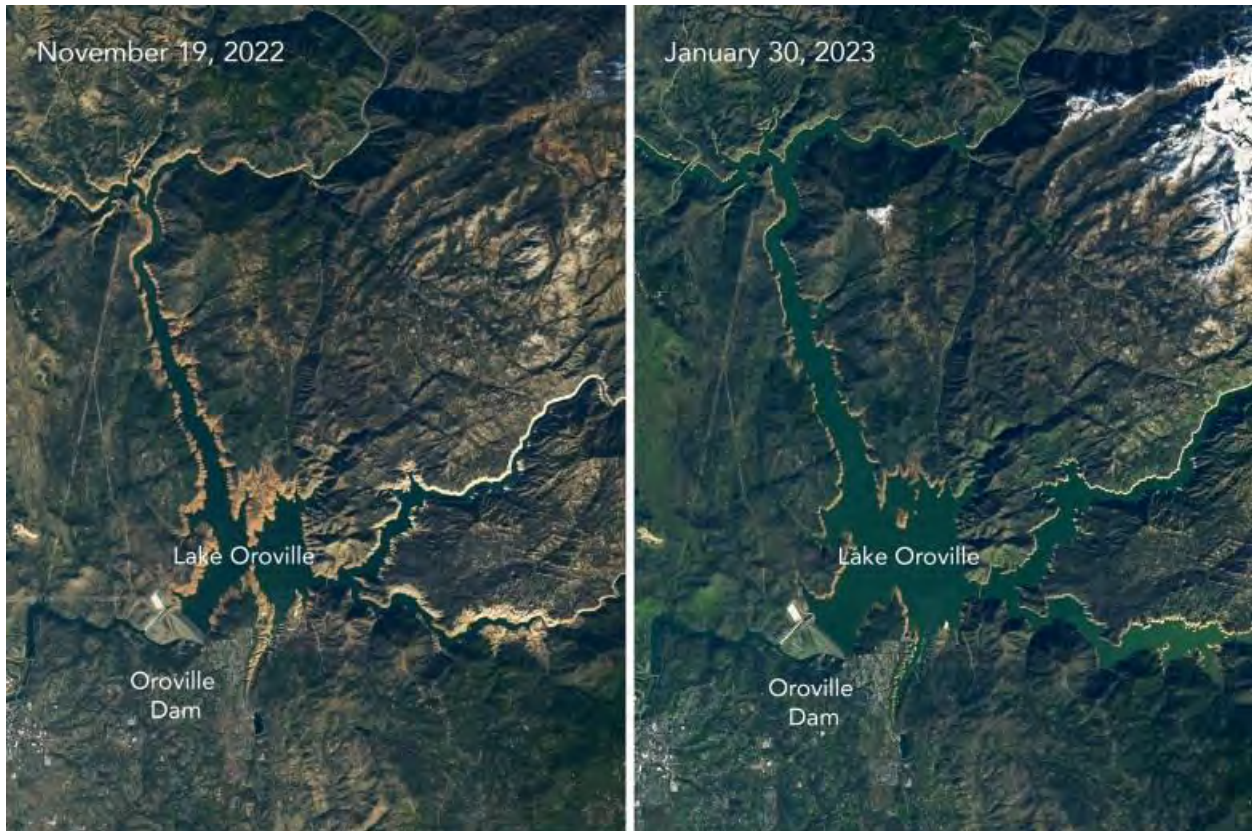
"Water management in California is complicated, and it's made even more complex during these challenging climate conditions where we see swings between very, very **dry, very, very wet, back to dry. We're now back into wet,"** said Karla Nemeth, director of the Department of Water Resources.

Rivers in the San Joaquin Valley are forecast to flood today or Saturday. Eleven **locations are expected to reach the flood stage, although no "danger stage" flooding is** anticipated, according to Jeremy Arrich, deputy director of the Division of Flood Management with the Department of Water Resources.

To make room for more water, state and federal officials who manage California's major dams and reservoirs are releasing water. Some will flow into the ocean — which aggravates many water managers, Central Valley legislators and growers, who often say freshwater that reaches the bay or ocean is wasted. However, efforts are underway to divert much of the released water into depleted groundwater storage basins.

On Wednesday, the Department of Water Resources increased outflow of water from Oroville from about 1,000 cubic feet per second to 3,500 cubic feet per second. By today, total releases could be as high as 15,000 cubic feet per second, according to Ted Craddock, deputy director of the State Water Project.

Oroville is now more than 75% full, containing 2.7 million acre-feet of water — up from less than one million in the beginning of December. In spite of releases, **the reservoir's** level will keep rising. Craddock said inflow in the next five days could hit 70,000 cubic **feet per second. That's about half a million gallons of water per second.**



Satellite images show how January storms boosted water levels in parched Lake Oroville, one of the state's largest reservoirs. State officials released water from the reservoir this week in anticipation of another major storm. Photos via NASA Earth Observatory

In 2017 Oroville's levels reached so high that the overflow water damaged its spillway. An emergency spillway had to be used, eroding a hillside and triggering evacuation of about 200,000 people in nearby communities.

The U.S. Bureau of Reclamation announced a similar operational move for Millerton Lake, the reservoir behind Friant Dam on the San Joaquin River, which supplies water to growers throughout the Central Valley.

The two-day rainfall totals will be "quite astounding" and "will lead to some really significant runoff," said State Climatologist Michael Anderson. More storms are expected next week and later in March.

Today's storm is creating what watershed scientists and weather watchers call a "rain on snow" event. Earlier this winter, freezing elevations hovered as low as 3,000 feet, meaning precipitation above that fell as snow.

That has changed, Anderson said. Freezing levels have risen to as high as 7,000 feet in the southern and central Sierra Nevada, where the bulk of the snowpack has accumulated. A National Weather Service forecast shows freezing elevations even **higher, at 9,000 feet, and warned that "snow will melt easily below 5,000 feet,"** since it is already approaching the melting point of 32 degrees Fahrenheit.

State officials say the premature snowmelt from this storm likely won't have much effect on supplies this spring and summer.

"This winter, there has been an accumulation of snow at lower to mid-level elevations, which will experience melt during this storm and will generate runoff into foothill and valley communities," said David Rizzardo, manager of the state water agency's hydrology section.

"However, at higher elevations, where the vast majority of the snowpack is, we will not experience significant melt. Even with higher snow levels above 8,000 feet in these storms, we still anticipate seeing additional snow accumulation at the higher elevations that will add to our snowpack totals, especially in the Southern Sierra."

John Abatzoglou, a UC Merced professor of climatology, said deep, soft snow has the physical capacity to absorb a great deal of rain. The snow may even freeze the rain, rather than vice-versa, effectively increasing the snowpack volume, at least for a while.

"As you add liquid to the snowpack, it gets denser, it gets warm, and it gets more apt to melt when the next storm comes," he said, noting that more atmospheric river events are coming next week.

While the latest storms flood river valleys, state regulators have taken action to capture as much stormwater as possible before it flows into the ocean and use it to recharge groundwater basins.

On Wednesday, the State Water Resources Control Board approved a petition from the Bureau of Reclamation to divert 600,000 acre-feet of San Joaquin Valley flood waters into wildlife refuges and groundwater recharge basins. Diversions can begin on March 15 and continue until July.

"Given the time it takes for water to reach the downstream point of diversion at Mendota Dam, the approval period will allow for floodwater capture following storms expected this weekend," the water board explained in a news release.

The action is intended in part to help meet Gov. Gavin Newsom's goal of increasing groundwater storage by over 500,000 acre-feet per year, spelled out in his Water Supply Strategy released last summer.

But environmental groups protested the **water board's action**.

Greg Reis, a hydrologist with The Bay Institute, said it will allow the bureau to divert all of the San Joaquin River except for 300 cubic feet per second — **what he calls "a very, very small" amount of water. Floodwaters, he said, are** important for ecosystem function and survival of fish, including threatened spring-run Chinook salmon.

He compared floodwaters in a river to a person's increased pulse when they exercise.

"If you don't get your heart rate up when you exercise, you don't get the health benefits," he said. **"Same thing for a river. You've got to get the flows up, and the 300 cubic feet per second is certainly not adequate for a river like the San Joaquin."**

https://calmatters.org/environment/2023/03/california-storm-reservoirs-flooding/?utm_source=CalMatters%20Newsletters&utm_campaign=04285eb425-WHATMATTERS&utm_medium=email&utm_term=0_faa7be558d-04285eb425-150181777&mc_cid=04285eb425&mc_eid=2833f18cca

Recharging Groundwater Essential for Farmers...and Food

Sacramento Bee

Jennifer Peters signed on to have her Madera ranch become the site of an experiment **in replenishing groundwater in California's Central Valley. Though this pilot program led** by a subdivision of the United States Department of Agriculture is far from the first effort to address the depletion of groundwater stores, it offers farmers like Peters hope **for the future of agriculture in the region. "If the generation that's running the ranch now, my son, doesn't buy into this and start improving the water quality, we're all going to be in a world of hurt by the time the sixth generation wants to come up," Peters said. "There'll be no farming."** Peters is a fourth-generation farmer who operates Markarian Family LP with her father and son. They cultivate wine grapes and almonds, crops that require irrigation to grow in the Central Valley.

Their farm is among more than 35,000 in the nation's fruit-and-nut hub that has suffered through a megadrought. The resulting conditions have required Peters and many others to pay a premium for water and live with the looming threat that one day, not that far off, their fields will be fallowed.

Many have seen it already. A report by UC Merced estimated that 696,000 acres of Central Valley farmland idled between 2019 and 2022. Those years coincided with severe drought in the region. The search for water has led growers to dig deep into underground water supplies. Many aquifers, geological structures that hold groundwater, are so depleted in the Central Valley that they are considered **at an "all time low" or "much below normal," according to California's Department of Water Resources' live monitoring system. Scientists found last year, before the past few months' extreme weather, that groundwater depletion in the Central Valley had** been accelerating. In parts of the Central Valley, land has been sinking about a foot a year **because of diminishing water, which also reduces the aquifer's storage capacity. The** depletion of water is a daunting problem that lawmakers and governmental agencies have tried to address for years. What is different about the project being piloted on **Peters' land under the so-called Environmental Quality Incentives Program** is that a federal agency is involved directly with local landowners rather than funding aquifer-recharge projects administered primarily by state or local irrigation districts.

This pilot lets the Natural Resources Conservation Service (NRCS) be surgical in the way that groundwater-recharge projects get built and tested, and encourages private **farmers to get involved by covering a significant portion of the construction costs. "It's nothing new,"** said Greg Norris, the state conservation engineer for NRCS. **"But what this is doing is we're evaluating how we can do it through our programs."**

This winter has brought significant rain and snow to northern California, which has boosted hope that the region may see some relief from the drought. Despite recent storms, major reservoirs that collect the water sent down to the Central Valley had below-average levels.

State and local agencies have long worked to mitigate the over-pumping of California aquifers. In 2014, then-Gov. Jerry Brown signed the Sustainable Groundwater Management Act to ensure local agencies oversee and reduce overdrafting

groundwater, primarily from basins across the Central Valley, with the goal of stabilizing levels in most areas by 2040. While this effort has put into focus the need to stabilize groundwater supplies, the state has struggled to deliver results. State rules on who can use what water and balancing environmental concerns often leave Central Valley farmers feeling left out, according to previous reporting by The Sacramento Bee. Local, state and federal officials from the community on both sides of the aisle continually lobby to get and keep more water.

Peters, who is a member of the local farm bureau board, said it is important to come together — and pitch in where they can. She dedicated a sandy stretch of land to the NRCS project in hopes of recharging the aquifer below for herself and her neighbors. **“We have to start collecting water, even if it’s in smaller basins throughout the state,” she said. “We have to start doing it.”**

California has been artificially recharging groundwater since the turn of the 20th century. This recharging is often done by injecting water into wells that are connected to the aquifers or adding surface water to an area that is absorbed through the ground. The projects that NRCS is funding in its pilot program, Norris said, involve adding surface water to the Central Valley. The participating farmers will flood their fields and build trenches that can hold water until it is absorbed into the ground; they are referred to as on-farm recharge and basins respectively.

One challenge of replenishing aquifers through adding surface water is tracking its complex movement through the ground, said Wendy Rash, a NRCS water quality specialist. Another is the risk of pesticides and other fertilizers being absorbed and, **therefore, contaminating clean water. “We’re also working with farmers, looking at their nutrient and pest management practices, to try to do some risk control,” Rash said, “because as we’re putting water back into the aquifer, we don’t want to be degrading the quality of that water.”** Dave Krietemeyer, the lead NRCS engineer for the Central Valley, said that the agency has more than a dozen of these pilot projects going on around Madera County. NRCS is also working on a few projects in Tulare County and is expanding to Fresno.

<https://www.sacbee.com/news/politics-government/capitol-alert/article272639257.html#storylink=cpy>

[Leading California Bank Teeters: Tech Start-Ups Panic](#)

NY Times

Panic swept through the start-up industry on Thursday as investors at some venture capital firms urged portfolio companies to move their money from Silicon Valley Bank **over concerns about the tech industry stalwart's financial stability.**

Silicon Valley Bank's spiral was set off by its surprise announcement Wednesday that it would take extraordinary and immediate steps to shore up its finances amid a dimming economic environment for the start-ups and other technology companies that dominate its client base. The bank disclosed that it had sold off \$21 billion of its most liquid, or easily tradable, investments; borrowed \$15 billion; and organized an emergency sale of its stock to raise cash.

Banks are loath to take any of those steps — let alone all three at once — and when **they do, the moves are typically carefully choreographed. Silicon Valley Bank's stock** price plummeted 60 percent on Thursday as investors rushed to sell shares after the announcement.

A bank spokeswoman did not respond to a request for comment.

If Silicon Valley Bank failed, it would be the second-largest such unraveling in U.S. history, smaller only than the run on Washington Mutual during the 2008 financial crisis, when that bank had roughly \$300 billion in customer deposits. At the end of last year, Silicon Valley Bank reported \$212 billion in customer assets.

Founded in 1983, Silicon Valley Bank is small compared with Wall Street banks but has an outsize footprint among tech start-ups. **It calls itself the "financial partner of the innovation economy."** In addition to its other banking services for start-ups, it is known for providing them loans and private wealth management to tech workers.

Mark Suster, an investor at Upfront Ventures, wrote that he believed the only financial **risk to Silicon Valley Bank's customers was a** panic that led to a run on the bank.

"Think about how many companies would be wiped out overnight if SVB went bankrupt," he said in an interview. **"This would be catastrophic, and people shouldn't be making jokes of it."**

Villi Itchev, an investor at Two Sigma Ventures, urged the industry to "support" the bank by not withdrawing money. Roseanne Wincek, an investor at Renegade Partners, wrote that a bank run caused merely by panic would be a "self own" for the industry.

"There are two things in life that only exist if you believe in them: God and bank runs," said Anshu Sharma, chief executive of Skyflow, a data privacy start-up. He is also an investor in 65 other start-ups, and he urged his portfolio companies to sit tight.

Sunny Juneja, founder of Canopy Analytics, a Bay Area start-up focused on real estate technology, said that he had tried to move his start-up's **cash** — a few million dollars — out of Silicon Valley Bank after his advisers and investors told him to do so on **Thursday, but that the bank's online portal was down. He spent the afternoon trying to** set up an account at another bank.

MORE:

https://www.nytimes.com/2023/03/09/business/silicon-valley-bank-investors-worry.html?partner=slack&smid=sl-share&utm_source=CalMatters+Newsletters&utm_campaign=04285eb425-WHATMATTERS&utm_medium=email&utm_term=0_faa7be558d-04285eb425-150181777&mc_cid=04285eb425&mc_eid=2833f18cca

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A Brief History of the Pajaro River

The Central Coast's second largest watershed lies on the boundaries of four counties.

PUBLISHED MAR 15, 2023 3:13 P.M.

Tweet Share



Detail from a photo tweeted by the city of Watsonville warning residents about the impending atmospheric river storm. CITY OF WATSONVILLE

By Dustin Mulvaney

The Pajaro River is the second largest watershed on the central coast of California, at 1,340 square miles. It's in the news because a major levee failure inundated the town of Pajaro in the middle of the night on March 10 and into the morning of March 11.

The river is the boundary between Santa Cruz and Monterey counties, and Santa Clara and San Benito counties, and it drains a few more counties; so the river's management has long been politically fragmented. It's a case study in conflict over shared river basins, riparian political conflict.

The river's physical geography is shaped by the San Andreas fault, which crosses the Pajaro at the Chittenden Gap, and tributaries running off the Santa Cruz Mountains, and the Gabilan, Coast and Diablo ranges. In fact, the 1989 Loma Prieta earthquake deformed the levees. The river's path through the upper reaches is on the North American Plate, while the lower reaches are on the Pacific Plate. Not far from where the sea meets the river today is Elkhorn Slough, an estuary that takes water off the Salinas and Pajaro rivers.

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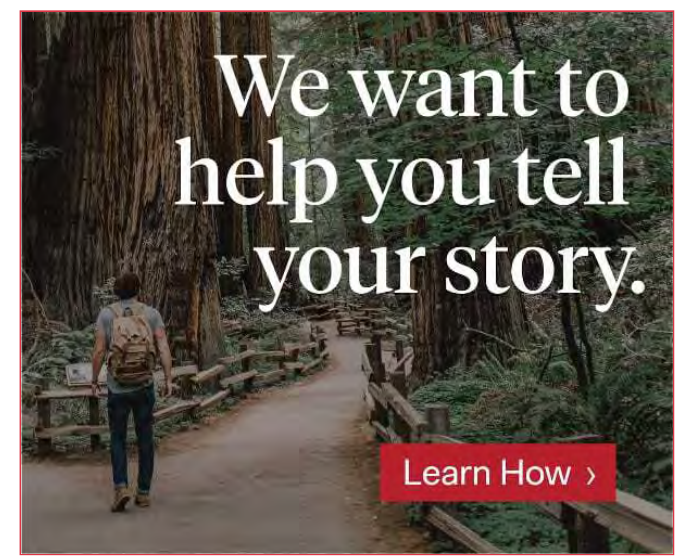
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A Changing Landscape

The lower Pajaro River prior to colonialism was full of creeks, ponds, marshes and wetlands in the winters. The earliest settler agriculture did little to transform this system because they grew mostly wheat and used the land during dry season for livestock. In the 1870s, workers from the Kwangtung Providence of China, which has a similar climate and terrain, transformed the land into some of the most productive arable land in the world, growing the town of Watsonville in the center of a major floodplain.

The first recorded flood along the Pajaro was in what was then known as Brooklyn, established in 1888 when the Chinese community of Watsonville agreed to move across the river and county line, reestablishing themselves on the site of what is the community of Pajaro today.

The first levees were on the Santa Cruz County side of the river to protect Watsonville, but they were not built on the Monterey side. According to Cabrillo College Professor Emeritus Sandy Lydon, "Chinese residents learned to move their possessions to the second floor of their dwellings to protect them from water damage."

The Corps Comes to Town

The Works Progress Administration was the first federal effort to develop flood control, and the Army Corps of Engineers started plans in 1936. But the Corps had to redesign their plans after a major flood in 1938 exceeded anticipated flows.

After WWII delays, the Army Corps finished levee construction in 1949, using war surplus materials in some places, and turned them over to Santa Cruz and Monterey counties to run on a 50/50 cost share basis. The counties agreed to maintain them based on the Corps' operations manual.

The system was designed to provide protection against a 1% chance (100-year) flood in urban areas and 2% chance (50-year) elsewhere. Two major floods within ten years far exceeded anticipated flows and caused more in repairs (\$1.3m) than the initial levees cost (\$750k).

In 1963 the Corps found the project inadequate for the congressionally intended federal investment, and Congress authorized the reconstruction of the levees in 1966, and again in 1986, but proposed designs could not find common agreement about boundaries, land condemnation, or funding.



The Pajaro River separates Watsonville, in Santa Cruz County, and Pajaro, in Monterey County.

Photo by the Army Corps of Engineers

An important factor in the failure to address flooding in Pajaro was changes to the funding mechanism. Earlier federal investments in flood control were entirely paid for by the federal government, but by this time local governments were asked to contribute a cost share to new flood control construction, 25%, which later rose to 35%. But different counties have different priorities, and this becomes more complicated in areas where one side of a river bank is in a different county. Getting counties to agree on the investment, whose land gets condemned for new flood control, etc., gets complicated really fast, exemplifying the challenges of political fragmentation.

For example, Monterey County is an enormous agricultural economy, and is less likely to invest to prevent losses of the much smaller agricultural revenue near Pajaro. And in Santa Clara County, where half the watershed's residents live; Pajaro is not anywhere near the county's top priority.

Through the 1970s a long drought cycle, high costs, and opposition to condemnation of agricultural land prevented action. The area experienced severe flooding during El Niño storms in 1995—flooding that required the Army Corps to breach levees to get water back into the Pajaro River.

Table 1. Comparison of land, population, agriculture, and Pajaro River flood control expenses by county.

	San Benito (1997)	Santa Clara (1998)	Santa Cruz (1997)	Monterey (1997)
Square miles in watershed	838	374	109	19
Percentage of watershed	62.5	27.9	8.1	1.4
Population of towns/cities in PV(2000)	31,330	73,250	38,100	3,332
Rural pop in Pajaro Valley (est.)	18,470	30,000	13,800	1,500
Total pop in Pajaro Valley (est.)	49,800	103,250	51,900	4,832
Population per square mile of county portion in watershed	59	276	47	254
Value of agriculture in County	\$164 million	\$160 million	\$290 million	\$2,192 million
Value of agriculture in Pajaro Watershed	\$164 million	\$120 million	\$261 million	\$254 million
Percentage of each county's agriculture in Pajaro Watershed	100%	75%	90%	12%
Pajaro Valley flood zone budget	—	—	\$1,200,000 (1999)	\$40,000 (1995) \$280,000 (1999)

Sources: Santa Cruz County Farm Bureau, Monterey County Agriculture Commissioner, San Benito County Agriculture Commissioner, Santa Clara County Agriculture Commissioner, California Department of Finance, Monterey County Department of Public Works, Santa Cruz County Public Works Department/zone 7, ASI 1999.

To echo how fragmented governance can result in unequal flood control investments: In 1995 Santa Cruz County contributed \$1,200,000 in its budget, compared to \$40,000 appropriated from flood control from Monterey, and zero from the other two counties. This despite Monterey County benefitting from lucrative strawberry production and processing facilities located in the Pajaro River floodplain.

Ironically the levee that broke in 1995 was on the Monterey side of the river, but technically in Santa Cruz County (river mile 9) because in several places along the river, a few farmers laying out the first levees sought to maximize arable land.

Today it is unclear when any sense of normalcy will return to the residents of Pajaro, even when they can return to homes or work. The damage, contamination, and vulnerable housing highlight yet another manifestation environmental injustice in California that we must not forget.

New levee construction was finally approved in recent years and is set to begin in 2024. Too little too late for those evacuated and impacted by the 2023 atmospheric river. We need to better understand why vulnerable residents and communities remain vulnerable and this case shows how political boundaries along rivers can undermine public commitments and investments in better flood control.

Dustin Mulvaney is a professor in the Department of Environmental Studies at San José State University.

This article draws on some newspaper archival work and a publication from 2001 by Keith Douglass Warner called “Flooding and fragmentation: how physical features structure political conflict over flood control in California’s Pajaro Valley.” Yearbook of the Association of Pacific Coast Geographers, 63(1), 97-118.

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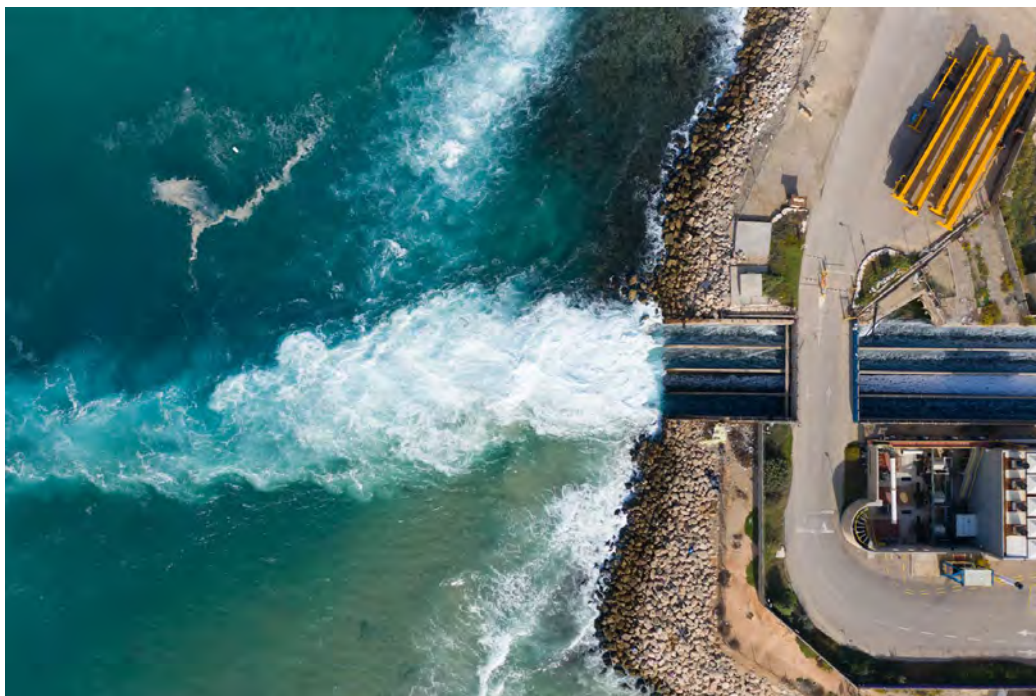


Flexible Desalination: A Renewable Energy Twist on the Energy-Water Nexus

Words by Tina Casey



APR 03, 2023



The world's largest water desalination plant in Hadera, Israel. (Credit: luciano/Adobe Stock)

A dire new report from the United Nations warns of a looming world water and sanitation crisis. Businesses can help alleviate the problem by supporting work on new desalination technologies that leverage

renewable energy, with broader implications for grid reliability and stability as well.

The world water crisis continues to loom...

The new [U.N. 2023 Water Development Report](#) follows decades of tracking global water resources and sanitation issues. It was released in advance of the U.N.'s [first conference on water resources](#) in almost 50 years, held last week.

The report was prepared by the U.N. Educational, Scientific and Cultural Organization (UNESCO), which warned: “The accelerating pace of change to water systems is creating new and ever-greater risks to society.”

“In parallel, demand for water is intensifying not only when it comes to domestic use but also in other sectors such as agriculture, energy and industry,” UNESCO added in the report. Even as demand is rising, [climate change](#) and pollution are adding new stressors, raising new obstacles to progress.

Overall, the report notes that the water and sanitation access described in U.N. Sustainability Goal 6 is off track. “According to the latest figures from 2020, 26 percent of the world’s population (2 billion people) did not have access to safely managed drinking water services...and an estimated 46 percent (3.6 billion) lacked access to safely managed sanitation,” the report reads.

...but businesses can contribute to progress

While the overall situation is dire, the report does take note of progress in the area of global [water use efficiency](#), an element of SDG 6.

Improvements in that area can cover a wide range, from repairing leaky pipes to planting different crops and investing in new technologies.

“Water savings are also often associated with energy savings, as less water needs to be extracted, treated, transported and heated,” UNESCO noted.

The report cites a three-year period from 2015 to 2018 in which water use efficiency rose by an average of 9 percent overall. The global industrial sector over-performed the average by a wide margin, achieving a 15 percent improvement during that period.

New technologies for the energy-water nexus

While past performance does not necessarily indicate future progress, all indications are that the technology factor will provide the force needed to sustain and accelerate progress on water use efficiency.

One emerging example is the deployment of new, [more efficient technologies](#) to collect [water vapor from the air](#). Desalination is [another pathway](#). The [expense and energy intensity](#) of desalination facilities has been an obstacle to widespread use, but technology improvements can help overcome those challenges. That includes improvements to renewable energy technologies that have allowed for a sharp drop in the cost of wind and solar power in recent years.

A new twist on the energy-water nexus

A drop in the cost of energy for desalination is just one water efficiency factor related to renewable energy. Another factor is the

potential value of desalination facilities in contributing to the stability and reliability of a grid that depends heavily on wind and solar power.

In past years, the use of wind and solar power was limited by weather and time-of-day factors. However, new grid management and energy storage technologies are smoothing out those intermittent bumps, and the U.S. Department of Energy has spotted an opportunity to add desalination facilities to the mix.

On March 22, the Energy Department announced funding for a suite of 12 new projects aimed at increasing the efficiency of water desalination and reuse technologies. Three of the projects are focused specifically on balancing the energy use of industrial-scale desalination facilities with the availability of intermittent resources on the grid.

The basic idea is to time the operation of desalination facilities to take advantage of excess wind or solar power. Having a dedicated, industrial-scale electricity consumer taking up the slack during periods of low demand could also help motivate additional renewable energy development.

“Desalination plants can draw large amounts of electricity from the grid and have the potential to become flexible or intermittent power users to increase grid stability and reliability,” [the Energy Department explained](#) in its announcement.

The University of California will lead one of the projects in partnership with the Chino Basin Desalter Authority in San Bernardino County and the water engineering firm Irvine, Hazen and Sawyer. As described by the Energy Department, the partners are tasked with

developing a framework for estimating the value of deploying desalination plants as flexible power users. The partners will also spot potential obstacles that could impede flexibility.

Stanford University will head up a second project in partnership with the SLAC National Accelerator Laboratory, the National Energy Technology Laboratory and the city of Santa Barbara in California. This project takes note of an existing degree of flexibility in operating desalination plants.

“In some parts of the U.S., operators of desalination facilities can participate in demand-response energy supply contracts where they pay lower electric rates but are also required to lower energy use during periods of high grid demand,” the Energy Department observes. The team will use an assessment platform developed by the public-private National Alliance for Water Innovation research program to identify opportunities for upgrading desalination plants and optimizing their schedules around the use of low-cost, low-carbon energy resources.

A third project pairs the Electric Power Research Institute with Colorado State University, the National Renewable Energy Laboratory and the not-for-profit Salt River Project utility district in Arizona. The team will take a broad look at energy availability and water management to identify high-impact opportunities for desalination flexibility in the context of the electrification trend.

The desalination fight has only just begun

The other nine Energy Department projects involve advanced technology improvements in other areas of desalination plant operations,

including the treatment of brine left over from the process.

One example is a new treatment system that deploys three different electrochemical processes — electroosmosis, electrophoresis and electrodialysis — to treat a range of contaminants in desalination brine, including pesticides, boron, heavy metals and PFAS (per- and polyfluoroalkyl substances, often called “forever” chemicals).

New solutions and public-private partnerships like these dovetail with the new United Nations report, which calls for a renewed focus on collaboration, partnerships, new technologies, and the sharing of data and information.

U.S. businesses can help accelerate progress by lending their voices in support of federal resources for tackling the water crisis, including more resources for electrification and renewable energy development.



TINA CASEY  

Tina writes frequently for TriplePundit and other websites, with a focus on military, government and corporate sustainability, clean tech research and emerging energy technologies. She is a former Deputy Director of Public Affairs of the New York City Department of Environmental Protection, and author of books and articles on recycling and other conservation

themes. She is currently Deputy Director of Public Information for the County of Union, New Jersey. Views expressed here are her own and do not necessarily reflect agency policy.

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Working water is not wasted water. How healthy, flowing rivers benefit people and the environment

Ann Willis
March 8, 2023



The Tuolumne and San Joaquin rivers meet at the Dos Rios Ranch Preserve in Modesto. The 2,100-acre preserve is California's largest floodplain restoration project.
Rich Pedroncelli/Associated Press 2022

It's a familiar scenario: Rising rivers are pinched off from the flood plains that could have spread, slowed and stored the sudden abundance of water. Floodwaters break through levees and leave destruction and heartbreaking loss in their wake. Renewed frustration and fury enter the public dialogue about "wasted" water.

I could be describing the recent events in California, where footage of fast-moving rivers carrying floodwaters out into the Pacific Ocean baffled some who have been preoccupied (and rightfully so) with drought and dire predictions about the fate of California's water supply. But it's also the story of the Mississippi River in the aftermath of the 1849 flood of New Orleans. And the 1927 flood in New Orleans. And California's Central Valley floods of 1964, 1982, 1995, 1997, 2017 and, of course, this past month. Over the past 150 years of river management, floods have been framed as "wasted water," falsely pitting the environment against the economy, ignoring the self-inflicted consequences of rivers constrained by levees and overlooking the opportunities healthy rivers provide to support people and ecosystems. It is time (again) to

take a more holistic approach, recognizing that the health of our rivers is central to our state's future. Flowing rivers are working rivers, and they benefit us all.

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River managers use the term “environmental flows” to describe the water that’s allowed to stay in rivers to nurture the ecosystem, as opposed to water diverted or stored for farms, cities or hydropower. While I worked at the UC Davis Center for Watershed Sciences, we dove in deep on environmental flows, calculating an environmental flow management strategy for every major tributary to the San Joaquin River, which nourishes the valley that bears its name. We [modeled two environmental flow policies being considered by the state](#) and how each affected a watershed’s hydropower production, flood control and water supply.

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The first provides a percentage of natural flows, ranging from 30% to 50%.

The second focuses on restoring specific pieces of annual flow patterns that support ecologically valuable functions (e.g., seasonal floods or spring snowmelt).

The big takeaway? Healthy, flowing rivers benefit people. We learned that environmental flows can enhance the state’s hydropower production, rather than create an additional constraint to competing water demands. We learned that water was available for storage when we focused on the relationship between flow quantity and ecological quality. We recognized that, above a certain point, more water was not necessarily better.

But we also learned that, even if we committed to environmental flows tomorrow, we’ve pinched our rivers so tightly between a maze of levees that they don’t have space to carry even modest historical floods, let alone what we’re likely to see with climate change.

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Our research showed that [restoring floods that occurred 10% to 50% of any given year may be more critical to sustaining California’s stream ecosystems](#) than releasing higher flows during dry years. But levees and floodplain development on many of California’s rivers, including all four major tributaries to the San Joaquin, make restoring these moderate floods impossible.

For example, the Tuolumne River below New Don Pedro Dam is designed to carry flows up to 9,000 cubic feet per second before flood damages occur (a cubic foot of water is about the size of a basketball). However, the median flood that has a 1-in-2 chance of occurring in that stretch of river is over 17,000 cubic feet per second.

The irony is tragic: Building levees that tightly constrict our rivers have not only cut them off from flood plains that could improve water quality, recharge aquifers and boost ecological health, but it has also increased the risk of flood damage to our communities. Today’s threat is the result of decisions we made when we believed that flowing rivers were “wasted” water and engineering was our salvation. In an unchanged world, the status quo of “more levees, more storage” is clearly unworkable; doubling down on this failed strategy and adding climate change only amplifies these problems.

Fortunately, the solutions we need already exist: River-driven restoration occurs every time an obsolete dam is removed, a derelict levee is breached or set back, a floodplain is restored or a reservoir is operated using forecasts rather than outdated historical data.

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In the San Joaquin Valley, these solutions are already underway.

The San Joaquin River winds through Dos Rios Ranch in Modesto. Research shows that healthy, flowing rivers benefit people and the environment.
Paul Kuroda/Special to The Chronicle 2022

One example is in Great Valley Grasslands State Park: My organization, American Rivers, is leading a team to breach an obsolete levee on the San Joaquin River to reconnect 120 acres of historical floodplain habitat, improving habitat for wildlife while reducing flood risk and the costs (economical and ecological) of levee maintenance. And stream flow is the secret sauce that catalyzes these solutions.

It’s time to resist the siren call of “more levees, more storage” that follows every natural disaster and pits our economy against ecosystems. Healthy rivers are essential to all life. When we understand and mimic the natural patterns of a free-flowing river, we restore more than ecosystems. We spare ourselves the inevitable catastrophe of the status quo, and we invest in our own health, safety and well-being.

Ann Willis is California Regional Director for American Rivers, a nonprofit organization dedicated to restoring and protecting rivers across the country. Previously she worked as a senior researcher for the UC Davis Center for Watershed Sciences.

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LATEST HEADLINES

Mayor's message | Even in wet year, water remains top of mind

By [FRED KEELEY](#) |

March 4, 2023 at 2:30 p.m.

Santa Cruz is experiencing some of its coldest weather in decades, on top of its wettest weather in years. It's hard to believe that just a year ago we were amid the driest winter months on record. Fueled by climate change, these "abnormal" seasons are now normal – drought punctuated by extreme storms.





Fred Keeley

While our communities are recovering from acute damage done during recent atmospheric rivers, the most chronic impact of climate change locally is on our water supplies – caused by weather extremes. For Santa Cruz, where 95% of our supply comes from the San Lorenzo River and north coast streams, we are particularly vulnerable to drought. This is why the city has taken aggressive actions to “drought proof” the community’s water supply.

These actions include cutting-edge climate modeling, which show that our current “abnormal” weather patterns are in fact now normal and will only increase in severity over time. They include rehabilitating and replacing outdated pipes, pumps and tanks to make sure the city isn’t losing water to leaks and breaks. They include replacing old (and in some cases nonfunctioning,) water meters with new ones to alert customers of leaks or unusual use – saving both water and money.

Actions include partnering with other local water agencies such as Soquel Creek Water District, Scotts Valley Water District, San Lorenzo Valley Water District, and others to manage local groundwater resources in a sustainable way – something that was never done before the Sustainable Groundwater Water Management Act of 2014. Also partnering with these agencies to explore sharing water resources, as available.

In addition to actions that maximize existing water resources, the city of Santa Cruz is also aggressively studying “drought proof” supply projects. Our city’s water use is already some of the lowest in the state. Should we have multiple years of drought as forecast (or perhaps I should say “when” we have multiple years of drought), we won’t be able to conserve our way to reliability. We must add new sources to our supply to address the unpredictability that climate change creates; to drought proof our system.

Other actions the city has taken include adopting policy last fall that commits the city to a path to water security. While specific water supply projects haven’t been selected yet, the policy codifies the urgent need to add supply and commits to using either aquifer storage and recovery (ASR), recycled or desalinated water, or, more likely, a combination. All these options were vetted and recommended by the citizen-led Water Supply Advisory Committee (WSAC) and approved by City Council in 2015.

It may seem counter-intuitive to talk about the urgent need to drought proof our water supply when Santa Cruz’s reservoir, Loch Lomond, is full and spilling. But Loch Lomond is the city’s only reservoir (and only significant storage,) and when full only holds about one years’ worth of water supply. It was designed and built in the 1960s to fill and spill every year, which it did reliably before climate change was on the radar. Now multiple years pass without it filling.

As Santa Cruz Water Director Rosemary Menard often says, “climate change is THE game changer for the Santa Cruz water system.” Fortunately, our community is well on its way to a secure water future and drought proof system.

Fred Keeley is the mayor of Santa Cruz.

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Fred Keeley



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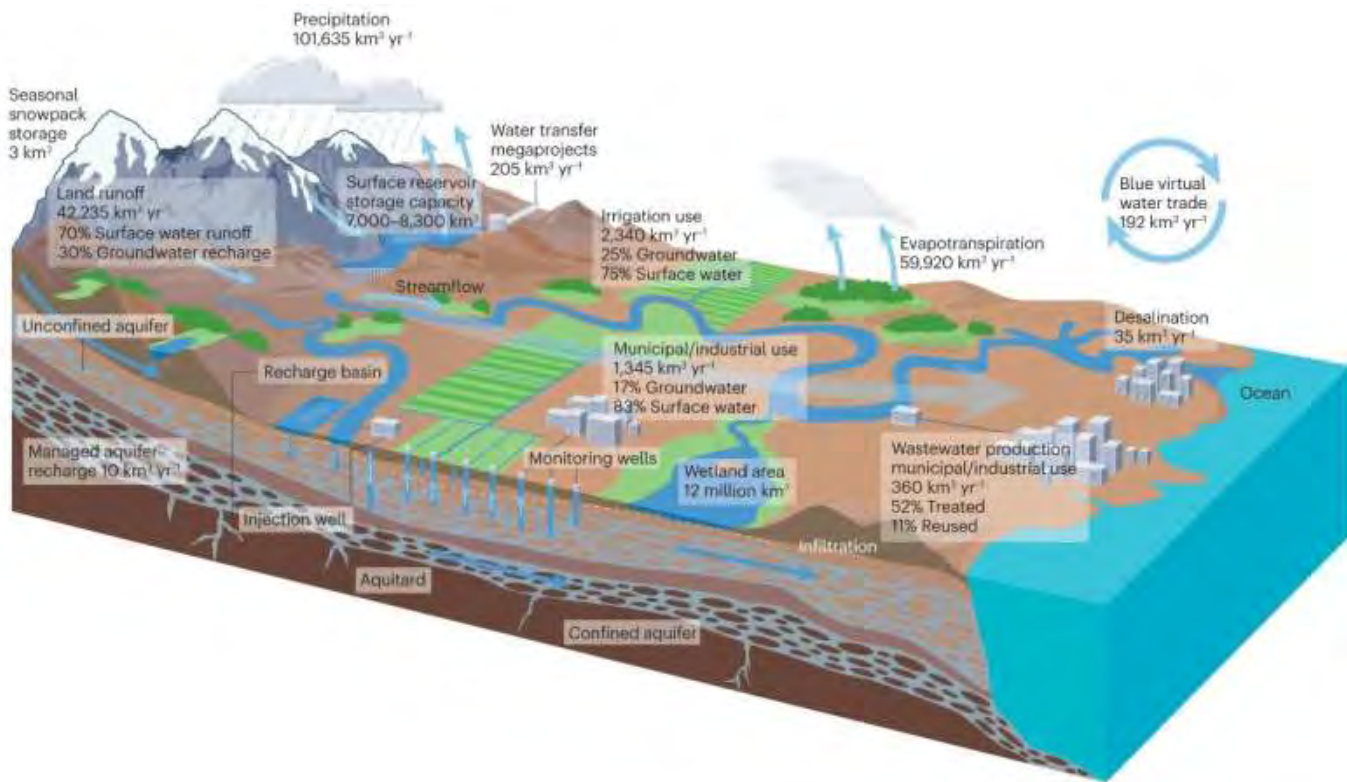
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New review of world water resources provides sustainable management strategies

by University of Texas at Austin



A figure from the review study illustrating global annual water storage and fluxes. Credit: *Nature Reviews Earth & Environment* (2023). DOI: 10.1038/s43017-022-00378-6

A recent review study led by The University of Texas at Austin provides an overview of the planet's freshwater supplies and strategies for sustainably managing them.

Published in *Nature Reviews Earth & Environment*, the study highlights the connections between surface and groundwater and calls for diversified strategies for managing them both.

"I like to emphasize a lot of solutions and how they can be optimized," said lead author Bridget Scanlon, a senior research scientist at the UT Bureau of Economic Geology, a research unit of the Jackson School of Geosciences.

The study draws on data from satellites, climate models, monitoring networks and almost 200 scientific papers to analyze Earth's water supply, how it's changing in different regions and what's driving these changes. The study's co-authors include almost two dozen water experts from around the world.

According to the research, humans primarily rely on surface water. Globally, it accounts for 75% of irrigation and 83% of municipal and industrial supply annually. However, what we see at the surface is tightly connected to groundwater flow. In the United States, about 50% of annual streamflow starts as groundwater. And globally, surface water that seeps into the ground accounts for about 30% of annual groundwater supplies.

Human intervention can strongly influence the exchange in water between surface and groundwater sources. About 85% of groundwater pumped by humans in the U.S. is considered "captured" from surface water, which leads to declines in streamflow. At the same time, irrigation sourced from surface water can increase groundwater recharge as irrigated water seeps through the ground back to aquifers.

The study cites numerous examples of human activity affecting this flux between surface water and groundwater supplies. For example, surface water irrigation recharged aquifers in the early to mid-1900s in the Northwestern U.S.'s Columbia Plateau and Snake River Plain, while global models show that groundwater pumping has greatly reduced the volume of water going to streams, with 15-21% of global watersheds at risk because of the reduced flows.

Despite their inherent connection, surface water and groundwater are frequently regulated and managed as separate resources. According to the researchers, future water resilience depends on recognizing that surface water and groundwater behave as a single resource—and acting on that knowledge.

The study describes different ways for managing water through both natural and engineered solutions that can help increase water supplies, reduce demand, store water and transport it. According to Scanlon, one of the best ways to adapt to increasing climate extremes is storing water during wet times and drawing on it in times of drought.

"We have droughts and we have floods," she said. "We are trying to manage those extremes and a way to do that is to store water."

Annually, the world stores about 7,000-8,300 cubic kilometers, or about two times the amount of water in Lake Michigan, in surface reservoirs. The researchers said it was important to continue developing groundwater supplies, too, because they are more resilient than surface reservoirs during long-term droughts. Managed aquifer recharge can help cities build up their groundwater supplies by collecting surface water and diverting it underground into aquifers. Globally, about 10,000 cubic kilometers of water is stored this way each year.

"This type of integrated research, linking surface and groundwater, is exactly what is needed to develop lasting solutions to issues such as fresh water use," said Scott Tinker, the director of the Bureau of Economic Geology. "Too often studies are done in isolation, and well-intended applications have unintended outcomes."

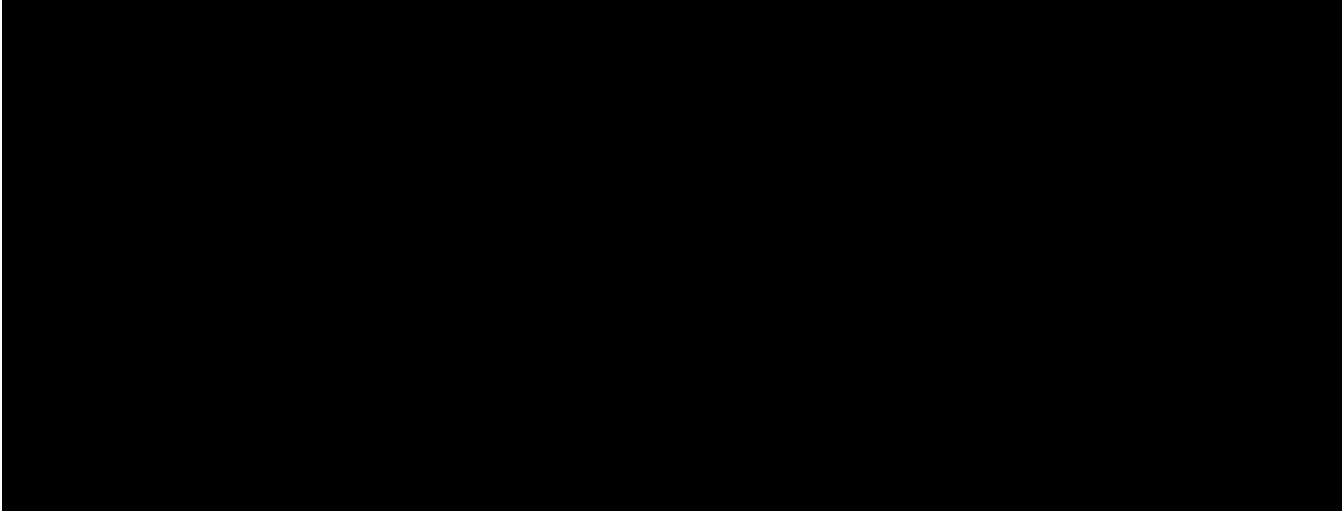
Matthew Rodell, a hydrologist at NASA Goddard Space Flight Center who was not involved in the study, said that the paper offers a useful compendium of research results and potential solutions for managing water supplies while also keeping water quality—a characteristic that's more difficult to monitor remotely than quantity—in mind.

"Water quality is one of the next targets in terms of being able to manage water resources," he said. "I like that this was incorporated as well."

More information: Bridget R. Scanlon et al, Global water resources and the role of groundwater in a resilient water future, *Nature Reviews Earth & Environment* (2023). DOI: [10.1038/s43017-022-00378-6](https://doi.org/10.1038/s43017-022-00378-6)

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CLIMATE

Risky feedback loops are accelerating climate change, scientists warn

PUBLISHED MON, MAR 6 2023 • 3:14 PM EST



Emma Newburger
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KEY POINTS

Risky feedback loops that are accelerating global climate change may not be fully accounted for in current climate models, according to a recent study published in the scientific journal *One Earth*.

A group of international scientists reviewed climate literature to identify 41 climate feedback loops, 27 of which are accelerating global warming.

One instance of a positive feedback loop is that warming in the Arctic has led to melting sea ice, which has prompted even more warming because water has a darker surface than ice and therefore absorbs more heat.





Risky feedback loops that are accelerating global climate change may not be fully accounted for in current climate models, [according to a recent study](#) published in the scientific journal One Earth.

A group of international scientists from institutions like Oregon State University, Exeter University and the Potsdam Institute for Climate Impact Research in Germany, identified 41 climate feedback loops in what they called “the most extensive list available of climate feedback loops.” Of these, they discovered 27 amplifying feedback loops that are accelerating global warming and only seven that are slowing it.

A feedback loop is a cyclical chain reaction that either speeds up or slows down warming. An amplifying, or positive, feedback loop is the process in which an initial change that prompts temperature rise triggers another change that causes even more temperature rise.

These positive feedback loops, which can be large and difficult to quantify, threaten to cause a permanent shift away from Earth’s current global climate, researchers warned. For instance, warming in the Arctic has led to melting sea ice, which has prompted even more warming because water has a darker surface than ice and therefore absorbs more heat.

Another example involves the impact of wildfires, which are becoming more frequent as the Earth warms and drought conditions intensify. Combustion of the vegetation during wildfires releases carbon dioxide into the atmosphere, which then contributes to the greenhouse effect and triggers even higher temperatures.

“There are many such amplifying feedbacks, including some that are not fully accounted for in climate models,” said Christopher Wolf, a postdoctoral scholar at Oregon State University and a lead author of the study.

“Consequently, the effects of greenhouse gas emissions could be underestimated and strong climate mitigation policies are needed,” Wolf added.



Other dangerous feedback loops include the thawing of permafrost, or the frozen ground that underlies much of the Arctic and contains plant and animal remains. As temperature rise accelerates the thaw of permafrost, the organic matter in the frozen layer breaks down and releases carbon dioxide and methane gas into the atmosphere.

Tim Lenton, an Earth systems scientist at the University of Exeter and one of the study co-authors, said the results suggest that the amplification of climate change could be greater than expected.

“That is yet another reason to accelerate action to limit global warming – because that also limits how much it is going to get amplified by the feedbacks in the climate system,” Lenton said.

Some feedback loops may also be associated with key climate tipping points that could significantly disrupt the global climate system, researchers said. For example, feedback loops that are driving ice melt in the Arctic could ultimately trigger the collapse of the Greenland ice sheet.

“In the worst case, if positive feedbacks are sufficiently strong, this could result in tragic climate change outside the control of humans,” researchers wrote.

“It is too late to fully prevent the pain of climate change as severe impacts are already being felt, but if we can have a much better understanding of feedback loops and make the needed transformative changes soon while prioritizing basic human needs, there might still be time to limit the harm,” they wrote.





VIDEO 03:13

Renewable energy firm discusses 'full circle' of planned transition to net-zero

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BUSINESS

State, federal officials laud Pure Water Monterey expansion





U.S. Rep. Jimmy Panetta addresses reporters Monday at Monterey One Water’s Pure Water Monterey project. (Dennis Taylor — Herald Correspondent)

By **DENNIS L. TAYLOR** | newsroom@montereyherald.com | Monterey Herald
PUBLISHED: March 6, 2023 at 2:53 p.m. | UPDATED: March 7, 2023 at 11:21 a.m.

MARINA – Standing on a concrete pad that will support a major new water supply for the Monterey Peninsula, state and federal officials on Monday struck celebratory tones in describing government partnerships that will help usher in an expansion of the Pure Water Monterey project.

Tanya Trujillo, the U.S. Dept. of the Interior assistant secretary for water and science, told gathered reporters that Pure Water Monterey and its expansion is a good example of how to address unprecedented dry conditions with innovative technologies that provide for new water sources.

Trujillo was joined by Paul Sciuto, the general manager of Monterey One Water; U.S. Rep. Jimmy Panetta, and Joaquin Esquivel, chairman of the state Water Resources Control Board.



Tanya Trujillo, the U.S. Dept. of Interior Assistant Secretary for Water and Science, stands in front of Monterey One Water's Pure Water Monterey project and talks about partnering with the state to fund innovative new sources of water. (Dennis Taylor — Herald Correspondent)

Pure Water Monterey, a project of Monterey One Water, as well as its expansion, takes wastewater and purifies it before injecting it into the Seaside Basin, the major aquifer in addition to the Carmel River supplying drinking water to the Monterey Peninsula.

The current Pure Water Monterey project produces 3,500 acre-feet of water a year. When the project is expanded, it will produce 5,750 acre-feet, or roughly 1.9 billion gallons of water annually. For context, the average American family uses 300 gallons a day, according to the U.S. Environmental Protection Agency.

Sciuto noted that the expansion will supply more than 50% of the water demand for the Peninsula, with the rest made up primarily of water from the Carmel River and the Seaside Basin.

“That’s the most in the world,” Sciuto said, naming Singapore as second with supplying about 40% of its demand from recycled water projects. “It’s a drought-proof water source.”

Panetta reminded reporters that not only is he a House member representing the Central Coast, but also someone who grew up in Carmel Valley and has a personal understanding of the area’s water challenge. He heralded the Pure Water Monterey expansion as a source of water for the future.

“My children will benefit from this project,” he said.

With climate change wreaking havoc on the Central Coast weather patterns – years and years of drought followed by torrential rains and flooding – Panetta said the old ways of doing things will no longer suffice.

“We used to say we could save it or suck it,” he said, referring to reservoirs and groundwater. “Now it’s screen it, clean it and stuff it back in the ground. Projects like these will enhance aquifers and protect the environment.”

In a previous version of this story a state source of funding was misidentified. The funding is from a program of the state Department of Water Resources.

Tags: [Newsletter](#)

 Author **Dennis L. Taylor**

Dennis L. Taylor has reported on diverse issues for three decades in the San Francisco and Monterey bay areas, including 10 years in the Silicon Valley business press covering venture capital and technology investments.

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LET'S TALK WATER MANAGEMENT

The series of unrelenting storms — called atmospheric rivers — that clobbered California over December and January brought unprecedented levels of rainfall. San Francisco saw 17 inches of rain from Dec. 26 to Jan. 15, and New Year's Eve revealed to be the city's 2nd wettest day since 1849. The rainstorms were caused by a "Pineapple Express:" a type of atmospheric river where the moisture is drawn from Hawaii, presumably from Larry Ellison's pineapple plantations, and flows across the Pacific to discharge on Silicon Valley and the whole of California. The storms reportedly caused over \$1B in damage and killed at least 20 people.

The intense rainfall uncovers failures in California's water management and showcases the

state's need to adopt new strategies and technologies to conserve water. As the 1974 film *Chinatown* (starring Jack Nicholson as a private eye who uncovers corrupt water management in 1930s LA), reminds us: "Beneath this building, beneath every street, there's a desert. Without water, the dust will rise up and cover us as though we'd never existed!"

The irony of suffering severe flooding at the same time as the State is in a drought reveals the central challenge of climate change in the West: climate volatility. California's dry months are getting drier, while the wet months are getting wetter and the system of reservoirs spread across the State built decades ago isn't designed for such extremes. Shasta and Oroville are California's largest reservoirs and their levels as of Feb 7th still sit remarkably lower than their historical averages: 67% and 59% of their historical average capacities, respectively.

Surface water (reservoirs, lakes, rivers, etc.) is just one way water is stored in California. Groundwater is an increasingly important source as a drier and hotter average climate has diminished surface water resources. However, water consumption from an increasing share of groundwater has exacerbated *overdrafting*. Overdrafting occurs when groundwater use exceeds the amount of recharge into an aquifer, which leads to a decline in groundwater level. In a normal year, 40% of the state's water supply comes from groundwater, but this share can jump to 60% in dry years.

A drier on average climate also means drier soil and weaker vegetation that is more susceptible to wildfires. Drier soil is also less efficient at absorbing water, and years of intense fires mean that mudslides are more frequent and likely.

California has made great strides to improve water management since the 2014 Sustainable Groundwater Management Act which requires local agencies to reach groundwater sustainability by 2042. While more must be done from a policy-stance plentiful opportunities also exist for innovative companies like Climate AI, applying their proprietary machine learning to create more accurate forecasts and actionable recommendations for their clients. Applying data and forecasting to reservoir management is a critical way to conserve water. Forecast-Informed Reservoir Operations, allow reservoir and dam managers to release or save water depending on forecasted weather patterns. Other viable solutions include water banks, restoring floodplains, and better irrigation and agricultural practices.

Unlike the final line of *Chinatown*, "Forget it, Jake. It's Chinatown," revealing the futility of fighting against the injustices of businessmen corrupting water management in LA in the 1930s,

there is hope for California. Despite being a dry state with limited water resources, measures to adopt a more data-driven approach to water management can help the state prepare for future weather events.

Benjamin Stevens, *Intern*

NUMBERS

5.6m

Californians live in severe drought

28.5m

Californians live in moderate drought

3m

Californians live in abnormally dry areas

26k

Californians live in an area without drought

NEWS

Xylem Inc., a leading water solutions and technology company, has agreed to acquire Evoqua Water Technologies in an all-stock transaction reflecting an enterprise value of \$7.5 billion. The merger will combine Xylem's water solutions and tech expertise with Evoqua's expertise in wastewater treatment and filtration systems.

I D E A S

Nanotechnology is an interesting way to approach water filtration. Leading startups like Warranium Energy and Nanoseen capture impurities and contaminants in water with biological filtration (use of a bioreactor for micro-filtration) and nanocomposite membranes which capture water impurities and filter them out using only gravity and proprietary nanomembrane filters.

L I F E

The fictional 1974 film *Chinatown* is set in 1930s LA but is loosely based on events from the 1910s as LA grew and fights over control of the water supply emerged. The film stars Jack Nicholson as *Jake Gittes*, a private eye, hired to investigate the murder of an LA politician. Gittes uncovers corruption in the LA Department of Water and Power and a shady businessman, Noah Cross, who profits from controlling and restricting LA's water supply.

“Bring the water to L.A. or you bring L.A. to the water.”
– Noah Cross, *Chinatown* (1974)





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ENVIRONMENT

'We Can't Be Living in an Economy of 40 Million People This Close to the Edge.'

Lake Mead, a key water source for California and six other states, is close to drying up. Water policy expert Felicia M... action is needed on conservation, recycling and efficiency.



Published on April 25, 2023
By Dan Ross [t](#)



Water intake towers at the Hoover Dam stand next to a bleached "bathtub ring" on the banks of Lake Mead on August 19, 2022 in Arizona. Photo: Justin Sullivan/Getty Images.



Lake Mead, in Arizona and Nevada, is the largest reservoir in the United States and part of the Colorado River system, which supplies water to seven U.S. states and part of Mexico, including one third of the water used in Southern California. It also supplies 30 Tribal Nations.



At the end of last year, experts predicted that, due to drought and heavy demand for water, Lake Mead was just two years shy of dead pool, when water levels drop below the point at which it can flow downstream of the reservoir.

9.58



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The seven states drawing from the Colorado River are negotiating which water cuts must be made by whom, to avoid losing the Colorado River supply. In January, the seven states missed one important deadline to reach a consensus over water reductions. If they can not reach an agreement by late summer, the Biden administration will likely step in and decide for them. Indeed, the federal government recently issued two options for what these cuts might look like for California, Arizona and Nevada. One gives priority predominantly based on current water rights, while the other cuts water usage by the same percentage for all users.

As a rare silver lining, the Colorado River snowpack this winter is 158% of average. But how much difference does that make to the Colorado River's grim outlook? Capital & Main asked Felicia Marcus about what must be done to prepare for the day Lake Mead might run dry. Marcus, a visiting fellow at Stanford University's Water in the West Program, was chair of the California State Water Resources Control Board, where she helped lead the board through the state's worst drought in modern history. She has also been the president of the Board of Public Works for the city of Los Angeles.



Felicia Marcus.

This interview has been edited for brevity and clarity.

Capital & Main: Given the snowfall this winter, do we still have to fear Lake Mead hitting dead pool?

Felicia Marcus: I think we do. I think we've gotten a reprieve, so it won't be quite as soon. But given that we're at the end of a 23-year downward trend due to drought, we're still within a relatively short time of dead pool. We still have to fear it.

How short is that time to dead pool?

I would say a few years — three or four, maybe, which is tomorrow in water time. It all depends on what we do. So rather than just watching the clock tick, what we'll see is tougher interim rules that keep us from hitting that wall. So, in some ways, dead pool is hopefully just a construct of what could happen if we don't act.

Who or what are the biggest obstacles standing in the way of meaningful progress?

Being overly optimistic of what the heavens would provide and the lack of political will to make hard decisions early enough.

In this case, I think history will judge political leadership poorly for having let the Colorado River resources and reservoirs dwindle down for 23 years before being able to take more dramatic action on conservation, recycling and efficiency. We've let it get to crisis proportions. If you want to put it more positively, hope springs eternal. But it's not a plan for the future.

LATEST



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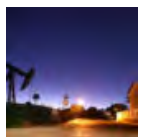
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“Our snowpack is our greatest source of storage — far greater than any of the reservoirs we’ve built. And when we lose that, we lose everything in the Southwest.”

What do we need to do to remove these obstacles?

A cold-eyed clarity about the facts that we face and just how bad the situation is, and some political courage to make hard decisions — in some cases earlier than we might need to in order to prevent even greater hardship later.

I mean, political courage is not something that’s in great supply in any day and age, but we need a lot more of it now as opposed to political leaders blaming others rather than taking responsibility. It’s very difficult to do, no doubt, but something where leadership is required.

How does climate change factor into this?

Enormously. Climate change is the freight train of pain heading at all of us. Whether we’re talking about the Bay-Delta system or the Colorado system, with just a few degrees of temperature rise, we end up with more precipitation falling as rain rather than snow. [This means] more flooding in the spring and far less snowpack to melt out at a reasonable rate over the spring and summer to replenish our reservoir streams and groundwater basins.

Our snowpack is our greatest source of storage — far greater than any of the reservoirs we’ve built. And when we lose that, we lose everything in the Southwest, where we have such extreme variable hydrology. It simply doesn’t rain or snow in the places where it’s most used in the time of year that it’s most used. And so as a result, we need that snowpack storage in order to make the modern Southwest viable.

How important are the current negotiations over Colorado River water allocations for preventing Lake Mead from hitting dead pool?

They’re absolutely essential. I mean, they’re the only thing that can really prevent dead pool, short of the federal government taking dramatic action. I think the negotiations are important on two fronts. Number one is if you can come to an agreement between the seven states [without federal intervention], it’s more robust, more easily implemented, and it avoids the inevitable litigation that would otherwise follow.

The negotiations also help to inform the federal government in some ways as to what it is they may need to do to help those negotiations succeed. And sometimes that means coming up with what the parties would say if they had the political guts to say it. In other cases, it means coming out with something tough to then give those parties the political backup to be able to make the hard decisions that they can’t make on their own.

Nobody wants to give away water. They can lose it, but they can’t give it away.

What if these negotiations fail?



Well, I think the federal government will act if the parties don't come to an agreement. They've signaled that they will act to prevent dead pool. There may be litigation on the side, but I don't think a judge is going to let it go to dead pool. I think the federal government will take every effort to avoid dead pool, which means we may have painful cuts in the next few years. But that's far better than having the tap completely turned off, and the economic disruption and social disruption that that would cause.

I think the bigger question is: Can the federal government come up with an interim solution that will maintain enough peace among the parties so that they can have the meaningful conversations they need to come up with new agreements starting in 2026? The current operating regime goes through 2026, and figuring out where to go from there is a much harder challenge because there's more up for grabs.

“There will be some people who complain about the impacts of the cuts but ignore the fact that if there's no water, there's no water.”

Last year as the drought reached crisis point, the Bureau of Reclamation, the federal water management agency for the West, told the seven states they needed to cut annual Colorado River use by as much as some 25%. Then on April 11, the agency issued a more modest revised set of water reduction options for California, Nevada and Arizona calling for cuts next year about half the amount previously stated. Why did they scale it back?

The purpose of their decision is to get us to the next agreement [in 2026] and to avoid dead pool or the loss of the ability to generate hydropower. It appears that they've decided with the abundance of rain and snow we've gotten, they can make a proposal that's on the lower end of what they had asked, although that's still a considerable amount of water.

Do you think that was the right decision?

I don't know. I suspect in the comments [they receive] they will hear people who say thank you. They will hear people who say we need to make deeper cuts because we can't be living in an economy of 40 million people this close to the edge. And then there will be some people who complain about the impacts of the cuts but ignore the fact that if there's no water, there's no water.

The Bureau of Reclamation has outlined two main avenues for water reduction. One is based predominantly on current water rights – those with seniority would have priority to water. The other option would be to have all users cut their usage by the same percentage. How would the winners and losers be different in each scenario?

First off, those scenarios aren't choices. They are opposite scenarios to study to illuminate the impact of each. The preferred option will be that the seven states come to some agreement in between, or the federal government chooses and constructs an option that is in between.

But to answer your question, in the water rights scenario — which is the governing law of the river — Arizona gets hurt the most. You have heavy impacts on Nevada, but the heaviest impact falls on Arizona because Arizona is the most junior water rights holder by agreement. At least large chunks of Arizona. There are some very senior water rights holders in the Yuma [Arizona] area who will be just fine. But the Central Arizona Project, which supplies water to Tucson and Phoenix and agricultural areas in between, would face very, very severe cuts.

In the other option, California faces the biggest cuts and that would fall heavily on Southern California, particularly the urban regions.

The impact is severe either way, which is why there's hope and maybe a little more optimism than there was even a couple of months ago that the seven states will come to some sort of agreement that is somewhere in between — not right in the middle — but somewhere in between [those two options].

It is made somewhat more possible by the fact that the federal government has put \$4 billion under the Inflation Reduction Act to deal specifically with conservation measures and land fallowing and the like, to make the impacts of whatever has to happen less severe. There are also other billions in the act, and in other legislation, that hopefully the federal government will also bring to bear to help speed the funding of recycled water projects, lawn replacement and other things.

Whether by an agreement among the states or federal intervention, cuts will be ordered. How will Southern California be impacted by the cuts?

Well, I think it'll be a mix. Clearly, the Metropolitan Water District — the largest wholesale water agency in the country which covers over 19 million people — will definitely have to bear the brunt of the cuts because they have junior [water rights]. Same is true with the Coachella Valley Water District. They're junior [in terms of water rights] to the Imperial Irrigation District. Pretty much all of urban Southern California will take some big hits — not as big as Arizona but nonetheless significant.

“Drinking water is actually a very small fraction of the water that we use. The rest of it is used for outdoor ornamental landscaping, for agriculture and for commercial uses.”

How well positioned is Los Angeles County to weather drastic cuts?

Well, I'd say every part of Southern California has sort of a different mix of options. I think those communities that are 100% dependent on Colorado River Water will have a problem. Those that have a mix of groundwater or other resources will have less of a problem. The interesting thing is it's not one big bathtub. There are areas of Southern California that have very robust groundwater management programs, and I think they will be in good shape.

Relatively speaking, the Metropolitan [Water District] has spent well over a billion dollars building storage in the Diamond Valley Reservoir [near Hemet in Southern California] and elsewhere underground. That will buy some time. You've got the largest water recycling project in the world in Orange County, which will also buy some time. And you have two even larger [water recycling] projects being proposed for the greater L.A. area: a 100% recycling at the Hyperion Treatment Plant project, and Metropolitan's joint project with the L.A. County Sanitation District. But both of those projects will take a decade or more to come to fruition.

You also have L.A. County working to implement stormwater capture projects that provide multiple benefits, including yielding more groundwater. The Los Angeles [Department of Water and Power] is also cleaning up their groundwater basins and working to recapture more stormwater in them. You have a mix of water efficiency first and foremost.

I think you'll see much more lawn rebates and limitations on watering outdoors, which is a huge source of water still in Southern California despite a lot of progress during the last drought. You'll see investment in plugging leaks through better technologies in single family and multifamily residential units that will yield a lot of water. I think all of that buys time for those recycling projects to come to fruition.

Where do you think the biggest cuts from the Colorado River *should* come from?

Well, I think it's a mix. We don't have a blank slate. Those with senior water rights have developed thriving economies and communities based on that. You can't just take it away from them without incurring tremendous pain. The equities are really very mixed. I think the cuts should come from a mixture of cutting out nonessentials to modern life, such as cutting way back on lawns. Certainly some amount of fallowing in agriculture. Not killing agriculture, but cutting back in areas where it's exceeded what nature can provide, and helping those communities make that transition over a period of years.

Could these cuts have unintended consequences, like impacted drinking water quality, which could affect people's health?

I don't think so. I mean, drinking water is actually a very small fraction of the water that we use. The rest of it is used for outdoor ornamental landscaping, for agriculture and for commercial uses. I think with proper management and prioritization of drinking water, we can do rather well.

There are communities that have had water quality impairments for years based on either contamination through the normal course of business in agriculture in their regions, or through illegal dumping or through overpumping of groundwater basins that mobilize natural contaminants that wouldn't have been mobilized otherwise, like arsenic or [hexavalent] chromium and some other contaminants. But that's very site specific.

I don't think you can blame the need to cut back on those problems. It may exacerbate it in some cases, but the problem isn't the Colorado River there. The problem is the lack of will on our part of society to provide for the drinking water needs and sanitation needs of all, which is why there is a worldwide movement for the human right to water.

How will it affect California's reliance on its already overstressed groundwater resources?

I think everyone needs to be more efficient. Agriculture, urban users, et cetera, we all need to manage water more precisely wherever we are and value every single drop of water. We just need to accelerate our activities. But first and foremost in all of those is conservation and efficiency, because it's the cleanest, cheapest and smartest way to extend our water resources.

There's plenty of low hanging fruit yet to be seized in terms of transitioning out of lawns, even as we plant more trees that we're going to need under climate change. In the kind of multibenefit use that uses urban greening to capture water when we see it in our urban areas and get it into green spaces and into the ground, I think there are tremendous multibenefit opportunities from the top of the watershed on down that we're just starting to see. These are the kinds of things that traditional ecological knowledge and communities have known from time immemorial that we seem to have forgotten in the last 100 years or so of industrialization and professionalization and siloization of professions.

We need to unlearn some of those things and start to integrate green infrastructure along with our gray infrastructure. That will help buffer the sorts of challenges that climate change is raising. We live in an incredibly wasteful and luxurious era of the use of water, but cutting our use to something that still enables us to have quite a high quality of life is definitely within our reach. But it will require change.

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



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WEBINAR SUMMARY: What is the potential role of desalination in California's water portfolio?

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With drought becoming a normal feature of life in California, finding reliable ways to increase freshwater resources has become imperative. One promising solution may be desalination – the process of removing salt and other minerals from seawater or [brackish](https://mavensnotebook.com/glossary/brackish/) groundwater to make potable water – which could potentially provide improved resiliency and create new sources of potable water within California's diminishing supplies.

However, high costs and environmental impacts have so far limited the role desalination plays in the state's water portfolio. But is there a larger role for desalination in California? At a [webinar](https://www.youtube.com/watch?v=068j0fj-24) (<https://www.youtube.com/watch?v=068j0fj-24>), held in February 2023, the [California Council on Science and Technology](https://ccst.us/) brought together four experts to explore the potential and the challenges of expanding desalination in California.

Desalination is, of course, not new to California; the first commercially viable reverse osmosis membrane was invented and patented by UCLA in 1960, and the first modern desalination plant was built over three decades ago on Catalina Island. Seawater desalination already contributes to local water supplies for some coastal communities, such as San Diego and Santa Barbara. Further inland, brackish groundwater, high in salts and other dissolved solids, is desalinated to serve communities in the Inland Empire.

However, desalination's contribution to California's water supply remains small: Seawater desalination only accounts for about 1% of California's water supply; brackish desalination even less.

So why all the discussion about desalination? Dr. David Sedlak, Director of the UC Berkeley Water Center, said desalination could be a lifeline if you don't have other water sources. "Where we see the importance of desalination for California's water portfolio is in the places where they have either junior water rights, where there are no other good sources of water that haven't already been exploited, where conservation has already been implemented, or where there are limited opportunities for water recycling. So there's a real desire among these communities to have desalination as one of the tools in their arsenal for consideration."



(<https://i0.wp.com/mavensnotebook.com/wp-content/uploads/2023/03/Desal-ACWDs-Newark-Facility.jpg?ssl=1>)

THE HIGH COST OF DESALINATED WATER

Assistant General Manager Robert Shaver and District Board President Jim Gunther inspect ACWD's Newark Desalination Facility. Photo by John Chacon / DWR

However, the cost of desalinated water per acre-foot is often higher than most other water supply options. And these costs can vary widely between desal plants as costs are dependent on site-specific factors, such as the availability of land, conveyance (<https://mavensnotebook.com/glossary/conveyance/>) from the desal facility to end users, and the contracting mechanism.

In most cases, desalination is a marginal water supply that would provide somewhere between five and 10% of a municipalities water source, so the costs should be amortized over the full water supply portfolio and looked at relative to the other available sources, said Dr. Meagan Mauter, the Research Director for the National Alliance for Water Innovation (NAWI) and an associate professor at Stanford University in the Stanford Doerr School of Sustainability.



<https://i0.wp.com/mavensnotebook.com/wp-content/uploads/2023/03/Santa-Barbara-desalination-plant.jpg?ssl=1>

Charles E. Meyer Desalination Plant in Santa Barbara, California, plays a key role in improving water reliability and resiliency for the City during the drought years. Photo by Florence Low / DWR

Desal is getting more expensive in California, not less expensive; this is mostly due to permitting costs rather than energy costs, Dr. Mauter said. She foresees the costs will be reduced when small-scale plants are modular in their technology and uniformly deployed; these modular systems could then be brought in and put to work for a whole host of different water supply systems. Eliminating a lot of the design costs and the economies of scale in manufacturing and deployment will help drop some of those costs, she said.

Dr. Reza Lakeh, Associate Professor at Cal Poly Pomona, pointed out that the transition to renewable energy is an opportunity for desal plants. California aims to run the grid fully on renewable energy by 2045, which will impose a significant demand on energy storage technologies because of the intermittent nature of renewables in the power grid.

"This has a huge potential that can be tied into water desalination because we can consume the energy at the times that is not needed by other sectors to generate water," he said.

Dr. Mauter agreed and noted that many facilities sign contracts with electricity providers to ensure grid stability by curtailing plant operations when power supplies are constrained – and deriving substantial revenue yearly, usually equivalent to 1-2 months of the plant's total energy costs.

"We're not designing for that right now in our desalination plants," she said. "There's an enormous opportunity to build flexibility into these desalination plant designs, potentially allowing them to flex their operation ... if not daily, then several times a week. The value-add to the grid, especially in displacing the need for things like battery storage, is tremendous. And I think there's an opportunity in the research arena to better articulate what that value is, and then also better design plants and standardize the design of plants that really allows for high intermittency operation."

However, Dr. David Sedlak pointed out that the true value of seawater desalination and brackish water desalination is its reliability; during periods of extended drought, that water becomes much more valuable. Also, desalinated water can be used to blend with other water with slightly elevated concentrations of constituents to bring it to acceptable drinking water quality.

"So there are opportunities when you have desalination for increased drought resilience, and also using that extremely clean water to improve the overall water quality in a larger water system," he said. "Here in California, many of our existing water systems need that low salinity water to improve their quality, aesthetics, and overall composition."

DISPOSING OF THE BRINE

Discharging brine to coastal waters can cause the saltier brine to sink to the seafloor without mixing with the ocean waters, creating a salty zone that can impact marine life in that area. New diffuser technologies have been developed that mix the brine with ocean water as it is discharged, said Dr. Sunny Jiang, a professor of Civil Environmental Engineering at UC Irvine. Diffusers lower the salinity and environmental impacts dramatically.

However, Dr. Lakeh noted that the use of diffusers has been subject to many debates and discussions in academia. "There are papers that support this method of disposal, but there are others that show concerns, so there is no clear indication," he said.

Disposing of brine is much harder for inland facilities, a challenge that has hindered the growth of brackish desalination. Southern California solved this problem by building a brine line from the Inland Empire to the coast, and the Livermore Valley has a pipeline that takes its sewage effluent (<https://mavensnotebook.com/glossary/effluent/>) to San Francisco Bay for discharge (<https://mavensnotebook.com/glossary/discharge/>). Brine lines have also been considered for other areas.

However, Dr. Eric Hoek, a professor at UCLA and the faculty director of UCLA Sustainable LA Grand Challenge, noted that the brine lines in Southern California are either fully or almost fully allocated, so there's not a lot of room for additional brine sources.

"I saw a map recently of what Southern California looked like when those pipelines were installed," he said. "The population was a fraction of what it is now. Then, it was mostly dirt and undeveloped land that the pipes were laid through. But now there are neighborhoods and business districts and industry all surrounding them. And so to do that again would be unbelievably expensive. But in other places, there may be opportunities."

"That brine has the potential to become feed streams and other industrial processes," said Dr. Mauter. "It has the potential to help us source specific elements that we may be interested in. But, broadly, we need to look at place-based solutions for brine management that account for existing disposal pathways, subsurface geology, and existing markets that a concentrate might feed into."



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Charles E. Meyer Desalination Plant in Santa Barbara, California, plays a key role in improving water reliability and resiliency for the City during the drought years. Photo by Florence Low / DWR

Dr. Lakeh pointed out that the real opportunity lies in the development of zero-liquid discharge technologies. “The development of technologies that desalinate the water to almost solids, or zero liquid discharge technologies, they can extract more water, and at the end, the reject of that process is a solid that can be repurposed in different applications, such as energy storage or construction,” he said.

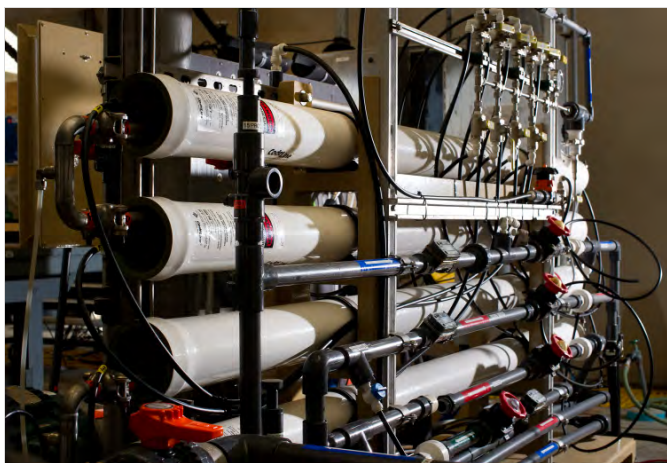
Dr. Hoek noted that in the Middle East, they are already exploring the idea of productizing the brine for something which can be selectively removed from the brine of a much higher value, like magnesium or a bromide (<https://mavensnotebook.com/glossary/bromide/>) for industrial applications or even selling a clean sodium chloride brine for the production of chlorine and caustic soda.

“In many cases, the money from selling those products that you harvest from the brine can pay for the whole water treatment operation and with profit on top,” he said. “So some of the future direction is going to involve what some people refer to as valorizing what is traditionally viewed as a waste; squeezing as much clean, fresh water out as we can, and trying to extract value from high-value constituents that may exist in that concentrated brine stream.”

THE POTENTIAL FOR SMALL-SCALE MODULAR DESIGNS FOR SMALLER COMMUNITIES

Researchers have been developing modular systems that could be a potential solution for those reliant on wells at risk of running dry during droughts or those with water contamination problems, such as nitrate (<https://mavensnotebook.com/glossary/nitrate/>) or arsenic.

Dr. Sedlak acknowledged that modular systems present challenges, such as making them operate autonomously, ensuring the maintenance is simple, and the system is not rejecting large quantities of water.



<https://i0.wp.com/mavensnotebook.com/wp-content/uploads/2023/03/Desal-test-facility-in-Port-Heuneme.jpg?ssl=1>

The mission of the Seawater Desalination Test Facility in Port Hueneme, Ventura is to provide a real world test environment for long term evaluation of desalination equipment and other water purification components including reverse osmosis membranes, pumps, and energy recovery devices. Photo by John Chacon / DWR

“Right now, you could deploy a small-scale desalination system that relies upon reverse osmosis or another technology to a household well or cluster of homes or a small community; they just happen to be relatively expensive,” said Dr. Sedlak. “By focusing on the best ways of using sensors, changing the materials used in membranes, and working on pretreatment, we think that there’s a path to lowering that cost and making it the go-to option when we think about protecting communities from threats of water contamination and also being able to access brackish water resources.”

“The water contamination issues in these small communities are not exclusively issues with total dissolved solids,” said Dr. Mauter. “There can be issues with nitrates or with arsenic. So the National Alliance for Water Innovation (NAWI) is piloting technologies designed to be small-scale systems that serve communities and may or may not be membrane-based. So you’re not generating the same degree of concentrate that needs to be managed in those inland communities, but are focusing on separating the ions of concern and doing so through either sorbent or electrochemical based processes.”

STREAMLINING THE PERMITTING PROCESS

Governor Newsom’s water supply strategy directs state agencies to consider avenues for streamlining coastal desalination permitting processes. Panelists agreed that developing modular systems could potentially speed up the permitting process.

However, Dr. Sedlak said getting it right with these early desalination projects is important. “I don’t work directly in the permitting process for ocean desal plants. But as an observer from the outside, it feels to me a

lot like the early days of potable water recycling, where every single project is quite different from one another and undergoes a lot of scrutiny; those take a long time, there are differences of opinions, and it does delay the process.”

He suggested that an independent science panel might be able to provide advice on the technical issues complicating permitting because it does seem like every project is a Ph.D. dissertation. Once the state has permitted half a dozen projects, the permitting process will likely go much faster.

“Want it or don’t want it, desalination is going to come because you’re going run out of water,” said Dr. Jiang. “So California should seriously consider streamlining the permitting process.”

LOOKING FORWARD

https://ccst.us/wp-content/uploads/2023_Desalination_CCST_OnePager.pdf“I would just encourage us to think about desalination more broadly than just seawater desalination,” said Dr. Mauter. “There are a lot of impacted water supplies that are not available to us for consumption or productive agricultural or industrial use because of specific contaminants of concern or because of some specific ions that are at concentrations that don’t really allow for their use. So we need to think about desalination as serving a broad set of non-traditional waters. And we need to think about those non traditional waters as that will help provide California with a resilient water supply portfolio.”

“One of my observations from my time working on potable water reuse is that new technologies often undergo a process of ‘legitimization,’ where the public has to decide whether they think it’s the right thing to do,” Dr. Sedlak said. “Having lived through the legitimization of potable water reuse, I understand the importance of academic researchers, professional scientists, utilities, and regulators coming together to conduct research needed to support decisions about investments in future water infrastructure.”

Dr. Sedlak said the state needs to take the issue of legitimization more seriously by listening to the critics, doing the science, and building regulation in a way that addresses those issues. “We have potable water reuse, which is going gangbusters in the state. And on the other end, we have nuclear power, which is shutting down at a time when the state might have been well served by having it, and those can be traced to a lack of good stewardship by the legitimization process. And so we’re at a critical point for desalination. And if we get it right, this could be something in our portfolio going into the future.”

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Feb. 2023

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INNOVATIONS IN DESALINATION

Photo: Charles E. Meyer Desalination Plant in Santa Barbara, California | Florence Lee / Calif. Dept. of Water Resources

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CCST Desalination Resilience Initiative: Designing, simulating, and increasing the resiliency of desalination systems against extreme heat, power outages, and the COVID-19 pandemic is critically important for the state in which California led and now. CCST is committed to advancing science and technology aimed to improve our resilience to drought, reduce harm, and increase the lives of all Californians.

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The following experts can advise on desalination:

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SUMMARY

- Current desalination technology must often use more energy to separate salt and other contaminants from water.
- Desalination produces freshwater that meets the highest water quality standards, but high costs and environmental impacts limit the role it currently plays in California's water portfolio.
- Systems across California's government agencies and research institutions are exploring ways to improve desalination and drive down costs.
- As the costs of desalinated water approach parity with other freshwater resources, many new applications for desalination can be imagined.

DESALINATION FOR WATER SECURITY

As California braces for what may be a fourth year of historic drought conditions (even despite recent rainfall this January), desalination is receiving renewed interest as a tool for securing drought-proof water supplies.

Seawater desalination—where salt and other impurities are removed from seawater, resulting in pure freshwater—already contributes to water resilience for several coastal Californian communities like San Diego and Santa Barbara. Further inland, **brackish groundwater** is desalinated to serve communities like Norwalk and Irvine. With 840 miles of coastline, some have asked why California hasn't yet pivoted to its seemingly endless supply of water as a solution to its water challenges.

Most desalination today is accomplished with **reverse osmosis** (see next page). While this technology has come a long way since first being developed at the University of California Los Angeles in the 1950s, desalination is still prohibitively costly for many communities. However, as climate change threatens California's (and much of the world's) freshwater supplies, researchers are working to change the equation and exploring ways that desalination could contribute to water security.

DESALINATION CHALLENGES

HIGH ENERGY DEMAND
Significant energy is required to desalinate seawater. Energy sources for more than one-third of the operational costs of running desalination plants.

BIODEGRADATION
Desalination results in a hypersaline byproduct known as "brine." Brine disposal can be challenging, especially for inland brackish water desalination plants—and may negatively impact marine environments.

INFRASTRUCTURE AND ENTANGLEMENT
Much of the current desalination plants are built on existing infrastructure, including impoundment (forming larger impoundment against intake channel) and associated brine pits and evaporating operations through the plant. Subsurface intake pipes placed on the seabed floor can also bring along these types of impacts. However, subsurface intakes are not feasible for many locations and are considerably more expensive.

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