CITY OF SANTA CRUZ
Downtown Library Community Room
224 Church Street
Santa Cruz, California 95060

WATER COMMISSION

Regular Meeting

August 21, 2023

7:00 P.M. GENERAL BUSINESS AND MATTERS OF PUBLIC INTEREST, DOWNTOWN LIBRARY COMMUNITY ROOM/ZOOM

NOTE: This meeting will be held as a hybrid meeting with public attendance available both in-person and via teleconference.

This meeting may be viewed remotely, using either of the following sources:

- **Zoom Live (no time delay):** https://us06web.zoom.us/j/81160613636
- **Facebook:** https://www.facebook.com/SantaCruzWaterDepartment/?epa=SEARCH_BOX

PUBLIC COMMENT:
If you wish to comment on items the meeting, please see information below:

- **Call any of the numbers below. If one number is busy, try the next one. Keep trying until connected.**
  +1 669 444 9171
  +1 346 248 7799
  +1 719 359 4580
  +1 720 707 2699
  +1 253 205 0468
- Enter the meeting ID number: **811 6061 3636**
- When prompted for a Participant ID, press #.
- Press *9 on your phone to "raise your hand" when the Chair calls for public comment.
  - It will be your turn to speak when the Chair unmutes you. You will hear an announcement that you have been unmuted. The timer will then be set to three minutes.
  - You may hang up once you have commented on your item of interest.
  - If you wish to speak on another item, two things may occur:
    1) If the number of callers waiting exceeds capacity, you will be disconnected and you will need to call back closer to when the item you wish to comment on will be heard, or
    2) You will be placed back in the queue, and you should press *9 to "raise your hand" when you wish to comment on a new item.

NOTE: If you wish to view or listen to the meeting and don't wish to comment on an item, you can do so at any time via the Facebook link or over the phone or online via Zoom.

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 – 3.7) 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)

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

2. Water Commission Minutes from July 17, 2023 (Pages 2.1 – 2.3)

   That the Water Commission approve the July 17, 2023, Water Commission Minutes.

3. Water Department Debt Report (Pages 3.1 – 3.7)

   That the Water Commission receive information on the Water Department's debt profile.

Items Removed from the Consent Agenda

General Business (Pages 4.1 – 5.9) 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.

4. 2022 Water Quality Consumer Confidence Report (Pages 4.1 – 4.25)

   That the Water Commission receive information and a presentation on the results of the 2022 Water Quality Consumer Confidence Report.

5. Water Supply Augmentation Implementation Plan Quarterly Update (Pages 5.1 – 5.9)

   That the Water Commission receive an update and provide feedback regarding the status of the Water Supply Augmentation efforts including a presentation on water supply modeling.

Subcommittee/Advisory Body Oral Reports

6. Santa Cruz Mid-County Groundwater Agency

7. Santa Margarita Groundwater Agency

Director's Oral Report

Information Items (Pages 8.1 – 8.42)

Adjournment

WATER COMMISSION
INFORMATION REPORT

DATE: 08/14/2023

AGENDA OF: 08/21/2023

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:

August 8, 2023

Adjustment of Water Department Miscellaneous Fees (WT)

Resolution No. NS-30,181 was adopted adjusting the Water Department's miscellaneous fees for services due to labor cost increases and rescinding Resolution No. NS-29,540.

Resolution to Reimburse Capital Expenditures from Future State Water Resources Control Board Financing for Newell Creek Pipeline Replacement Project (WT)

Resolution No. NS-30,182 was adopted authorizing the Water Department to be reimbursed by State Water Resources Control Board (SWRCB) for costs related to the Graham Hill Water Treatment Plant Facilities Improvement Project.

Felton Diversion Pipeline Emergency Repair Project (e702301) – Ratification of Plans and Specifications and Authorization to Advertise for Bids and Award Contract (WT)

Motion **carried** to ratify the plans and specifications for the Felton Diversion Pipeline Emergency Repair Project (e702301) and staff's action to advertise for bids on the City's website; authorize the Water Director to execute change orders within the approved project budget; find the project exempt under the California Environmental Quality Act; and authorize and direct the City Manager, or designee, to execute the contract per **Resolution No. NS-27,563**, and in a form approved by the City Attorney.

Regional Drought Resiliency Project: Scotts Valley Water District - City of Santa Cruz Intertie-1 Project (c702205) – Project Approval (WT)

Motion **carried** to approve the Scotts Valley Water District - City of Santa Cruz Water Intertie-1 Project (c702205) considering the certified Santa Cruz Water Rights Project Final Environmental Impact Report and the Intertie-1 Project Addendum to the Santa Cruz Water Rights Project Final Environmental Impact Report.

Resolution of Necessity for Regional Drought Resiliency Project: Intertie 1 for Firehouse Lane Property, APN 067-202-60, Owned by C-SHORE, a Partnership, Robert R. and Edithanne Rittenhouse, and Denoyer F. and Nancy T. O'Laughlin (CA/WT)

Resolution of Necessity No. NS-30,186 was adopted finding that public interest and necessity require the acquisition of interests in certain real property on Assessor's Parcel Number 067-202-60, located in the unincorporated area of Santa Cruz County, and authorizing the City Attorney to proceed with eminent domain proceedings to acquire the real property.

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

ATTACHMENTS: None.

CITY OF SANTA CRUZ
Water Department

Water Commission
7:00 p.m. – July 17, 2023
Downtown Library Community Room
224 Church Street, Santa Cruz

Summary of a Water Commission Meeting

NOTE: There was a technical failure experienced with the audio recording of this meeting. Video recording covers the full meeting, but sound is not available until minute 32 of the recording.

Call to Order: Vice Chair Engfer called the meeting to order at 7:07 PM in the Downtown Library Community Room.

Roll Call

Present: T. Burns; M. Duncan-Merrell; D. Engfer (Vice Chair); A. Páramo; and S. Ryan.

Absent: J. Burks (Chair), with notification; and G. Roffe, with notification.

Staff: R. Menard, Water Director; H. Cagliero, Administrative Assistant III; H. Luckenbach, Deputy Water Director/Engineering Manager; and S. Easley Perez, Principal Planner.

Others: One member of the public (via Zoom).

Presentation: None.

Statements of Disqualification: None.

Oral Communications:

At 7:08 p.m. Vice Chair Engfer opened Oral Communications. There were no speakers. Vice Chair Engfer closed Oral Communications at 7:09 p.m.

Announcements:

Water Director Menard announced the resignation of Commissioner Roffe and thanked him for his years of service.

Consent Agenda:

1. City Council Items Affecting the Water Department

2. Water Commission Minutes from June 5, 2023

3. Updated Working Draft Water Commission 2023 Work Plan

Commissioner Burns moved approval of the Consent Agenda. Commissioner Duncan-Merrell seconded.

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

Items removed from the Consent Agenda: None.

General Business

4. Regional Drought Resiliency Project: Intertie-1 Project, Water Commission Consideration and Recommendation

Water Director R. Menard introduced S. Easley Perez, Principal Planner, who gave a presentation on this item and responded to questions from the Commission with assistance from H. Luckenbach and R. Menard.

How are the operational agreement discussions going with Scotts Valley Water District (SVWD), and what is the timeline looking like?

- I think that the details can be worked out relatively readily-part of what we're trying to decide on is the operating model that will be the basis for this agreement.

Are you trying to anticipate and incorporate multiple different usage scenarios into the operational agreement with SVWD?

- We would like to have a centralized framework for the operating model that would determine cost-basis and operational aspects. The intention is not to set up this intertie for emergency use only and have to purge the water sitting in the pipes before each use. Much of the discussion at this time centers on how we can make this a functioning piece of infrastructure that addresses water quality and management issues.

There was reference in the addendum to twenty-five mature trees that will be removed or impacted by this project, is there any mitigation contemplated for the impacts on those mature trees?

- There isn't a specific mitigation measure for the trees. At this point, we think we need to remove twelve trees – we just finished our arborist report and we are still looking at permitting for those trees – whether they will be permitted through the encroachment permit process or whether we will need to seek County permitting and the result will help determine the mitigation requirement. There is not a CEQA measure for trees specifically, only habitat mitigation.

Vice Chair Engfer opened public comment and the following person spoke:

Becky Steinbruner

Vice Chair Engfer closed public comment.

Commissioner Burns moved the staff recommendation on Item 4. Commissioner Ryan seconded.

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

Subcommittee/Advisory Body Oral Reports

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

The MGA met last on June 15, 2023, and the agenda included approval of the budget for the next fiscal year and a presentation on the update to the Mid-County Groundwater Sustainability Plan (GSP) which is due in January of 2025. In addition, recruitment for two private well owner representatives was discussed as two of the current representatives are nearing the end of their terms. The next meeting of the MGA will be in September.

7. Santa Margarita Groundwater Agency (SMGWA)

The SMGWA has not met since the meeting on May 25th, 2023, and will meet next on August 24th. The board has set up an ad hoc committee to evaluate and recommend potential improvements for the annual reporting process required for their GSP, and the initial meeting is in the process of being scheduled for early August. It was announced at the last meeting that SMGWA was not approved for funding from the grant application.

Director's Oral Report:

R. Menard announced that she will be working with the City Manager on filling the two vacant appointments on the Commission and these will most likely be included on the City Council agenda for either the late August or September.

R. Menard also announced she will be giving a presentation for Scotts Valley Water District at their August 10th meeting.

R. Menard provided a reminder that the next Water Commission meeting date was rescheduled to August 21st and will be held using an alternate location at the Downtown Library Community Room and a system that would allow our meetings to be hybrid for the public and presenters.

At 8:07 p.m. Vice Chair Engfer opened public comment and the following person spoke:

Becky Steinbruner

Vice Chair Engfer closed public comment at 8:10 p.m.

Information Items: Information items included in the agenda packet were not discussed.

Adjournment: The meeting was adjourned at 8:10 PM.

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WATER COMMISSION
INFORMATION REPORT

DATE: 08/10/2023

AGENDA OF: 08/21/2023

TO: Water Commission

FROM: David Baum, Chief Financial Officer, Water Department

SUBJECT: Water Department Debt Report

RECOMMENDATION: That the Water Commission receive information on the Water Department's debt profile.

BACKGROUND: On June 5, 2023, the Water Commission reviewed and recommended adoption of the FY 2024 Operating Budget and Capital Investment Program (CIP) Budget. During the Commission's discussion, Commissioner Burns asked for additional information regarding the Department's debt profile. In particular, he requested an additional financial document that shows total Water Department debt.

DISCUSSION: The Water Department's CIP for the next five years is $394 million. The Long Range Financial Plan (LRFP), approved in 2021, anticipates that 85% of the CIP will be funded by long-term debt. The forecasted amount of new debt is $323 million through FY 2028, which would fund 82% of the adopted CIP. The other 18% will be funded by cash from operations and grants. Details are presented in Attachment 1, "FY 2023-28 Financial Pro Forma", which was included in the FY 2024 budget packet to the Water Commission.

Over the past nine years, the Water Department has executed seven debt agreements. The highlights are as follows:

- $11,260,000 Water Revenue Bonds issued in 2014 refinanced two outstanding debts – the 2006 Water Revenue Bonds and a note payable to the State.
- $25,000,000 I-Bank Water Infrastructure Loan issued in 2016 financed capital improvements in the City's water system, including Bay Street Reservoir, Beltz Well #12 and Graham Hill Water Treatment Plant (GHWTP) filter rehabilitation.

- $20,925,000 Water Revenue Bonds issued in 2019 refinanced the 2018 line of credit with Bank of America and financed capital improvements in the City's water system, including Coast Pump Station, University 5 Tank Replacement, and water main replacements.
- $103,453,000 State Revolving Fund (SRF) loan for the Newell Creek Inlet/Outlet (NCIO) Project; $77.4 million is currently outstanding.
- $45,900,000 SRF loan for the GHWTP Tanks Replacement (Tanks) Project; $19.5 million is currently outstanding.
- $50,000,000 line of credit for construction financing related to the SRF and Water Infrastructure and Financing Innovation Act (WIFIA) loan-funded projects; $16 million is currently outstanding.
- $127,730,000 WIFIA Loan; $4,641,929 is currently outstanding.

As of 6/30/2023, the debt outstanding is $166.3 million. Additional details for the current outstanding debt appear in Attachment 1, "SCWD Debt Roster", Attachment 2, "SCWD Debt Service" and are summarized as follows:

$ 7,275,000	2014 Revenue Bonds
$21,711,316	2016 I-Bank Loan
$19,800,000	2019 Revenue Bonds
$77,392,166	2020 SRF Loan (NCIO Project)
$19,519,970	2021 SRF Loan (Tanks Project)
$16,000,000	2021 Bank Revolving Line of Credit
$4,641,929	2023 WIFIA Loan
$166,340,381	Total Debt

Repayment of the debt occurs through 2063 and is structured like a home mortgage with equal payments through the life of the loans. The $16,000,000 line of credit will be repaid with reimbursements from the long-term debt provided by the 2020 and 2021 SRF loans and the 2023 WIFIA loan. The $16,000,000 line of credit is short-term construction financing. All water net revenue is pledged to the repayment of debt. The net revenue is the gross water revenue minus operating costs.

The following table summarizes debt ratings, debt outstanding, debt service coverage and population served for the Water Department. Similar metrics are provided for the smaller Soquel Creek Water District and the larger Marin Municipal Water District for reference purposes. Santa Cruz has a solid investment-grade rating; albeit slightly lower than Soquel Creek and Marin, due to the fact that Soquel Creek has less debt, while Marin has a slightly lower coverage but a much larger rate base to support debt repayment.

	Comparative Debt Metrics			
	Similar Water Agencies			
		6/30/2022		
			Debt	
	Credit	Debt	Service	Population
	Ratings	Outstanding	Coverage	Served
Santa Cruz	AA-/A-	$ 139,234,522	3.54	100,000
Soquel Creek	AA	$ 48,357,000	5.39	41,000
Marin Municipal	AA+	$ 155,042,000	2.91	187,500
Ratings are provided by S&P Global for each water agency;				
Santa Cruz also includes rating information from Fitch.				

Future Debt Depends on Revenue Growth

The LRFP and annual budgets forecast the funds needed to cover operations and capital expenditures. Details of the forecast are provided in Attachment 3. There are two tests to consider when forecasting debt needed to fund capital expenditures. First, the LRFP established a minimum debt service coverage ratio of 1.5. For FY 2023, the ratio is calculated as follows:

$44,331,199	Total Revenue
$31,384,737	Total Expenses
$12,946,462	Net Revenue
$5,201,605	Debt Service (excluding line of credit)
2.49	Debt Service Coverage Ratio

Second, issuance of new debt depends on meeting the additional bonds test (ABT). The ABT is a debt covenant included in each debt agreement. It requires that current net revenues are at least 120% of the maximum annual debt service (MADS), which occurs in 2030. For FY 2023, the ABT is calculated as follows:

$12,946,462	Net Revenue
1.20	Coverage requirement
$10,788,718	Net Revenue available for total debt
$7,664,264	MADS 2030
$3,124,454	Net Revenue available for new debt service
$60,182,000	Debt Capacity for new debt in FY 2024

The debt capacity is based on thirty-five years of level debt service and using the current WIFIA loan rate, which is 3.77%. As we draw down loan funds from the WIFIA loan, we will be required to provide a calculation from an independent financial advisor. This calculation assures the lender that debt covenants are met. The $60.2 million debt capacity calculated above is more than what we expect to borrow in FY 2024.

Two bond rating agencies, S&P Global and Fitch, affirmed credit ratings for the Water Department in fall 2022; the ratings are "AA- (stable outlook)" and "A- (stable outlook)", respectively.

FISCAL IMPACT: The Financial Pro Forma provided in the FY 2024 budget package demonstrates that the Water Department has adequate funds to repay its debt obligations during the five-year CIP.

PROPOSED MOTION: No motion is required. This is information only.

ATTACHMENT(S):

1. SCWD Debt Roster
2. SCWD Debt Service
3. FY 2023-28 Financial Pro Forma

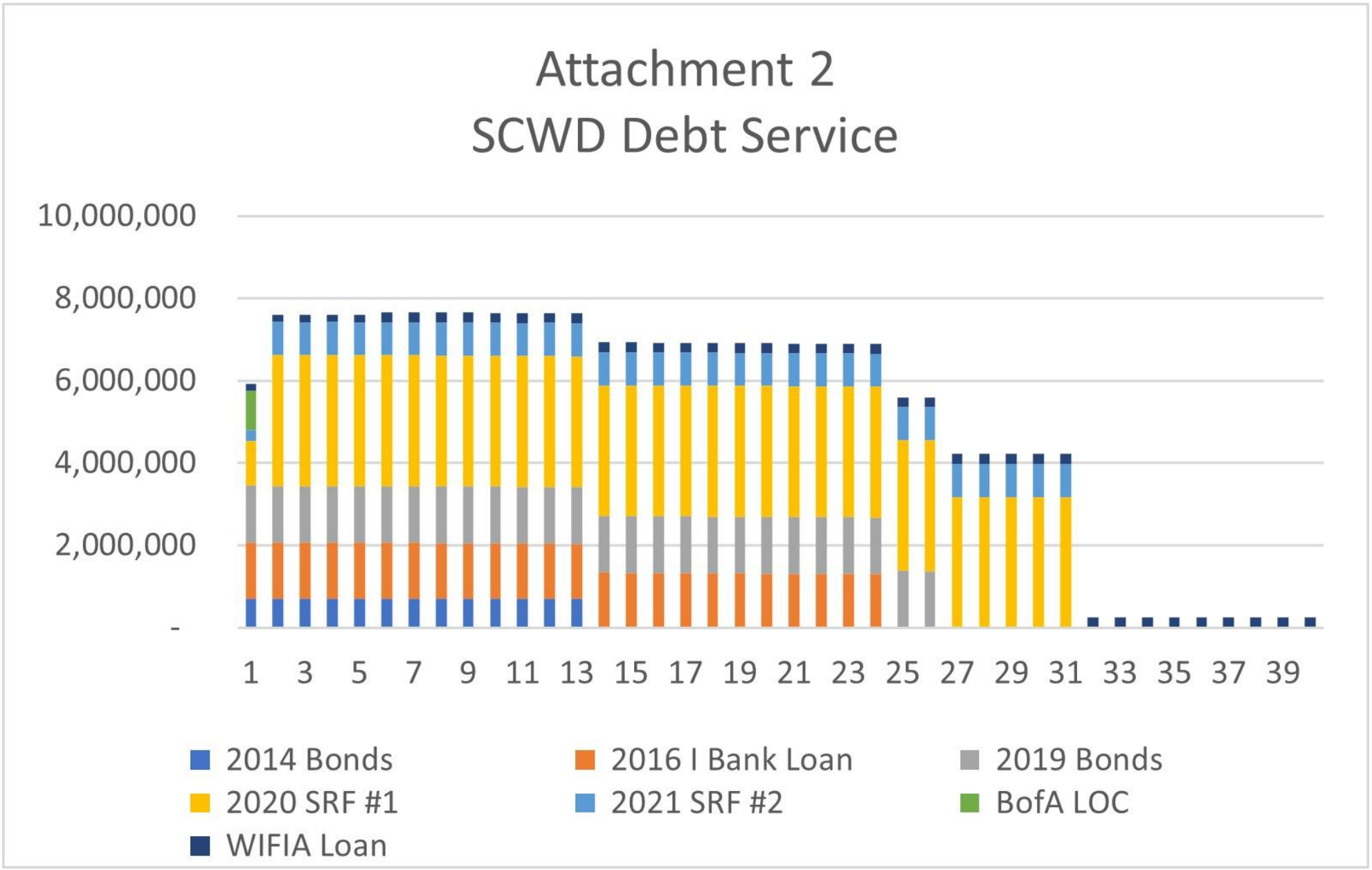
Attachment 1
SCWD Debt Roster

	Date	Draw / Project		Principal Payment	Balance
2014 Water Revenue Bonds	7/22/2014	$ 10,813,901	Repay 2006 Bonds		
	7/22/2014	137,234	Repay 1995 State Loan		
	7/22/2014	308,865	Costs of Issuance		
	3/1/2015			$ 590,000	$ 10,670,000
	3/1/2016			435,000	10,235,000
	3/1/2017			400,000	9,835,000
	3/1/2018			410,000	9,425,000
	3/1/2019			410,000	9,015,000
	3/1/2020			420,000	8,595,000
	3/1/2021			430,000	8,165,000
	3/1/2022			440,000	7,725,000
	3/1/2023			450,000	7,275,000
	Total	11,260,000		3,985,000	
2016 State I-Bank loan	11/30/2016	4,066,302	North Coast System Rehab		25,000,000
	11/30/2016	3,077,456	Beltz 12 Well Installation		25,000,000
	11/30/2016	5,154,693	GHWTP Filter Replacement		25,000,000
	11/30/2016	5,255,821	Bay Street Reservoir		25,000,000
	11/30/2016	1,595,747	Main Replacements		25,000,000
	11/30/2016	260,418	Gravity Trunk Main Valves		25,000,000
	5/3/2017	3,008,819	North Coast System Rehab		25,000,000
	5/3/2017	575,007	GHWTP Filter Replacement		25,000,000
	8/1/2017			505,367	24,494,633
	3/21/2018	727,930	North Coast System Rehab		24,494,633
	3/21/2018	888,936	Tait Wells Replacement		24,494,633
	3/21/2018	388,871	GHWTP Filter Replacement		24,494,633
	8/1/2018			521,741	23,972,892
	8/1/2019			538,646	23,434,246
	8/1/2020			556,098	22,878,148
	8/1/2021			574,115	22,304,033
	8/1/2022			592,717	21,711,316
		25,000,000			
2019 Water Revenue Bonds	12/12/2019	10,509,951	2018 LOC Payoff		
	12/12/2019	247,590	costs of issuance		
	6/9/2020	3,814,678	U5 Tank Replacement		
	6/9/2020	3,478,826	Water Main Replacements		
	6/9/2020	1,293,613	Tube Settlers for GHWTP		
	4/1/2021	5,143,002	Coast Pump Station		
		1,759,930	Other Projects		
	3/1/2020			70,000	20,855,000
	3/1/2021			335,000	20,520,000
	3/1/2022			350,000	20,170,000
	3/1/2023			370,000	19,800,000
	Total	26,247,590			

Note: total proceeds were $26,247,590; total par amount was $20,925,000. The extra $5,322,590 resulted from a premium paid by investors at time of bond sale.

2020 SRF Loan for Newell Creek Inlet/ Outlet Project	8/8/2023	77,392,166	NCIO Project		77,392,166
2021 SRF Loan for GHWTP Concrete Tanks Replacement Project	8/8/2023	19,519,970	GHWTP Tanks Project		19,519,970
2021 Line of Credit	6/28/2021	21,000,000	SRF and WIFIA Projects		21,000,000
	12/1/2022			5,000,000	16,000,000
2023 WIFIA Loan for GHWTP FIP, NCP, ASR and U4 Tank Projects	6/30/2023	4,641,929	NCP, ASR and U4 Projects		4,641,929

Total Debt Outstanding $ 166,340,381


Attachment 2
SCWD Debt Service
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
-
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39
2014 Bonds
2016 I Bank Loan
2019 Bonds
2020 SRF #1
2021 SRF #2
BofA LOC
WIFIA Loan

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 reveni	$ (5,188,829)	$ (5,372,944)	$ (6,261,317)	$ (5,780,174)	$ (5,275,368)	$ -
Total Rate Revenue	$ 42,269,155	$ 48,734,079	$ 56,726,468	$ 60,640,594	$ 64,824,795	$ 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	**$ 44,331,199**	**$ 50,796,123**	**$ 58,788,512**	**$ 62,702,638**	**$ 66,886,839**	**$ 74,395,033**
Operating Expenses						
Personnel	$ 16,582,877	$ 17,721,968	$ 18,734,656	$ 19,922,352	$ 21,192,020	$ 22,549,790
Services, Supplies & Other	$ 14,407,688	$ 18,381,435	$ 15,884,476	$ 16,678,700	$ 17,512,635	$ 18,388,267
Capital Outlay	$ 394,171	$ 352,230	$ 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	$ 12,946,462	$ 17,630,919	$ 23,734,806	$ 25,645,284	$ 27,703,067	$ 32,953,902
Capital Expenditures	$ 63,437,941	$ 53,448,020	$ 109,578,833	$ 99,522,116	$ 64,587,345	$ 67,240,538
Grant Funded	$ 490,020	$ 5,043,995	$ 7,964,084	$ 1,030,000		$ -
SRF Funded	$ 36,150,813	$ 12,580,383	$ 6,295,419	$ 652,975	$ 465,971	$ 349,433
WIFIA Funded	$ 4,000,000	$ 16,491,999	$ 58,517,320	$ 54,898,833	$ 40,739,034	$ 2,565,960
Currently Funded	$ -	$ -	$ -	$ -	$ -	$ -
Pay-Go Funded	15,317,758	$ 9,307,518	$ 11,301,753	$ 13,153,009	$ 12,797,812	$ 12,952,329
Debt Funded (Bonds or Line of Credit)	$ 7,479,350	$ 10,024,125	$ 25,500,257	$ 29,787,299	$ 10,584,528	$ 51,372,816
Debt Service	$ 5,201,605	$ 7,463,169	$ 11,505,137	$ 11,507,574	$ 13,865,623	$ 18,892,181
Net Income	**$ (7,572,901)**	**$ 860,231**	**$ 927,916**	**$ 984,701**	**$ 1,039,632**	**$ 1,109,393**
Total Cash Balances						
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	$ 8,174,454	$ 8,636,712	$ 9,127,362	$ 9,642,672	$ 10,195,455
Coverage and Targets						
Debt Service Coverage (W/Out Reserves)	2.49x	2.36x	2.06x	2.23x	2.00x	1.74x
Debt Service Coverage Target	1.50x	1.50x	1.50x	1.50x	1.50x	1.50x
Days' Cash (Includes only Funds 711 & 716)	180	180	180	180	180	180
Days' Cash Target	180	180	180	180	180	180

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WATER COMMISSION
INFORMATION REPORT

DATE: 08/15/2023

AGENDA OF: 08/21/2023

TO: Water Commission

FROM: Lindsay Neun, Water Quality Manager

SUBJECT: 2022 Water Quality Consumer Confidence Report

RECOMMENDATION: That the Water Commission receive information and a presentation on the results of the 2022 Water Quality Consumer Confidence Report.

BACKGROUND: The United States Environmental Protection Agency (USEPA) and State Water Resources Control Board, Division of Drinking Water (DDW) require the City of Santa Cruz Water Department (SCWD) to deliver an annual water quality consumer confidence report (CCR) covering water quality during the previous calendar year to its customers by July 1 of each year. The purpose of the CCR is to inform customers about the quality of their drinking water and must contain the following eight requirements:

- Water System Information;
- Source(s) of Water;
- Definitions;
- Detected Constituents;
- Information on *Cryptosporidium*, Radon, and other Contaminants (if detected);
- Compliance with Drinking Water Regulations;
- Variances and Exemptions (if applicable); and
- Required Education Information.

DISCUSSION: Serving the community safe and reliable drinking water that meets or surpasses rigorous State and Federal drinking water standards in SCWD's highest priority. Providing high quality drinking water year-round requires a large team of dedicated water professionals who work together to treat source waters, maintain water infrastructure, operate and maintain the complex distribution system, sample and analyze water quality samples, carefully manage watershed lands, and plan and upgrade water facilities.

SCWD's Water Quality Laboratory (WQL) is a California Environmental Laboratory Accreditation Program certified drinking water laboratory, and the Water Quality staff is responsible for collecting drinking water samples weekly throughout the Santa Cruz distribution system and analyzing them for a variety of chemical and microbiological constituents. In

addition to monitoring the water quality in the distribution system, the WQL staff also collects and analyzes water samples from all the system's source waters. Based on the population of our community, the WQL is required to test a minimum of 100 distribution-system and 15 raw-source water quality samples per month. In 2022, the WQL staff collected and processed more than 37,800 drinking water tests from raw source waters, treatment plants, and the City's distribution system.

The 2022 CCR covers treated water quality results from the SCWD's distribution system and three water treatment plants, Beltz Treatment Plant, Beltz 12 Treatment Plant, and the Graham Hill Water Treatment Plant, between January 1, 2022, and December 31, 2022. For the 2022 monitoring period, the Santa Cruz Water system complied with all State and Federal drinking water standards. Constituents with primary drinking water standards such as aluminum, arsenic, chlorine, copper, *E. coli*, fluoride, haloacetic acids, lead, nitrate, total trihalomethanes, and total coliform bacteria, were measured below their Maximum Contaminant Levels (MCLs). Additionally, constituents with secondary drinking water standards including color, iron, manganese, odor, sulfate, total dissolved solids, and zinc were also measured below their Secondary Maximum Contaminant Levels (SMCLs).

In addition to performing routine monitoring of source water, treatment-plant-finished water, and the distribution system to comply with State and Federal regulations, SCWD also voluntarily performs monitoring of unregulated emerging constituents with State notification levels (NLs) such as boron, chlorate, per-and polyfluoroalkyl substances (PFAS), and vanadium. All unregulated constituents collected from treatment plant finished water during 2022 were below their respective NLs.

FISCAL IMPACT: None.

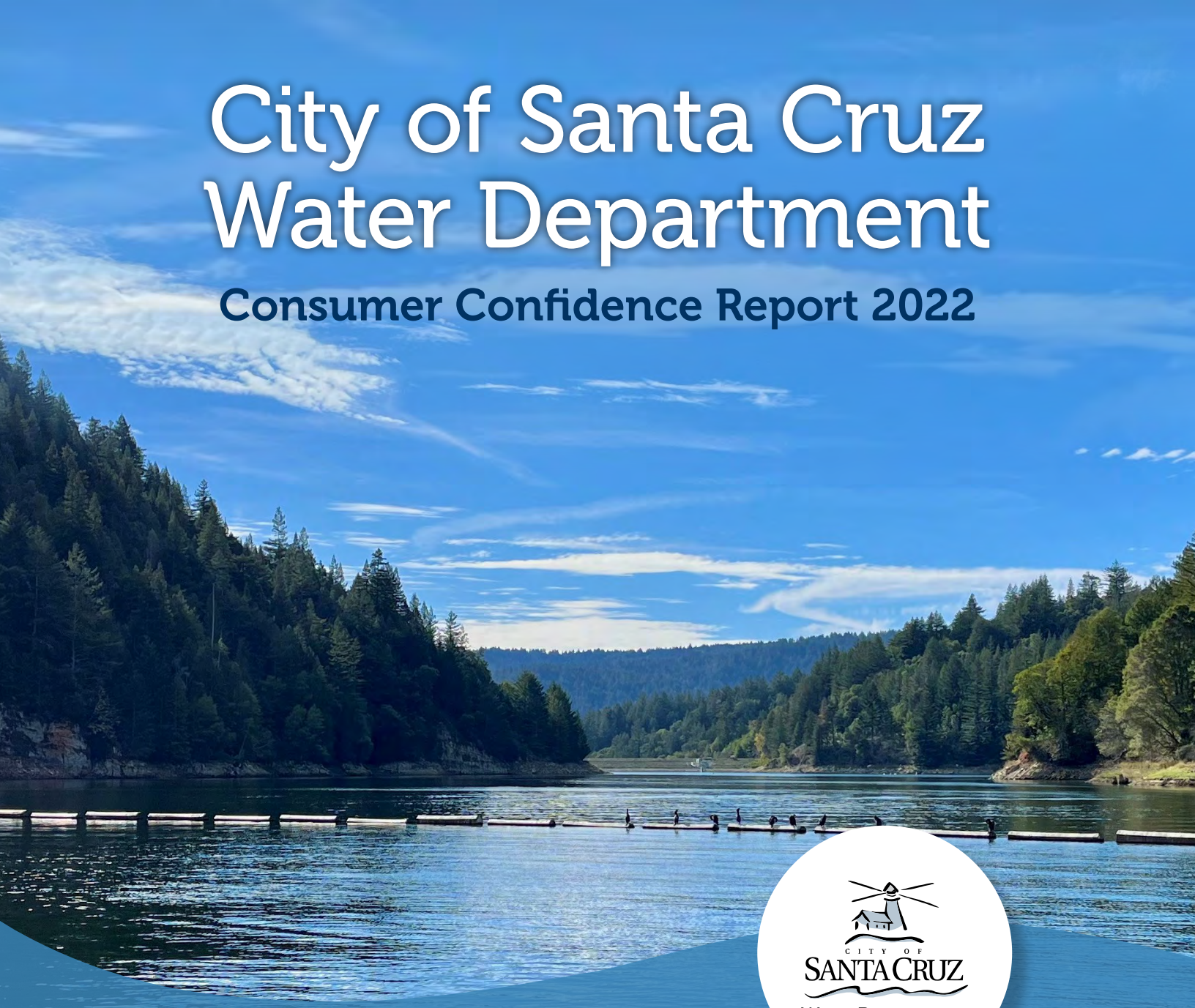
PROPOSED MOTION: None.

ATTACHMENT(S):

1. 2022 City of Santa Cruz Water Department Consumer Confidence Report
2. 2022 Water Department Consumer Confidence Report Presentation

City of Santa Cruz Water Department

Consumer Confidence Report 2022



CITY OF SANTA CRUZ
Water Department

What is This Report?

The annual Consumer Confidence Report on water quality reflects the hard work and investment by the City of Santa Cruz Water Department (SCWD) to provide high-quality drinking water to its customers. SCWD water meets all U.S. Environmental Protection Agency (USEPA) and California State Water Resources Control Board, Division of Drinking Water (State Board) drinking water health standards.

Included in this report are details about where SCWD water comes from, what it contains, and how it is treated and tested to ensure customers receive high quality drinking water. SCWD is committed to providing customers with accurate information about their drinking water quality.

Espanol • Este informe contiene información muy importante sobre su agua para beber. Favor de comunicarse el Departamento de Agua de la Ciudad de Santa Cruz a (831) 420-5220 o 212 Locust Street, Suite D; Santa Cruz, CA 95060 para asistirlo en español.

Santa Cruz Water Department Snapshot 2022

Serving the community safe and reliable water that meets or surpasses rigorous State and Federal drinking water standards is SCWD's highest priority. Providing high quality drinking water year-round requires a large team of dedicated water industry professionals who work together to take on responsibilities such as treating raw source water, maintaining water infrastructure (i.e., pumps, water mains, and tanks), operating and monitoring the complex distribution system, sampling and analyzing water samples, carefully managing watershed lands and upgrading facilities.

24,884 Service Connections

95,939 Population Served

20 Square Miles of Service Area

37,855 Water Tests Per Year

2,594 Million Gallons Served to Customers

15 Distribution System Storage Tanks

20.9 Million Gallons of Water Storage Capacity

31 Miles of Raw Water Mains

263 Miles of Treated Water Mains

Where Does Our Water Come From?

SCWD's drinking water supply consists of surface water and groundwater that are well protected and carefully managed. SCWD depends on raw water from four locales: the San Lorenzo River (SLR), Loch Lomond Reservoir, North Coast sources and the Beltz Groundwater Wells, located mid-county near Live Oak. All of SCWD's water sources are locally derived and dependent on annual rainfall and runoff. In 2022, 92% of water served to SCWD's customers was produced at the Graham Hill Water Treatment Plant (GHWTP), while the remaining 8% was produced by the Beltz and Beltz 12 Water Treatment Plants.

Where Does Our Water Come From?

San Lorenzo River and Tait Wells

SLR water is diverted at two locations: Tait Street Diversion and Felton Diversion.

The Tait Street Diversion, located in the City of Santa Cruz west of the GHWTP, diverts water from the river and the Tait Wells. Water produced by the Tait Wells is delivered to the SLR intake sump at the Coast Pump Station and then pumped to the common transmission pipeline that also conveys the SLR and North Coast water to the GHWTP.

The Felton Diversion, five miles upstream from the Tait Street Diversion, pumps water from the SLR to Loch Lomond Reservoir for additional reservoir storage when flow are available. Under the current water rights diversion permit for the Felton Diversion, water diverted at Felton cannot be sent directly to the GHWTP. Ultimately, this water is directed back to the GHWTP for use/treatment by way of the Newell Creek pipeline.

Loch Lomond Reservoir

Loch Lomond Reservoir was constructed in 1960 and is located on Newell Creek, approximately 10 miles northeast of the City of Santa Cruz. The reservoir's maximum storage capacity is approximately 8,776 acre-feet (2.8 billion gallons). Water is conveyed from Loch Lomond to the GHWTP through the Newell Creek Pipeline. Loch Lomond primarily receives local watershed runoff but can also receive water diverted from the SLR at the Felton Diversion, as allowed under the current water rights.

North Coast

The North Coast water supply consists of two coastal streams and one spring located six to eight miles northwest of the City of Santa Cruz. Water from Liddell Spring, Laguna Creek and Majors Creek is transported through the Coast Pipeline to the Coast Pump Station, where it is then conveyed to the GHWTP. The use of some of these sources by SCWD dates back to 1890.

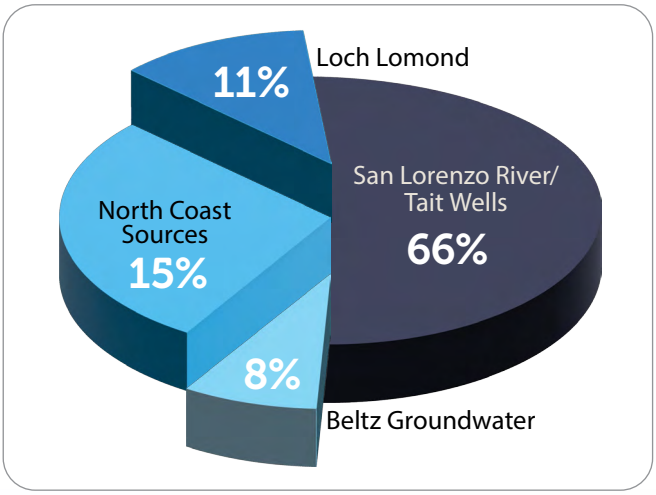
Live Oak Beltz Groundwater Wells

The Beltz Groundwater system consists of four groundwater wells and two small groundwater treatment plants (Beltz Treatment Plant and Beltz 12 Treatment Plant) located in the southeast portion of the City's service area. Three of these wells draw directly from the Purisima Aquifer, while one well draws from both the Purisima and Santa Margarita Aquifers.

Generally, the groundwater treatment plants are used during the late spring, summer and early fall seasons to supply customers in the southeast service area when surface water flows have diminished. Due to the drought conditions of 2022, the groundwater treatment plants were utilized earlier and for a greater portion of the year than in previous years. The Beltz Treatment Plant was in use in January and between June and December and the Beltz 12 Treatment Plant was in use between June and August.

2022 System Supply

During 2022, the SLR and Tait Wells contributed 66% of the total source water supply, while the North Coast Sources contributed 15%, Loch Lomond contributed 11% and the Beltz groundwater wells contributed 8%.



Aquifer Storage and Recovery Demonstration at Beltz Wells

As part of SCWD's Water Supply Augmentation Strategy, SCWD began an Aquifer Storage and Recovery (ASR) Demonstration Project in 2022. Available winter and spring flows from the North Coast sources and the SLR were treated to potable standards at the GHWTP, conveyed through the water distribution system and injected into two existing production wells. After injection, the water was stored, recovered, and directed to SCWD's distribution system. During 2022, SCWD injected a combined total of 85.6 million gallons (MG) into the Purisima and Santa Margarita Aquifers, which included 35.9 MG injected at Beltz Well 8 from Jan. 20 to May 9, 2022, and 49.7 MG injected at Beltz Well 12 from Jan. 17 to May 2, 2022. SCWD will perform the second year of the ASR Demonstration Project in 2023.

Contaminants That Can be Present

To ensure that tap water is safe to drink, the USEPA and the State Board prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. State Board regulations also **establish limits for contaminants in bottled water** that provide the same protection for public health.

The sources of drinking water (both tap and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activities.

Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses, parasites and bacteria that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
- Inorganic contaminants, such as salts and metals, that can be naturally occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
- Pesticides and herbicides that may come from a variety of sources such as agriculture, urban storm water runoff and residential uses.
- Organic chemical contaminants, including synthetic and volatile organic chemicals that are byproducts of industrial processes and petroleum production, and can come from gas stations, urban storm water runoff, agricultural application and septic systems.
- Radioactive contaminants that can be naturally occurring or be the result of oil and gas production and mining activities.

Source Water Assessment and Protection

Since 1996, water suppliers that rely on surface water have been required to conduct source water assessments of water sources, called Watershed Sanitary Surveys, to identify potential sources of contamination and determine how to treat those potential contaminants. Assessments include a delineation of the area around water sources and a review of activities with the potential to release contaminants within that area. Watershed Sanitary Surveys are required every five years. Several potentially contaminating activities exist in the area of SCWD water sources, including improperly functioning septic systems, commercial cannabis cultivation, urban runoff, roads (including timber harvest roads), mining and quarry activities, chemical spills, pesticides, herbicides, fire, and geologic hazards, including landslides after significant rains, among others. Also, a few legacy land disturbances including historic timber harvest roads and isolated industrial operations that resulted in contaminant plumes still have the potential to impact drinking water sources.

To provide high quality drinking water, SCWD works proactively with partners to reduce or eliminate potential contaminant sources and prioritizes the use of the best quality source waters during times when the drinking water system is most vulnerable (i.e., during storm runoff periods). This watershed protection effort also provides environmental benefits, such as support for steelhead trout and Coho salmon. In 2023, the Watershed section of SCWD completed an **update to the Drinking Watershed Sanitary Survey of the San Lorenzo Valley and North Coast Watersheds.**

Review the source water report for Water Year 2021 (Oct. 1, 2020 – Sept. 30, 2021), which includes source water quality data post-CZU Lightning Complex Fire.

Drinking Water and Lead

Lead was not detected above the regulatory action level in SCWD's water supply. Exposure to lead, if present, can cause serious health effects, especially for pregnant women and young children. Lead in drinking water is primarily derived from materials and components associated with service lines and home plumbing. SCWD is responsible for providing high-quality drinking water but cannot control the variety of materials used in indoor plumbing components. When your water has been sitting for several hours in these pipes, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to two minutes before using water for drinking or cooking. If you do so, you may wish to collect the flushed water and reuse it for another beneficial purpose, such as watering plants. If you are concerned about lead in your water, you may want to consider having your water tested. You may contact the SCWD's Water Quality Laboratory (WQL) to schedule a free lead test.

Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline (1-800-426-4791) or on the **USEPA website**.

Lead in Schools

In 2017, the State Board directed all permitted water systems in California to provide lead monitoring assistance to all public K-12 schools. Between 2017-2019, SCWD assisted 24 schools within the Santa Cruz service area with lead testing per the free **Lead Testing Schools program**. You may contact your school or the SCWD's WQL for the results.

Lead and Copper

In 2021, tap water samples were collected from 32 Santa Cruz area homes and analyzed for lead and copper as required by the **Lead and Copper Rule (LCR)**. The results are provided in the Table of Detected Constituents on page 10 of this report. The next round of LCR monitoring will be conducted in the summer of 2024.

Testing and Monitoring Water Quality

To ensure water quality standards are met, drinking water samples are collected weekly throughout the service area and analyzed for a variety of chemical and microbiological constituents. Samples are tested by SCWD's WQL, a California Environmental Laboratory Accreditation Program certified drinking water laboratory, using the latest testing procedures and equipment. The WQL collects and analyzes over 100 distribution system and 15 raw source water quality samples per month to ensure that water delivered to its customers meets or exceeds Federal and State drinking water standards. In 2022, the WQL processed more than 37,800 drinking water tests in the raw source waters, treatment plants and City's distribution system. This is in addition to the extensive treatment process control monitoring performed by certified Water Treatment Operators and online instruments. Test results from the distribution system are provided in the Table of Detected Constituents on page 11 of this report. Some of the data in this report, though representative, are more than one year old. SCWD holds a State Board monitoring waiver for some contstituents that were not detected after repeated monitoring and therefore their monitoring frequencies are less than annual.

Laboratory analysis was also performed for many constituents beyond what is listed in the tables; only those constituents detected in the tap water are shown. The presence of contaminants in the water does not necessarily indicate that the water poses a health risk.

Unregulated Emerging Constituents

In addition to performing routine monitoring of source water, treatment plant finished water, and the distribution system to comply with State and Federal regulations, SCWD also voluntarily performs monitoring for unregulated emerging constituents with State notification levels (NLs) such as boron, chlorate, per- and polyfluoroalkyl substances (PFAS), and vanadium. All unregulated constituents collected from treatment plant finished water were below their respective NLs and results are provided in the Table of Detected Constituents on page 11 of this report.

More information on drinking water NLs can be found on the **State Board website**.

How Constituents are Measured

Constituents are measured and reported in extremely small quantities such as parts per million, parts per billion, and in some cases, parts per trillion. These comparisons help explain the measurements:

Milligrams per liter (mg/L) or parts per Million (ppm)

One drop in a hot tub

One second in 11.5 days

Micrograms per liter (ug/L) or parts per Billion (ppb)

One drop in an Olympic-size swimming pool

One second in nearly 32 years

Nanograms per liter (ng/L) or parts per Trillion (ppt)

One drop in a 6-acre lake or 1 drop in 20 Olympic-size swimming pools

One second in nearly 32,000 years

Abbreviations and Data Table Units

CU: Color Unit is a measure of color

mg/L: milligrams per liter or parts per million (ppm)

ng/L: nanograms per liter or parts per trillion (ppt)

NTU: Nephelometric Turbidity Units

µg/L: micrograms per liter or parts per billion (ppb)

µmhos/cm: a measure of electrical conductivity

SU: Standard Units is a measure of pH

TON: Threshold Odor Number

Key Water Quality Terms

Some of the terms, abbreviations and symbols are unique to the water industry and might not be familiar to all customers. Terms used in the table are explained below:

AL: Regulatory Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

LRAA: Locational Running Annual Average: The locational quarterly average of the most recent 12 months of data.

MCL: Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water which is delivered to the customer. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible.

MCLG: Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

MRDL: Maximum Residual Disinfectant Level: The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG: Maximum Residual Disinfectant Level Goal: The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants..

NA: Not Applicable

ND: Constituent Not Detected

NL: Notification Level: Health-based advisory levels established by the State Board for chemicals in drinking water that lack MCLs. When chemicals are found at concentrations greater than their notification levels, certain requirements and recommendations apply.

PDWS: Primary Drinking Water Standard: MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG: Public Health Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA).

SDWS: Secondary Drinking Water Standards: Non-mandatory water quality standards.

SMCL: Secondary Maximum Contaminant Level: Secondary MCLs are set for contaminants that my adversely affect the taste, odor or appearance of drinking water. These aesthetic considerations are not considered as health concerns.

TT: Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water.

Santa Cruz Water Department Water System
Water Quality Data for 2022

This table lists all of the drinking water constituents detected between January 1 and December 31. SCWD water quality met or surpassed all State and Federal criteria for public health protection.

Table of Detected Constituents

PRIMARY DRINKING WATER STANDARDS – *Public Health Related Standards*

INORGANIC CHEMICALS

Constituents (units)	Sample Date	MCL	PHG	Average (Range: Low-High)			Violation	Major Source In Drinking Water
				Graham Hill Water Treatment Plant	Beltz Treatment Plant	Beltz 12 Treatment Plant		
Aluminum (mg/L)	2022	1	0.6	0.03 (ND – 0.04)	ND	ND	No	Erosion of natural deposits; residue from some surface water treatment processes
Arsenic (µg/L)	2022	10	0.004	ND	0.10 (ND – 0.63)	ND	No	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Barium (mg/L)	2022	1	2	0.04 (0.03 – 0.04)	0.03 (0.03 – 0.03)	0.03 (0.03 – 0.03)	No	Erosion of natural deposits/rocks
Fluoride (mg/L)	2022	2.0	1	0.14 (0.13 – 0.18)	0.09 (ND – 0.18)	0.19	No	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories
Nitrate as N-Nitrogen (mg/L)	2022	10	10	0.29 (0.13 – 0.38)	ND	ND	No	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage, erosion of natural deposits

DISINFECTION BY-PRODUCTS AND DISINFECTANT RESIDUAL (DBPs and disinfectant residual samples were collected from predetermined sample locations throughout the distribution system)

Constituents (units)	Sample Date	MCL or [MRDL]	PHG or [MRDLG]	Average (Range: Low-High)	Violation	Major Source In Drinking Water
Chlorine (mg/L)	2022	[4]	[4]	0.90 (0.13 – 2.8)	No	Drinking water disinfectant added for treatment
Total Trihalomethanes (TTHM) (µg/L)	2022	80 LRAA	NA	71 (7 – 96)	No	By-product of drinking water disinfection
Haloacetic Acids (five) (HAA5) (µg/L)	2022	60 LRAA	NA	35 (2 – 48)	No	By-product of drinking water disinfection

TURBIDITY (Turbidity samples were collected and analyzed continuously/every 15 minutes at the Graham Hill Water Treatment Plant)

Constituents (units)	Sample Date	TT	PHG or [MRDLG]	Results	Violation	Major Source In Drinking Water
Turbidity (NTU)	2022	1 NTU	NA	0.06 Highest Single Turbidity Result of 2022	No	Soil runoff. Turbidity is a measure of the cloudiness of water. We monitor it because it is a good indicator of the effectiveness of our filtration system.
	2022	95% of samples ≤0.15 NTU	NA	100%		

LEAD AND COPPER (Lead and copper tap water samples were collected from 32 customers' homes throughout the community)

Constituents (units)	Sample Date	AL	PHG	Tap Water 90th Percentile	Number of Samples Exceeding AL	Exceeds AL	Major Source In Drinking Water
Copper (mg/L)	2021	1.3	0.3	0.3	0/32	No	Internal corrosion of household plumbing systems; leaching from wood preservatives
Lead (µg/L)	2021	15	0.2	<2	0/32	No	Internal corrosion of household plumbing systems; discharges from industrial manufacturers; erosion of natural deposits

MICROBIOLOGICAL (Microbiological samples were collected from predetermined sample locations throughout the distribution system)

Constituents (units)	Sample Date	MCL	MCLG	Results	Violation	Major Source In Drinking Water
Total Coliform Bacteria	2022	<5% positive samples per month	0 positive	0	No	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful bacteria are present
E. coli	2022	0 positive	0 positive	0	No	*E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal fecal wastes

SECONDARY DRINKING WATER STANDARDS - *Aesthetic Standards*

Constituents (units)	Sample Date	SMCL	Average (Range: Low-High)			Violation	Major Source In Drinking Water
			Graham Hill Water Treatment Plant	Beltz Treatment Plant	Beltz 12 Treatment Plant		
Chloride (mg/L)	2022	500	25 (19 – 28)	51 (39 – 58)	30	No	Runoff/leaching from natural deposits; seawater influence
Color (CU)	2022	15	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	No	Naturally-occurring organic materials
Iron (µg/L)	2022	300	2 (ND – 29)	8 (ND – 52)	ND	No	Leaching from natural deposits; industrial wastes
Manganese (µg/L)	2022	50	1.0 (ND – 6.6)	1.2 (ND – 4.7)	0.82 (ND – 2.1)	No	Leaching from natural deposits
Odor-Threshold (TON)	2022	3	1 (1-1)	1 (1-1)	1 (1-1)	No	Naturally occurring organic materials
Specific Conductance (µmhos/cm)	2022	1600	431 (385 – 465)	638 (590 – 715)	515 (480 – 575)	No	Substances that form ions when in water; seawater influence
Sulfate (mg/L)	2022	500	70 (58 – 110)	130 (130 – 130)	80	No	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids (mg/L)	2021*/ 2022	1000	268 (250 – 280)	473 (440 – 520)	471* (450 – 500)	No	Runoff/leaching from natural deposits
Zinc (mg/L)	2022	5	ND	ND	0.03 (0.02 – 0.03)	No	Runoff/leaching from natural deposits

UNREGULATED CONSTITUENTS OF INTEREST

Constituents (units)	Sample Date	Average (Range: Low-High)			Major Source In Drinking Water
		Graham Hill Water Treatment Plant	Beltz Treatment Plant	Beltz 12 Treatment Plant	
Alkalinity, Total as $CaCO_3$ (mg/L)	2022	114 (90 – 122)	140 (128 – 150)	132 (118 – 146)	Alkalinity is the measure of water's capacity to resist acidic changes in pH
Calcium (mg/L)	2022	51 (49 – 60)	70 (69 – 73)	60 (59 – 61)	Naturally occuring mineral
Hardness, Total as $CaCO_3$ (mg/L)	2022	165 (144 – 200)	239 (216 - 256)	195 (184 – 204)	Hardness is the sum of naturally occurring cations present in the water, generally calcium and magnesium
Hexavalent Chromium (µg/L)	2022	0.14 (0.08 – 0.22)	0.029	NA	Naturally occurring in rocks, plants, soil, volcanic dust and animals
Magnesium (mg/L)	2022	9.3 (8.4 – 10)	16 (14 – 18)	11 (11– 11)	Naturally occurring mineral
pH (SU)	2022	7.3 (7.1 – 7.6)	8.0 (8.0 – 8.1)	7.4 (7.2 – 7.6)	pH is the measure of how acidic or basic the water is
Potassium (mg/L)	2022	2.3 (2.0 - 2.9)	5.8 (4.2 – 7.0)	2.9 (2.8 – 3.0)	Naturally occurring mineral
Sodium (mg/L)	2022	24 (21 – 26)	43 (39 – 47)	30 (30 – 31)	Sodium refers to the salt present in the water from runoff/leaching from natural deposits and saltwater influence

UNREGULATED CONSTITUENTS WITH NOTIFICATION LEVELS

Constituents (units)	Sample Date	NL	Average (Range: Low-High)			Major Source In Drinking Water
			Graham Hill Water Treatment Plant	Beltz Treatment Plant	Beltz 12 Treatment Plant	
Boron (mg/L)	2022	1	0.06	0.03 (ND - 0.06)	0.07 (0.07 - 0.08)	Leaching of rocks and soils, and fertilizers/pesticides
Chlorate (µg/L)	2022	800	96 (62 – 130)	280 (200 – 360)	200	Degradation of hypochlorite solutions
Perfluorobutane sulfonic acid (PFBS) (ng/L)	2022	500	ND	0.6 (ND - 1.8)	ND	Food and industrial manufacturing facilities
Perfluorohexane sulfonic acid (PFHxS) (ng/L)	2022	3	0.20 (ND - 2.2)	2.2 (1.9 - 2.5)	ND	Food and industrial manufacturing facilities
Perfluorooctanoic acid (PFOA) (ng/L)	2022	5.1	0.40 (ND - 2.2)	ND	ND	Food and industrial manufacturing facilities
Perfluorooctane sulfonic acid (PFOS) (ng/L)	2022	6.5	0.67 (ND – 3.3)	ND	ND	Food and industrial manufacturing facilities
Vanadium (mg/L)	2022	0.05	0.04 (ND - 0.5)	ND	ND	Weathering of rocks and soil erosion

UNREGULATED CHEMICALS REQUIRING MONITORING UNDER FEDERAL UCMR 4

Constituents (units)	Sample Date	Source Water Average	Source Water Range	
			Low	High
Bromide (µg/L)	2018/2019	53	42	64
Total Organic Carbon (mg/L)	2018/2019	2.6	1.7	4.1

Constituents (units)	Sample Date	Treated Water Average	Treated Water Range		Constituents
			Low	High	
Manganese (µg/L)	2018/2019	2.4	<0.4	11	
Brominated Haloacetic Acids 6 HAA6Br[4] (µg/L)	2018/2019	17	11	26	Bromochloroacetic acid, bromodichloroacetic acid, dibromoacetic acid, dibromochloroacetic acid, monobromoacetic acid, and tribromoacetic acid
Haloacetic Acids 9 HAA9[5] (µg/L)	2018/2019	49	31	70	Bromochloroacetic acid, bromodichloroacetic acid, chlorodibromoacetic acid, dibromoacetic acid, dichloroacetic acid, monobromoacetic acid, monochloroacetic acid, tribromoacetic acid, and trichloroacetic acid

Questions? Contact SCWD

City of Santa Cruz Water Department Staff

Water Administration

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(831) 420-5486
WaterQuality@santacruzca.gov

Water Resources

Chris Berry, *Watershed Compliance Manager*
(831) 420-5483
WaterResources@santacruzca.gov

Learn more and get involved

Get additional information about SCWD including Water Conservation, Loch Lomond Recreation Area, engineering projects and more on **SCWD's website**. Learn more about water quality testing on the **Water Quality Laboratory Webpage**.

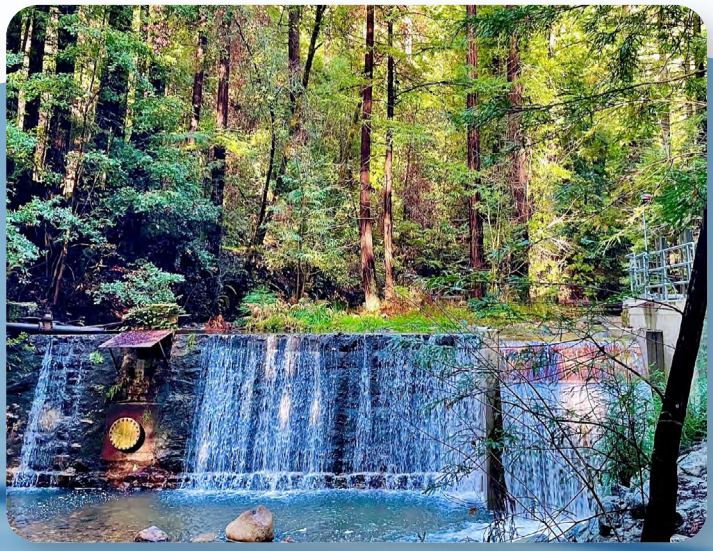
Customers are invited to attend City Council and **Water Commission meetings**. Water Commission meetings are held the first Monday of each month at 7 p.m. Visit the **SCWD website** or call (831) 420-5200 to find out more.

Additional information about drinking water safety and standards is available from the **State Board** and the **USEPA**.

Learn how **drinking water standards** are established.

CITY OF SANTA CRUZ
Water Department

Our Water, Our Future




2022 Water Quality Consumer Confidence Report
August 21, 2023
Our Water, Our Future
SANTA CRUZ
Water Department

Presentation Overview

1. Introduction to the Water Quality Laboratory
2. Consumer Confidence Report Requirements
3. 2022 Consumer Confidence Report Updates
4. Water Quality Monitoring Requirements
5. Summary of 2022 Water Quality Data

City of Santa Cruz Water Quality Laboratory

CALIFORNIA Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

CERTIFICATE OF
ENVIRONMENTAL LABORATORY ACCREDITATION

Is hereby granted to

City of Santa Cruz Water Quality Laboratory

715 Graham Hill Road

Santa Cruz, CA 95060

Scope of the certificate is limited to the
"Fields of Accreditation"
which accompany this Certificate.

Continued accredited status depends on compliance with applicable laws and regulations, proficiency testing studies, and payment of applicable fees.

This Certificate is granted in accordance with provisions of Section 100825, et seq. of the Health and Safety Code.

Certificate No.: **1875**

Effective Date: **5/1/2023**

Expiration Date: **4/30/2025**

Sacramento, California
subject to forfeiture or revocation

Christine Sotelo, Program Manager
Environmental Laboratory Accreditation Program

CALIFORNIA Water Boards

CALIFORNIA STATE
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Fields of Accreditation

City of Santa Cruz Water Quality Laboratory

715 Graham Hill Road
Santa Cruz, CA 95060
Phone: 8314205480

Certificate Number: 1875
Expiration Date: 4/30/2025

Field of Accreditation: 101 - Microbiology of Drinking Water			
101.010	002	Heterotrophic Bacteria	SimPlate
101.050	001	Total Coliform P/A	SM9223 B Colilert
101.050	002	E. coli P/A	SM9223 B Colilert
101.050	003	Total Coliform (Enumeration)	SM9223 B Colilert
101.050	004	E. coli (Enumeration)	SM9223 B Colilert
101.050	005	Total Coliform P/A	SM9223 B Colilert 18
101.050	006	E. coli P/A	SM9223 B Colilert 18
101.050	007	Total Coliform (Enumeration)	SM9223 B Colilert 18
101.050	008	E. coli (Enumeration)	SM9223 B Colilert 18
101.170	001	Enterococci	Enterolert
Field of Accreditation: 102 - Inorganic Chemistry of Drinking Water			
102.095	001	Turbidity	SM2130 B-2001
102.100	001	Alkalinity	SM2320 B-1997
102.121	001	Hardness	SM2340 C-1997
102.130	001	Specific Conductance	SM2510 B-1997
102.140	001	Residue, Filterable TDS	SM2540 C-1997
102.150	001	Chloride	SM4110 B-2000
102.150	002	Fluoride	SM4110 B-2000
102.150	003	Nitrate (as N)	SM4110 B-2000
102.150	004	Nitrite (as N)	SM4110 B-2000
102.150	006	Sulfate (as SO4)	SM4110 B-2000
102.175	001	Chlorine, Free	SM4500-Cl G-2000
102.175	002	Chlorine, Total Residual	SM4500-Cl G-2000
102.203	001	Hydrogen Ion (pH)	SM4500-H+ B-2000
102.240	001	Phosphate,Ortho (as P)	SM4500-P E-1999
102.262	001	Organic Carbon-Total (TOC)	SM5310 C-2000
102.263	001	Dissolved Organic Carbon (DOC)	SM5310 C-2000

As of 5/1/2023, this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

Page 1 of 1

Field Sampling

Laboratory Analysis

What is a Consumer Confidence Report (CCR)?

- Federal Regulations: Safe Drinking Water Act (SDWA), Consumer Confidence Report (CCR) Rule and 40 CFR Part 141, Subpart O
- California Regulations: California Health and Safety Code 116470 and California Code of Regulations, Title 22, Article 20
- Annual Water Quality Report containing information about:
  - -Source(s) of water
  - -Detected constituents
  - -Compliance with drinking water standards
  - -Educational information
- Data derived from distribution system and treatment plant water sampling events
- Communication between water systems and their consumers
- Deliver to consumers by July 1 of each year (Website, SCMU Review, Water Bill, and Facebook)

2022 Consumer Confidence Report

CITY OF SANTA CRUZ WATER DEPARTMENT
CONSUMER CONFIDENCE REPORT
2020

Este informe contiene información muy importante sobre su agua para beber. Favor de comunicarse el Departamento de Agua de la Ciudad de Santa Cruz a (831) 420-5220 o 212 Locust Street, Suite D; Santa Cruz, CA 95060 para asistirlo en español.

WHAT IS THIS REPORT?

This annual Consumer Confidence Report provides a summary of the water quality tested in 2020 and has been prepared to inform the City of Santa Cruz Water customers about their drinking water quality. Included in this report are details about where your water comes from, what it contains, and how it compares to Federal and State drinking water standards. The City of Santa Cruz vigilantly safeguards its water supplies and provides thorough treatment to ensure that our customers receive high quality drinking water. We are committed to providing our customers with accurate information about their drinking water quality. **In 2020, as in years past, your tap water met all U.S. Environmental Protection Agency and State of California drinking water health standards.**

WHERE DOES OUR WATER COME FROM?

To provide water for our service area, the City of Santa Cruz depends on water supplies from four locales: the North Coast sources, San Lorenzo River, Loch Lomond Reservoir and the Live Oak wells. Except for groundwater from the Live Oak wells, all other water sources are from surface water diversions or groundwater under the direct influence of surface water, which are dependent on annual rainfall and runoff.

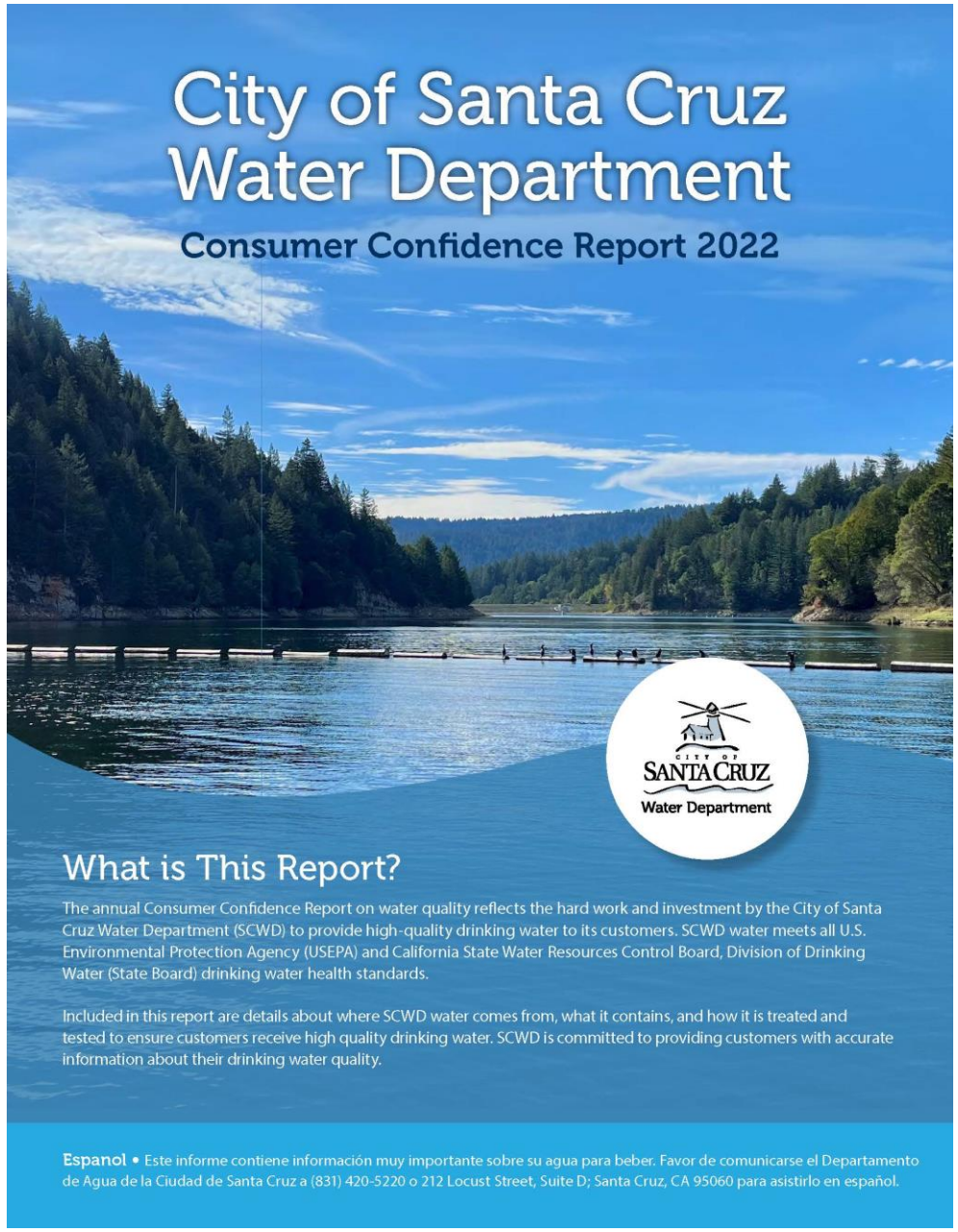
The North Coast sources consist of surface water diversions from three coastal streams and one natural spring. Due to the excellent water quality and the lowest production cost, these North Coast sources are used to the greatest extent possible. These source waters are conveyed to the City's Graham Hill Water Treatment Plant for treatment. The use of these sources by the City dates back to 1890.

San Lorenzo River flows are diverted to the Graham Hill Water Treatment Plant for treatment. Three Tait wells (groundwater under the direct influence of surface water) located next to the San Lorenzo River and hydraulically connected, are included in the City's water right. Additionally, the City can divert water from the San Lorenzo River in Felton to store in Loch Lomond Reservoir. This water is used to supplement storage in the reservoir during dry years, when natural water inflow from Newell Creek is low.

Loch Lomond Reservoir, constructed in 1960, provides surface water storage on Newell Creek. Water from the reservoir is treated at the Graham Hill Water Treatment Plant. Additionally, the reservoir and surrounding watershed are used for public recreation purposes, including fishing, boating, hiking and picnicking.

The Live Oak well system consists of four groundwater wells and two small groundwater treatment plants located in the southeast portion of the City's service area. Three of these wells draw directly from the Purisima Aquifer, while one well draws from both the Purisima and Santa Margarita Aquifers. During the late spring, summer and early fall seasons, when surface water flows may be inadequate to meet the daily customer water demand, this supplemental groundwater supply is pumped from the four Live Oak Wells and treated on site at two groundwater treatment plants and distributed to customers in the southeast service area.

NEW & IMPROVED



2022 Consumer Confidence Report

- Santa Cruz Water Department Snapshot 2022
- Where Does Our Water Come From?
- Contaminants That Can be Present
- Testing and Monitoring Water Quality
- Unregulated Emerging Constituents
- How Constituents are Measured
- Key Water Quality Terms
- Water Quality Data for 2022
- SCWD Contact Information

Water Quality Monitoring Requirements

- United States Environmental Protection Agency (USEPA) and California State Water Resources Control Board Division of Drinking Water (DDW)
- Monitoring frequency based on population of community served and historical results
- SCWD performs monitoring of unregulated constituents

Summary of 2022 Water Quality Data (January 1st –December 31st)

- SCWD water quality met or surpassed all State and Federal criteria for public health protection
- Regulated Constituents: No Maximum Contaminant Level (MCL) violations
- Unregulated Constituents all below Notification Level (NL)


Thank You
Our Water, Our Future
SANTA CRUZ
Water Department

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WATER COMMISSION
INFORMATION REPORT

DATE: 08/15/2023

AGENDA OF: 08/21/2023

TO: Water Commission

FROM: Heidi Luckenbach, Deputy Director/Engineering Manager

SUBJECT: Water Supply Augmentation Implementation Plan Quarterly Update

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RECOMMENDATION: That the Water Commission receive an update and provide feedback regarding the status of the Water Supply Augmentation efforts including a presentation on water supply modeling.

BACKGROUND and DISCUSSION: At the May 2023 Water Commission meeting, staff received input from the Commissioners on a new format for quarterly reporting. Using feedback from that meeting, staff have drafted the attached document and are modifying the website consistent with input received from the Commission to accommodate access to other relevant information. This is a work in progress and links to relevant reports, meeting agendas, presentations, and etc., will be updated routinely.

Additionally, staff will make a presentation to update the Commissioners on work being performed to understand source water availability from both raw water and wastewater sources.

FISCAL IMPACT: None.

PROPOSED MOTION: Receive information and provide feedback to staff on the material presented.

ATTACHMENT(S):

1. Progress Report

Project Name: Water Supply Augmentation Implementation Program

City Program Manager: H. Luckenbach

Work Performed thru July 31, 2023

Progress Report

This progress report is updated monthly for internal reporting purposes, and quarterly for external reporting. The purpose of the report is to summarize key efforts on each element related to water supply planning for the City of Santa Cruz Water Department, with links provided for additional information.

PROJECTS AND EFFORTS REPORTED ON BELOW

Additional information: Water Supply Planning

Water Supply Augmentation (WSA): Refers to work associated with non-specific supply alternatives, i.e., planning level tasks such as climate and water supply modeling that support the evaluation of all supply alternatives.

Aquifer Storage and Recovery (ASR): Includes the evaluation, piloting, demonstration, design, and construction or modification of existing and new ASR wells. Also includes water quality analyses, well capacity studies, and basis of design reports.

Recycled Water (RW): In addition to the study of water supply alternatives using recycled water, this project includes the design and construction of the 6" diameter tertiary pipeline located at the City's WWTF for the future use of tertiary water off-site for irrigation and other end-uses.

Regional Coordination: Focuses on the various efforts between the City and neighboring water agencies, specifically, Soquel Creek, Scotts Valley and San Lorenzo Valley Water Districts. Includes activities related to groundwater sustainability agencies such as the Optimization Study being performed through the Santa Cruz Mid-County Groundwater Agency and other related modeling.

Riverbank Filtration (RBF): A method of extracting water from a river through wells installed in the vicinity of the flowing source. Wells may be vertical or horizontal and located within or outside the flowing source. RBF is reported on here due to its potential contribution towards water supply reliability.

WORK ONGOING OR COMPLETED IN THE REPORTING PERIOD

Water Supply Augmentation (WSA)

- Training Staff on the Santa Cruz Water Supply Model (UMass)
- Developed hydrology for multiple climate change scenarios: the Catalog Climate and what has become known as R1270. This data will be used for several purposes including the Optimization Study portion of the Department of Water Resources Sustainable Groundwater Management Act Implementation Grant for the Santa Cruz Mid-County Groundwater Agency. The climate change hydrology used for the MGA GSP, called the Catalog Climate, will continue to be used in the modeling, and the City has asked that modeling also include hydrology associated with R1270 climate scenario as the initial plausible worst-case conditions for near term planning.

Aquifer Storage and Recovery (ASR)

Beltz 9 ASR Pilot Test:

- Issued Notice of Intent (NOI) to Award to Eaton Drilling Co. for the Beltz 9 ASR Pilot Setup and Monitoring Well contract. Scope of work includes installation of a monitoring well at the Beltz 9 site, preparation of the Beltz 9

municipal production well for ASR pilot testing, and installation of temporary ASR facilities in the well and at the site to facilitate the ASR pilot test.

- Submitted NOI to the RWQCB for enrollment in the *State Water Resources Control Board's General Waste Discharge Requirements for Aquifer Storage and Recovery Projects that Inject Drinking Water into Groundwater (General Order)*. Issuance of a Notice of Applicability (NOA) from the RWQCB will allow the City to conduct the ASR pilot test at Beltz 9 and confirm sampling requirements.
- Submitted Coastal Development Permit application for Beltz 9 ASR pilot testing and received confirmation that the project is exempt.

Beltz 8 and 12:

- City Council approved a professional services contract with Carollo for the design of Beltz 8 and 12 as permanent ASR facilities.

Other:

- In efforts to identify a location for an additional ASR well in the Mid-County Basin, staff commented on a draft assessment of Beltz 4 from Pueblo (June 23) as well as a draft assessment of Beltz 10 and 11 from Pueblo (May 23).

Recycled Water

The Pure Water Soquel construction team continues with the installation of the 6" tertiary treated water line at the City's WWTF.

Regional Collaboration

Held a meeting with Scotts Valley Water District and City of Scotts Valley as part of ongoing collaboration efforts. The City of Scotts Valley is assessing upgrades to their wastewater treatment facility; staff are exploring opportunities to combine resources.

Provided comments to San Lorenzo Valley Water District on their Request for Proposals titled: Feasibility Analysis for Utilization of San Lorenzo Valley Water District's Loch Lomond Reservoir Source.

Optimization Study:

- Optimization Team held a meeting confirming baseline alternatives and criteria for modeling; alternatives are focused on ASR, the Pure Water Soquel project, and water transfer and exchanges.
- Developed baseline groundwater modeling scenarios for Optimization Study including modifications to demands and hydrology/climate change scenarios.

Riverbank Filtration (RBF)

No New Report. RBF remains in the WSA portfolio of projects as a potential supply augmentation strategy. However, due to water right constraints at the City's San Lorenzo River intakes, RBF may provide pretreatment of surface water but will not add to the volume of water permitted for diversion. In addition, the GHWTP FIP provides additional treatment making this a redundant effort.

Project Name: Water Supply Augmentation Implementation Program

City Program Manager: H. Luckenbach Work Performed thru July 31, 2023

NEAR TERM ACTIVITIES (TWO – FOUR MONTHS)

Water Supply Augmentation (WSA)

- Develop scope of work for a United States Bureau of Reclamation Feasibility Study. This study would provide eligibility to the City for certain federal grant opportunities. This effort will likely be performed under a contract amendment with Kennedy/Jenks as the content of the WSAIP will provide much of the needed content to be cross walked to the United States Bureau of Reclamation formatting.
- Complete training on UMass SCWSM, document assumptions, and finalize workflow diagrams.
- Plan for and hold a risk meeting to review existing and potential new risks and develop mitigation strategies as appropriate (see attached summary of risks).

Aquifer Storage and Recovery (ASR)

Beltz 9:

- Construction on pilot testing infrastructure and new monitoring well to begin September 1.
- Begin Cycle 1 on November 1, pending the availability of water for injection.

Beltz 8 & 12:

- ASR design kickoff meeting and site visit with Carollo on August 9 to initiate the design of permanent ASR facilities at Beltz 8 and 12. The 30% Design deliverable and Basis of Design Report are anticipated at the end of the calendar year.

Other:

- Business Case Evaluation for 4th ASR Well – Staff are continuing to evaluate criteria and alternatives to perform a BCE to select the 4th well to be pursued for ASR pilot testing.

Recycled Water

Meet with the City Public Works Department staff as part of ongoing collaboration around the use of recycled water and other potential opportunities.

Regional Collaboration

General:

- City staff (Rosemary Menard) will present to Scotts Valley Water District Board (August 10, 2023) on the City's water supply challenges and approach to achieving supply reliability.
- SVWD Intertie Project: Continue developing the operations agreement, City Council approval of EIR addendum (August 8, 2023).
- Ongoing coordination with Beltz WTP Upgrades team regarding treatment plant upgrades (10% design).

MGA:

- Optimization Study: Finalize Technical Memorandum 1 Data Gap Analyses and Optimization Approach.
- Review results of baseline groundwater modeling.

- Hold scoping session with Akel Consulting for hydraulic modeling water supply alternatives developed in the Optimization Study.

SMGWA:

- Hold meeting with SVWD and San Lorenzo Valley Water District to discuss additional groundwater modeling needs (August 10).
- Quarterly SMGWA board meeting to discuss intertie and other business (August 24).

Riverbank Filtration

- No new report.

SCHEDULE HIGHLIGHTS {Additional information attached and here: Water Supply Schedule}

ASR:

- Kick off meeting with Carollo for design of permanent ASR facilities at Beltz Wells 8 and 12 (August 9)
- Begin constrution of site improvements and monitoring at Beltz 9 for ASR pilot testing (September 1)

Recycled Water:

- Regional coordination projects: Groundwater modeling complete (date to be confirmed following June 23 team meeting).

PROJECT RISKS {See attachment for list of current risks}

Source water availability presents the most significant risk to both ASR as well as recycled water alternatives and has been demonstrated through climate change modeling. In addition, construction on other parts of the water system has challenged our ability to perform injection on a regular basis. For example, ASR pilot testing at Beltz 9 is scheduled to start on November 1; however, this depends entirely on the availability of surface water as well as our ability to maintain service reliability to our customers.

BUDGET UPDATE {See attachment for summary budget}

See Attachment 3 for a summary of project budgets. Several contracts have been awarded including:

- Water Supply Augmentation: Groundwater Modeling for Optimization Study to Montgomery & Associates
- Aquifer Storage and Recovery: Property Survey for Beltz 8 and 12 to Bowman & Williams
- Aquifer Storage and Recovery: Design of Permanent ASR Wells at Beltz 8 and 12 to Carollo

Commonly Used Acronyms: {For complete list of Acronyms and Terms Acronyms and Glossary of Terms}

ASR	Aquifer Storage and Recovery	SLVWD	San Lorenzo Valley Water District
BCE	Business Case Evaluation	SMGA	Sustainable Groundwater Management Act

BOD	Basis-of-Design	SMGWA	Santa Margarita Groundwater Agency
GSA	Groundwater Sustainability Agency	SOP	Standard Operating Procedures
GSP	Groundwater Sustainability Plan	SOQ	Statement of Qualifications
IRWM	Integrated Regional Water Management	SVWD	Scotts Valley Water District
MGA	Mid-County Groundwater Agency	SqCWD	Soquel Creek Water District
NCP	Newell Creek Pipeline	WIFIA	Water Infrastructure Finance and Innovation Act
RBF	Riverbank Filtration	WSA	Water Supply Augmentation
RFQ	Request for Qualifications	WSAIP	Water Supply Aug. Implementation Plan
RWQCB	Regional Water Quality Control Board	WTP	Water Treatment Plant
		WWTF	Wastewater Treatment Facility

Other Links:

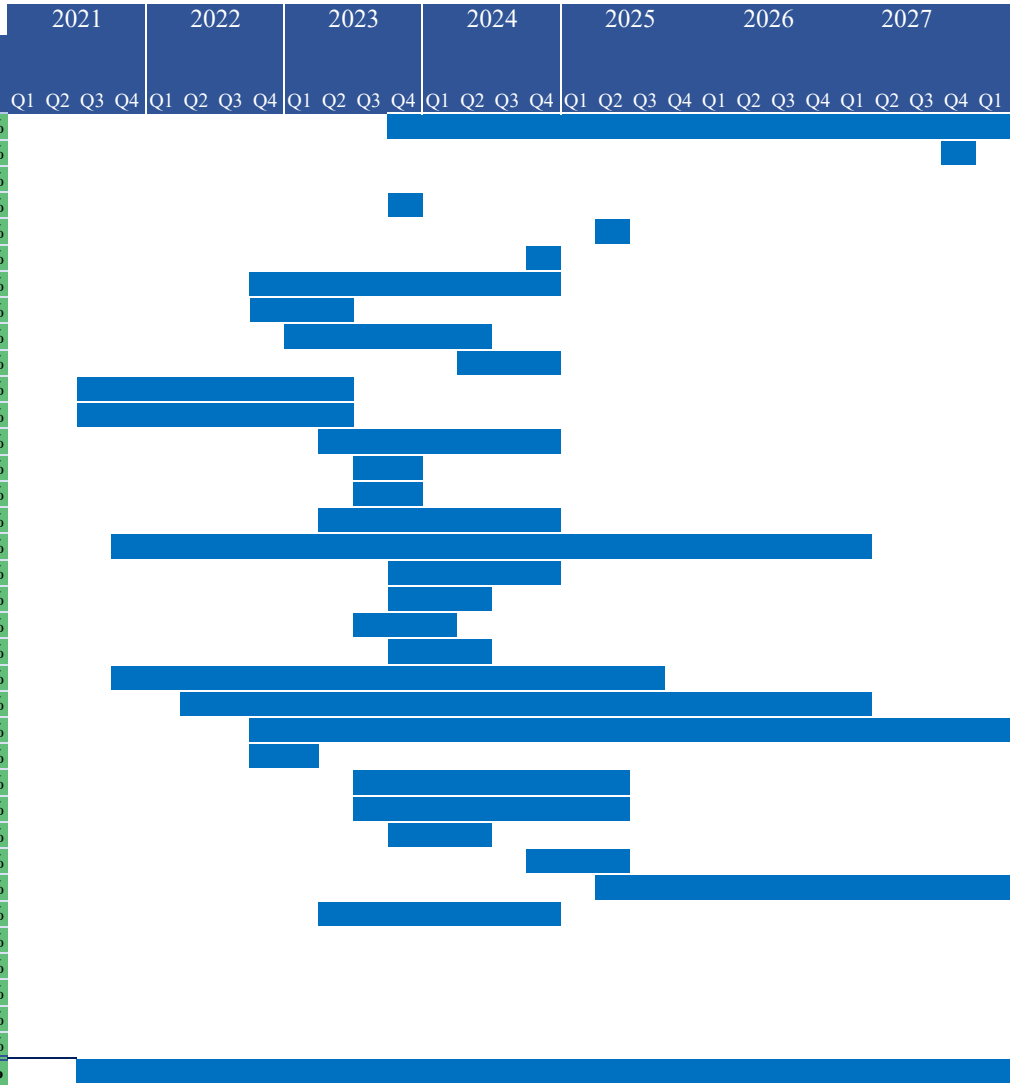
- Reports and Other Resources: Online Reports (This link will be modified as website continues to be updated. Also included will be any relevant Council and other Board meetings and actions.)
- WSAIP components and schedule: WSAIP Components and Schedule

Progress Report Attachments:

- Attachment 1: Water Supply Augmentation High-Level Project Gantt Chart
- Attachment 2: Water Supply Planning Risks
- Attachment 3: Water Supply Budget Summary

Water Supply Augmentation High-Level Project Gantt Chart

Intermediate & Minor Milestones	Start	End	% Days Complete
01-Driving Milestones	12/31/23	12/31/30	0.0%
001-SOWF - 500mgy of additional supply	12/31/27	12/31/27	0.0%
002-WSAC Milestone/Water Supply Gap Filled	12/31/30	12/31/30	0.0%
003-Water Rights Amendments	12/31/23	12/31/23	0.0%
004-MCGB Grant-funded Optimization Study	6/3/25	6/3/25	0.0%
005-Water Supply Augmentation Implementation Study	12/31/24	12/31/24	0.0%
02-Water Supply Augmentation Implementation Plan	1/1/23	10/31/24	0.0%
001-Demand Update	1/1/23	6/6/23	0.0%
002-Screening of Alternatives	4/1/23	4/30/24	0.0%
003-Final Report and Recommendations	5/1/24	10/31/24	0.0%
03-Current Water Supply/ Climate Change Analysis	10/1/21	6/1/23	0.0%
001-Climate Change Scenarios	10/1/21	6/1/23	0.0%
04-MCGB Grant Elements	7/1/23	12/31/24	0.0%
001-Groundwater Modeling	8/1/23	12/1/23	0.0%
002-Hydraulic Modeling	8/1/23	11/1/23	0.0%
003-Optimization Study	7/1/23	12/31/24	0.0%
05-Supporting Studies	11/1/21	1/5/27	0.0%
001-USBR Feasibility Study	12/1/23	12/31/24	0.0%
002-Corrosion Control Study	11/1/23	6/30/24	0.0%
003-Water Quality, Env. Funding	10/1/23	2/29/24	0.0%
004-MCDS	1/1/24	4/1/24	0.0%
005-Beltz 12 Ammonia Treatment	11/1/21	9/26/25	0.0%
006-Beltz WTP Upgrades	7/1/22	1/5/27	0.0%
06-MCGB Beltz ASR Program	11/1/22	12/31/28	0.0%
001-Beltz 8/12 Year 2 Demonstration Study	11/1/22	3/31/23	0.0%
002-Beltz 8 Conversion to Permanent	8/9/23	5/1/25	0.0%
003-Beltz 12 Conversion to Permanent	8/9/23	5/1/25	0.0%
004-Beltz 9 Pilot Test	11/1/23	5/1/24	0.0%
005-Beltz 9 Demonstration	11/1/24	5/1/25	0.0%
006-Beltz 9 Conversion to Permanent	6/3/25	12/31/28	0.0%
007-Beltz 4 & 10 Initial Feasibility Assessment	7/1/23	11/1/24	0.0%
07-Long Range Water Supply Projects			0.0%
001-Evaluation of Additional ASR in MCGB			0.0%
002-Evaluation of Additional ASR in SMGB			0.0%
003-Evaluation of Water Transfers/Exchanges			0.0%
004-Evaluation of Reuse			0.0%
Grand Total	**10/1/21**	**12/31/30**	**0.0%**



Water Supply Planning Risks						
Risks	**Comments**	**Status**	**Issue Age**	**Consequence#**	**Likelihood#**	**Priority Score**
Source Water Reliability- Climate Change	Climate change may reduce surface water available for ASR and transfers.	Open	132	5	5	25
Beltz 12 Ammonia Treatment	Presence of ammonia impacts rate and duration of extractions	Open	177	5	4	20
Beltz WTP Upgrades	Small site may limit production volumes therefor impacting ability to treat ASR related flows.	Open	154	4	4	16
Permitting	Lack of feasible DPR and SWRO permitting pathway.	Open	126	4	4	16
Water Rights Amendments	Delay or lack of resolution will impact ASR, water transfers and exchanges, and operational flexibility.	Open	170	5	1	5
Funding	Regional partnerships, and grant and loan opportunities will reduce impact customer rates.	Accept	0	4	4	0

Water Supply Budget Summary

Updated thru July 31, 2023

Program number	Eden Number - Project Name	FY23 Balance*	FY24 Budget	FY24 Encumbered	FY24 Actual Spent	Available for New POs	Vendors
3.1	c701705 -- Water Supply Augmentation	$ 574,542.10	$ 1,085,068.00	$ (446,419.00)	$ (1,932.16)	**$ 1,211,259**	
	Includes: analysis of non-specific supply alterntaves,						HDR
	planning level work,						Gary Fiske
	modeling Umass, Raucher, Fiske, etc)						Kennedy Jenks/ Umass
	WSAIP, SOWF						Simon Fraser University
							David Mitchell
							Montgomery & Assoc
							Black & Veatch
3.2	c701611 -- Recycled Water Feasibility Study	$ 201,998.14	$ -	$ -	$ -	**$ 201,998**	
	Includes: recycled water study						Kennedy Jenks
	design & construction of 6" tertiary line at WWTF						Soquel Creek Water District
3.2	c701612 -- Recycled Water - SDC	$ 2,979.41	$ -	$ -	$ -	**$ 2,979**	
							Soquel Creek Water District
3.3	c701609 -- ASR Planning	$ 767,505.85	$ 676,914.00	$ -	$ (6,666.07)	**$ 1,437,754**	
	Includes: evaluation of ASR alternatives through piloting ,						Pueblo Water Resources
	water quality analyses (e.g., ammonia), new well siting						Kennedy Jenks
	MW, rehab, site prep, well capacity analysis, BOD						Consor (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	$ 1,746,376.99	$ 3,760,000.00	$ (778,366.00)	$ (3,260.00)	**$ 4,724,751**	
	Includes: efforts leading to full scale operation of						Pueblo Water Resources
	***specific** ASR alternative using existing infrastructure*						Precision Hydro
	SWRCB or RWQCB Permit Fees						Bowman & Williams
							Carollo
3.3.2	c702102 ASR Mid County New Wells	$ 219,000.00	$ 45,541.00	$ -	$ -	**$ 264,541**	
							TBD
3.4	c702103 SMGWB Planning	$ 177,924.00	$ 6,854.00	$ -	$ -	**$ 184,778**	
	Includes: efforts in the SMGWB, ASR, IPR, other						SMGWB Collaboration
4.5	c701806 Riverbank Filtration	$ 616,341.61	$ 279,650.00	$ (243,454.20)	$ -	**$ 652,537**	
							Pueblo Water Resources
							PES Environmental Inc.

*Notes

FY23 Balance: Remaining (unspent/uncommitted) funds at the end of FY23.
FY24 Budget: Additional project funds (or budget) requested for FY24.
FY24 encumbered: Funds that are committed in Purchase Orders.
FY24 actual spent: All expenses (labor, materials, other) that have been charged to the project. As invoices are paid against POs, FY24 encumbered funds will decrease.
Available for new POs: Total (uncommitted) funds available for new FY24 purchase orders or expenditures.

FY 23 Balance + FY 24 Budget - FY24 encumbered - FY24 actual spent = Available for new POs.

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A New Age of Water is Dawning

A dry cracked lake bed in drought-stricken Lake Mead on September 15, 2022 in Boulder City, Nevada. - Located outside of Las Vegas near the Nevada-Arizona border, Lake Mead provides electricity to several parts of Arizona, California and Nevada and is also the source of water for rural, urban and tribal lands across the southwest. (Photo by Frederic J. BROWN / AFP) (Photo by FREDERIC J. BROWN/AFP via Getty Images)

AFP via Getty Images

IDEAS

BY **PETER H. GLEICK**

AUGUST 3, 2023 8:00 AM EDT

Peter H. Gleick is an internationally recognized expert on water and conflict and a member of the U.S. National Academy of Sciences. He's also the author of the new book, The Three Ages of Water *(PublicAffairs 2023).*

We're living in a pivotal moment in history, on the cusp of either sinking into a dark period of growing poverty, accelerating ecological destruction, and worsening conflict, or moving forward to a new age of

equity, sustainability, and stewardship of the only planet in the universe where we know life exists. I believe a positive future is not only possible, but inevitable, but solving our current crises and moving along the path to that desired future will require new, concerted, and sustained efforts.

Nothing better exemplifies both the threat and the promise facing us than the challenge of water.

Water is special, and we need to understand it differently from other aspects of the natural world. The story of water and the history of humanity are entangled in what I describe as the *Three Ages of Water*, from our early evolution to the dystopian or sustainable future that is coming. The First Age of Water on Earth encompassed the billions of years from the formation of our planet through the extinction of the dinosaurs 65 million years ago, the long transition from mammals that survived that killer asteroid, to the ultimate evolution of *Homo sapiens*.

In these early years, human populations grew from thousands to the first few millions spread over the continents, to Mesopotamia and Egypt, the floodplains of the Indus Valley in southern Asia, along the great rivers of China, across to Australia, and ultimately to the vast rain forests, grasslands, and savannas of the Americas. The First Age saw our transition from bands of hunter-gatherers to fixed communities and organized cultures. It saw the creation of language, writing, art, religion, and intentional agriculture. The earliest empires began to manipulate the world—and the water around them—building rudimentary dams and aqueducts, writing the first water laws and institutions, and fighting wars over water.

The First Age came to an end when rising human populations, expanding cities, the local depletion of wild plants and animals, the spread of water-related diseases, and growing pressures on natural resources demanded that we forge a new relationship with water. The answer to these challenges was to be found in the science, engineering, and social advances that define the Second Age of Water.

It has become fashionable to think of the era in which we live as the Anthropocene—the epoch when humans have become the dominant force on Earth driving changes in habitats and the survival of species, rewriting genetic codes, transforming landscapes and the oceans, and altering the very climate of the planet. At its heart is the acknowledgment that humans, for better or worse, now control our own fate and the fate of countless other species.

Flood waters run through the Shougang Bridge after the Yongding River was discharged in Beijing, China, August 1, 2023.
CFOTO/Future Publishing via Getty Images

This is the Second Age of Water—our own age. The Second Age encompasses the intellectual, cultural, and philosophical blossoming of civilization; the hydraulic marvels of the ancient Greeks and Romans; the artistic and scientific advances of the Islamic Golden Age and the Renaissance; and ultimately the engineering and technological revolutions of modern times. During the Second Age, we replumbed the entire planet. Humans built the first dams of gigantic scale to hold back flood waters, store water for dry periods, and produce reliable clean electricity. We learned about germs and diseases and their links to dirty water. We invented the first physical, chemical, and biological systems to purify

wastewater. We built aqueducts not tens of kilometers long dug out of dirt like our Mesopotamian and Roman ancestors, but thousands of kilometers long, through or over mountains, from glaciers to deserts. We deployed large-scale irrigation systems and the technologies to pump water from deep underground so farmers could grow food in places and at times never before possible. And we began casting our eyes, instruments, and then mechanical avatars outward to other planets and stars, looking for water and other evidence that we're not alone in the universe. We are all children of the Second Age of Water.

Modern civilization is built on these advances, and we've benefited from them in countless ways. We, mostly, live longer, healthier lives. We're, mostly, richer economically, socially, and culturally. Technology and access to information have exploded, as has our ability to understand and manipulate the world around us. Cholera, typhoid, and dysentery have been vanquished in the richer nations. While hundreds of millions lack adequate food, we're technically able to feed 8 billion people because of the Green Revolution and advances in irrigated agriculture. While billions still lack safe drinking water or sanitation or suffer from extreme hydrologic events, we know how to build and operate sophisticated water systems that can provide safe water, take away and treat wastewater, and protect us from floods and drought. We take most of it for granted.

The Second Age brought great benefits to society, but it also created unintended consequences. By the twentieth century, we started to see and understand the first evidence of the loss of nature, the rise of environmental problems as the Industrial Revolution accelerated and populations grew exponentially, the first world wars, and skyrocketing pressures on natural resources. Rivers treated as dumps for our waste began to catch fire and die. While we know how to provide safe water and

sanitation to all, deep "water poverty" persists and billions of people lack access to basic water services. Despite advances in medical knowledge, many water-related diseases persist, including new illnesses associated with pollutants like mercury, lead, pesticides, and complex agricultural and industrial chemicals. Violence associated with competition for access and control of water resources has worsened, as have intentional attacks on water systems during regional, religious, economic, and ideological conflicts around the world, as we've seen in recent years in Iraq, Syria, Ukraine, and elsewhere. Peak water limits are being reached as rivers run dry, aquifers are depleted, and ecosystems are destroyed.

Most worrisome to the future of water resources—and humanity—is climate change. As the twentieth century ended, scientists found irrefutable scientific evidence that the combustion of fossil fuels and the destruction of forests are altering the very climate of the planet, with accelerating impacts in every community and for every natural resource, especially water resources, changing flood and drought risks; melting ice caps, glaciers, and mountain snow; increasing demand for water to grow food; and damaging aquatic ecosystems.

In short, the end of the Second Age of Water has become a race between the growing risks of ecological collapse, massive economic inequality, and political conflict, and the growing efforts to apply our hard-earned knowledge and technologies to prevent global disaster. It's an awkward time: the awesome power to reshape the planet has come before we've fully embraced the idea that we must live sustainably on Earth; matured enough politically and socially to put aside prejudices, hatreds, cultural differences, and the baser instincts that threaten our very existence; or truly mastered the technologies that can both destroy and save us.

Humanity has a decision to make. We stand today at the brink of a new age, at a fork in the road of our own survival. We can become another extinct species, a blink in time in the natural history of the earth, or we can recognize that water is so vital to our continued existence that we must find a new way to live with it, manage it, and protect it. A bad future is possible; it's just not the future we would choose if we had a choice.

The good news is we have that choice: we can envision a positive future, a path to get there, and we can take the steps along that path.

In recent years, scientists and academics from multiple disciplines have begun to piece together solutions to the separate challenges of energy, agriculture, forestry, fisheries, climate, and, underlying all of it, water, and to offer a different vision—a vision of a way forward to a positive future. It is time to acknowledge both the benefits of the Second Age of Water and the need to move to the Third Age where we address the growing failures surrounding us and make the technological and social transition to sustainability. That transition won't be easy, but it is both necessary and possible.

In Lewis Carroll's 1865 book *Alice's Adventures in Wonderland*, Alice asks the Cheshire Cat, "Would you tell me, please, which way I ought to go from here?" The Cheshire Cat replies, "That depends a good deal on where you want to get to." Two paths lie before us: one to the dystopian visions of our sci-fi novels, apocalyptic movies, and pessimistic doomsayers; the other to a positive, sustainable world. Just as we can imagine a disastrous future, we can imagine a positive one, with a balance between humans and nature, growing equality and social cohesion, and healthy, stable societies. That's the future I focus on in the Third Age of Water, one that includes smart, successful, sustainable solutions to our water problems.

We are learning how to weave together a rich tapestry of actions, decisions, and policies of individuals, communities, and countries around the world, sometimes in surprising places and surprising ways, to address the unresolved water challenges of the Second Age. We know how to provide safe water and sanitation to everyone on the planet—no magic new technologies must be invented. We know how to use water more productively and efficiently to do the things we want as evidenced by the fact that we're actually dramatically reducing total water use in the U.S., despite a growing economy and population. We know how to clean up and reuse the most contaminated wastewater, as is already being done in Singapore, Israel, and parts of California. We are learning how to restore and protect natural ecosystems that have suffered from our past abuse, including removing river-destroying dams like the Elwha and Klamath river dams in the western U.S. and protecting and restoring wetlands and fisheries. We are coming to grips with the need to resolve disputes over water peacefully and diplomatically, rather than with violence. We are starting to put in place energy and water policies that can reduce the emissions of climate-altering gases while also making our water systems more resilient to those climate impacts we can no longer avoid.

I believe that a positive future in the Third Age of Water is not only possible but inevitable. Indeed, this optimism has permitted me to continue working on the critical global challenges of climate, water, and sustainability for four decades. Perhaps that's because the is simply too depressing to accept. It would be a cosmic shame if, alone in this small corner of the universe, our spark of intelligent life was not quite intelligent enough to overcome the challenges of living on a finite, delicate planet and fell back into a dark age of chaos, or, worse, went the way of the dinosaurs.

That’s possible. But it needn’t be that way. If we fail to achieve a positive future for water, it won’t be because we can’t. It will be because we didn’t. The hopeful vision for water I offer is reachable and the blueprint for it is already apparent in innovative, successful water efforts under way around the world. Let’s accelerate the transition to this Third Age of Water.

This essay includes excerpts from Gleick's new book, The Three Ages of Water: Prehistoric Past, Imperiled Present, and a Hope for the Future (PublicAffairs/Hachette 2023)

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NEW BRAUNFELS, Texas—On a sunny May morning four years ago, J Harmon was rousted out of bed by an emergency call: A 90-year-old dam near his home had failed, sending a torrent of water downstream and emptying the lake where he lived.

That afternoon, he got a second shock when he learned there was no money to fix it. The state entity that oversaw six aging dams on the Guadalupe River couldn't afford to rebuild them. One, the Wood Lake dam, had already failed in 2016, and two others had stopped working since 2019.

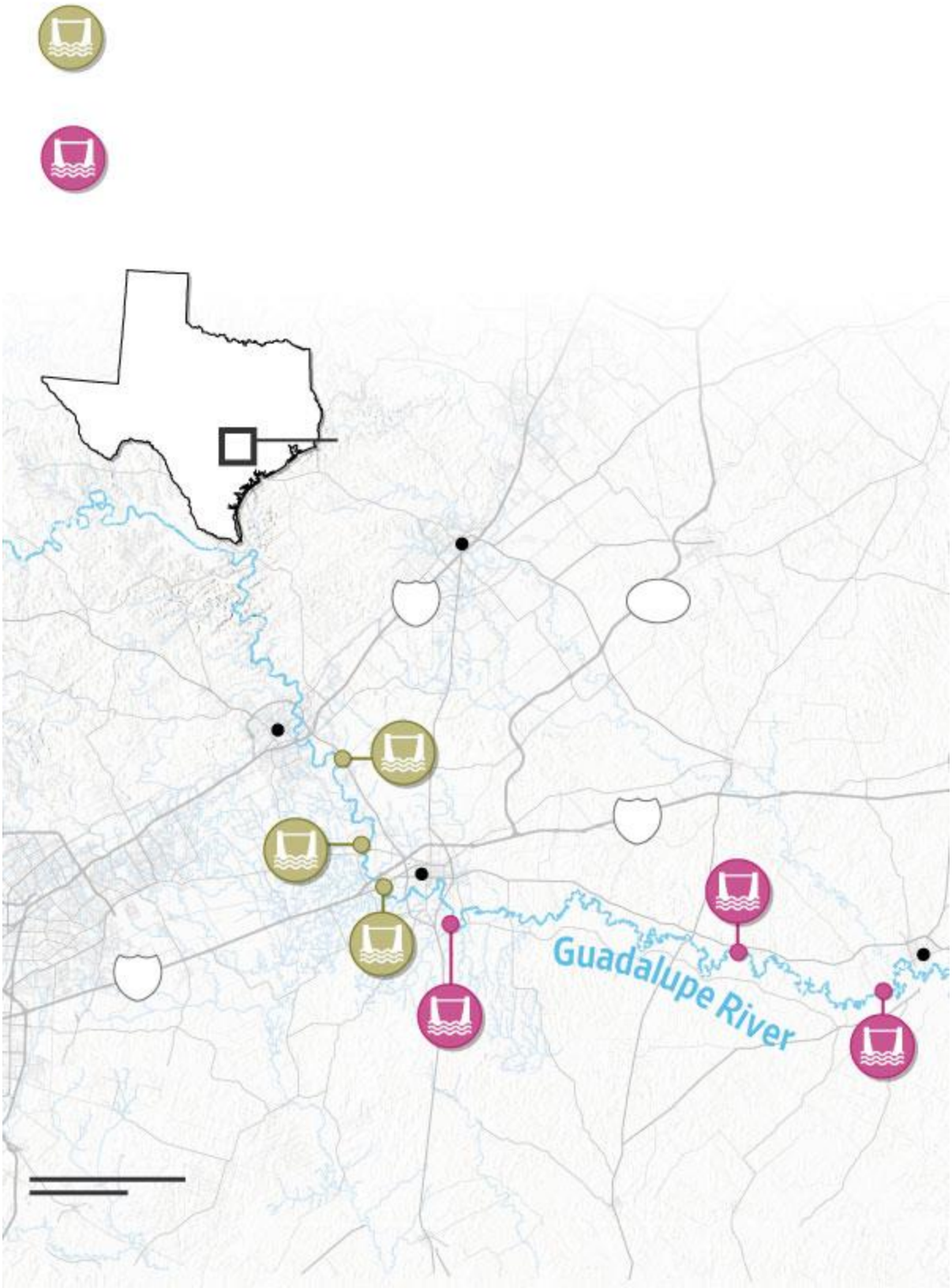
So Harmon decided to organize a campaign among affected property owners to rebuild the dam and save his community on Lake Dunlap—blazing a trail for other lakes downstream. Over the next four years, Harmon's group set up a special taxing district for lakefront homeowners and partnered with the local river authority, which hired a contractor to build a new $40 million dam, and used revenue from hydroelectric power to help pay the debt.

"It's not just a bunch of hillbilly bumpkins" that made this happen, Harmon, a retired 66-year-old home builder, said on a recent day as he stood below the newly rebuilt dam, which is expected to begin refilling Lake Dunlap later this month. "Although when we first started, we did not know what we were doing—I'll be the first to admit that."

J Harmon organized a campaign among affected property owners to rebuild the dam.

More Americans might have to become dam experts in coming years as small dams around the country reach the end of their lives, putting countless people and the fate of entire communities at risk.

Six dams on the Guadalupe River have failed or been left open because of their age in recent years; only three are being rebuilt



Dam being rebuilt

The average age of the 91,815 dams in the U.S. is 61 years, according to an inventory maintained by the U.S. Army Corps of Engineers. The number of dams that could lead to a loss of life if they failed has grown by about 20% to 16,000 over the last 10 years, according to a February report from the Association of State Dam Safety Officials. The report put the cost of needed repairs for dams not owned by the federal government at $157.5 billion.

While many people think of the giant federally built structures in the West when they picture dams, most are actually more modest projects, like the ones on the Guadalupe River, which were initially built by private developers before they were taken over by a state district.

“There’s nothing unusual about having communities grow up around a lake that depends on infrastructure many, many decades old, where you kind of don’t think about it—you just think about the lake,” said Robert Gilbert, chairman of the department of civil, architectural and environmental engineering at the University of Texas at Austin.

Video provided by the Guadalupe-Blanco River Authority shows the Lake Dunlap dam failing in 2019.

The Lake Dunlap dam and five others on the Guadalupe were built in the late 1920s and 1930s to provide hydroelectric power for the rural communities in the area. The state of Texas took them over in the 1960s and sells their power through the Guadalupe-Blanco River Authority. The dams don't generate enough electricity to fund a major rebuilding effort, said Darrell Nichols, general manager, and the authority isn't allowed to collect taxes.

"The function of these lakes has changed from what was lakes that were impounded for electric generation, to now being impounded for recreational use," he said.

That left financing the project largely up to the homeowners on the lake. Just a few days after the collapse, Harmon called a meeting of the Preserve Lake Dunlap Association, a pre-existing group he headed, and circulated a piece of paper asking everyone to write down their name and phone number and any skills they had that could help.

The community group set up a special taxing district that paved the way for a new $40 million dam, using revenue from hydroelectric power to help pay the debt.

It took about a year to settle on a plan to move forward including hammering out a deal in which the river authority contributed electric revenue to help pay off the debt, helped secure low-interest financing and covered the costs of designing the new dam, Harmon said. It took another year to win over the community to set up a taxing district and two more to complete construction.

One key decision was to seek to tax only people whose properties directly touched the water. “If you try to go across the street, the first thing people will ask is, ‘What about the guy behind me?’” he said.

Larry Johnson, a 72-year-old former college president who was recruited by Harmon early on, became a key organizer. “It was the middle of Covid, we couldn’t even have a meeting,” Johnson said. “How could you get 612 homeowners to get on the same page?”

They divided the lakefront into 22 neighborhoods and appointed captains of each. “We had this joke of BYO lawn chair. All the meetings were outside,” he said. “You can’t get more grassroots than that.”

Larry Johnson stands on a temporary staircase that will be removed once the water refills Lake Dunlap. PHOTO: JOE BARRETT/THE WALL STREET JOURNAL

Meanwhile, other lakes were also wrestling with what to do. One dam south on Lake McQueeney, the failure at Dunlap was a wake-up call.

“It had been a little bit of a topic of discussion but nobody thought it was going to fail” until Dunlap went down, said Paul Mueller, a 62-year-old in the construction business, who lives on Lake McQueeney.

SHARE YOUR THOUGHTS

Is the U.S. doing enough to protect communities from potential damage from aging dams? Join the conversation below.

Now, the McQueeney dam, which has yet to fail, and the one at Lake Placid, which became stuck in the down position in 2021, have just begun two-year rebuilding projects, using the funding plan at Lake Dunlap as a model. A community group is considering its options to repair the dam below Lake Placid, said Nichols of the river authority, but the final two dams are unlikely to be rebuilt because they don’t have a strong enough tax base.

Mueller’s cousin Kipp Mueller, 57, runs the Lake Breeze Ski Lodge, a private club where boats can drive right up to the restaurant when Lake McQueeney is full. The place is normally hopping seven days a week all summer, with an amateur water-ski show every Thursday, Kipp Mueller said. These days, the dwindling lake, which was drained a few months ago, seems far away across an expanse of grass, and the water-ski show is a shadow of its former self, he said.

Business is down about 50% this summer, Mueller said.

“We’ll be fine,” he said. “We have to get the dams fixed.”

Paul Mueller watching a construction crew make repairs to the spill gates on the McQueeney dam.

Write to Joe Barrett at Joseph.Barrett@wsj.com

BARCELONA—Fill a glass with tap water in Barcelona these days and one-fifth of it will be processed seawater. Another fifth will be treated wastewater derived from toilets, showers and other urban uses.

This mix is emerging as the drinking water of the future in Mediterranean countries. The region is becoming warmer and drier more quickly than most places on Earth, forcing people and governments to act faster here than elsewhere to find new freshwater supplies.

A prolonged drought in Spain's region of Catalonia is prompting rapid change. For many years after Barcelona's Llobregat desalination plant opened in 2009, it was little used, contributing less than 5% of the city's drinking water, which is mostly supplied by reservoirs and groundwater. Since last summer, the plant has worked at full throttle, producing over 500 gallons of fresh water per second.

"The population is increasing, business activities are increasing but water is somewhat decreasing," said Samuel Reyes, director of the Catalan Water Agency. "We need to change the way we think about water."

In countries around the Mediterranean Sea, recurrent droughts and dwindling flows of water from mountains into rivers are leading to a re-engineering of the water infrastructure. Farmers are digging more and deeper wells, and often switching to crops that need less water. Governments from Spain to Israel to Algeria are investing massively in desalination plants and looking for supplies of fresh water farther afield.

In the Italian region of Puglia, local authorities want to build a €1 billion, 100-kilometer underwater pipeline—not to carry oil or natural gas but drinking water. The planned project would bring river water across the Adriatic Sea from Albania to Puglia, the parched heel of Italy's boot.

Samuel Reyes, director of the Catalan Water Agency, says people need to think differently about water.

Puglia has no major rivers or snow-capped mountains. For now, the region is making the most of the little water it has. Local authorities are spending some €1.7 billion, equivalent to $1.9 billion, to repair and replace leaky water pipes, through which some 48% of drinking water there is lost.

“We need new infrastructure, but we also need to rethink our approach to the water we have,” said Francesca Portincasa, the head of Acquedotto Pugliese, the operator that oversees water management in Puglia.

Puglia’s infrastructure plans include building several new wastewater treatment plants and Italy’s first major desalination plant for drinking water, one of three that Puglia aims to operate by the end of the decade.

The changing climate is affecting the Mediterranean in ways beyond droughts. In a region where roughly 150 million people live close to the coast, rising sea levels are threatening homes, businesses and cultural heritage sites.

From sand barriers of Egypt's Nile Delta to floodgates that protect Venice, projects to keep the sea from swallowing the land are multiplying. Some scientists are beginning to consider ideas once dismissed as crackpot, such as damming the Strait of Gibraltar to keep sea levels in check.

Llobregat desalination plant is Spain's biggest for drinking water.

Reverse osmosis and high-pressure pumps are used to remove the salt from seawater at Llobregat.

Much of the Mediterranean region has been in the grip of a fearsome heat wave in recent weeks, raising mortality rates and putting pressure on overstretched healthcare systems, with the elderly especially at risk. Cities such as Barcelona and Nicosia in Cyprus have set up public shelters to protect people from prolonged exposure to high temperatures.

Declining access to fresh water poses one of the region's biggest long-term threats.

Desalinated seawater has long been a prime source of drinking water in hot, dry countries such as Saudi Arabia, Israel and the United Arab Emirates. Now, desalination is booming in countries whose landscapes provided plenty of fresh water for thousands of years.

There are downsides to desalination. Turning seawater into drinking water is an energy-intensive process, which makes desalination both costly and bad for the environment. The super-salty brine that is left over is harmful to the ocean's ecosystem.

Spain is betting heavily on the technology. Building new desalination plants is the centerpiece of the Spanish government's plan to deal with the growing problem of droughts.

In Catalonia, authorities plan to double desalination capacity over the next three years. Last year, the region's two desalination plants produced 16.7 billion gallons of drinking water, six times as much as in 2009. That water has helped the region to cope with this summer's extreme heat and drought. In the past, Catalonia has had to resort to extreme measures such as importing drinking water on tanker ships.

The Llobregat desalination plant is one of Europe's largest. Seawater reaches the plant from a pipeline that stretches some 1.3 miles into the sea. Then, it is pumped into tanks where coagulants are used to remove grease, seaweed and other substances. The water then goes through two filters to remove smaller impurities.

A prolonged drought is prompting rapid change in Barcelona.

Finally, it reaches the heart of the plant: a maze of green, blue, yellow and pink pipes where the salt is separated from the water through reverse osmosis. The whole process takes about 5½ hours.

"There are people here 24 hours a day," explained Laia Hernández, a representative of the Barcelona plant, during a recent tour of the facility. "Now that we are working at full capacity, maintenance work has to be done quickly."

The desalinated water flows to a drinking-water treatment center, where it is mixed with other water supplies, such as water from reservoirs and treated wastewater.

European Union rules say treated wastewater shouldn't be used in drinking water. To get around that, Barcelona's treated wastewater is discharged into a river before being extracted again downstream.

Rainfall has been so sparse that the Sau Reservoir, one of Catalonia's biggest, was only 6% full earlier this year. A medieval church, submerged when the reservoir was created in the 1960s, resurfaced. Fishermen were deployed to remove and euthanize the fish left stranded.

The economic effects of drought are felt most strongly in agriculture. This spring was the hottest Spain has ever recorded, and one of the driest. Farmers were hit especially hard. Insurance payouts to Spanish farmers totaled €772 million in the first half of 2023, exceeding the overall payments for last year as a whole, according to Agroseguro, which handles crop insurance payouts. The overwhelming majority of farmers in Spain are covered by crop insurance, which is subsidized by the state and gives payouts to farmers if their harvests are damaged by events such as extreme weather or disease outbreaks.

A medieval church that was submerged when Spain's Sau Reservoir was created in the 1960s recently resurfaced.

The Sau Reservoir at 28% of its capacity.

Scientists at Catalonia's Institute of Agrifood Research and Technology are trying to help farmers adapt, including how to optimize the use of a declining water supply.

"Our goal is to produce more food with less water. If we can't manage that, we will have a problem feeding our population in the future," said Joan Girona, a water expert at the institute. In one research project, the soil humidity of apple orchards in Catalonia is regularly monitored to determine exactly how much water they need. During the recent drought, Girona advised some farmers to pick unripe fruit, reducing the amount of water the trees need to survive.

In the Catalan countryside, some 70,000 hectares of farmland used to grow cereals and fruit rely on a 200-mile irrigation network known as the Canal D'Urgell.

In April, for the first time in its 160-year history, the canal stopped supplying irrigation water. "I couldn't believe it," said Sergi Balué, 45, a farmer who relies on water from the canal for most of his fruit production. "From that point on, there was a lot of uncertainty and fear."

Worried that his pear orchard wouldn't survive the spring, Balué did what generations of farmers have done before him: He asked a water diviner for help.

A canal that Sergi Balué relies on for most of his fruit production stopped supplying irrigation water earlier this year.

Armed with a Y-shape rod, the dowser surveyed the land and indicated a spot on the cracked earth beneath which he said he sensed water. After digging for 100 meters but finding no water, Balué gave up.

Balué is trying to adapt to water scarcity by collecting more rainwater in small reservoirs. He is also rethinking what crops to grow.

“I used to have only peaches here,” Balué said on a sweltering afternoon as he stood in the middle of an almond grove. Almonds, he explained, are more drought-resistant than flat peaches.

“The thinking is: Even with less water, here I can have something to harvest,” he said. “But it makes me feel sad because in this land we have always only grown peaches, pears and apples. Almond trees just aren’t the same.”

Tourists swim near the Sau Reservoir.

José Bautista contributed to this article.

Write to Margherita Stancati at margherita.stancati@wsj.com

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Monterey City Council welcomes regional collaboration to tackle water crisis

Monterey City Hall (Monterey Herald)

By **TESS KENNY** | tkenny@montereyherald.com | Monterey Herald

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MONTEREY – Affordable housing and water – you can't have one without the other. It's a stark reality cities on the Monterey Peninsula know well, with the latter always seeming in short supply. But the city of Monterey seems determined to make sure the tap doesn't run out, for either resource.

The possible solution? Regional collaboration.

At the Monterey City Council's regular meeting Tuesday night, the Peninsula's perennial disjunction – not enough water and not enough housing – was back on the agenda. But it wasn't all doom and gloom, as is often the case when it comes to hopes of feasible development. Instead, the possibility of finding a path forward was met with optimism, thanks to a handful of alternatives introduced by city staff that, if seen through, could open up opportunities for the city.

All it would take is some extra help from an unlikely source: the Marina Coast Water District, which – though not Monterey's main purveyor of water – might have the capacity to augment the city's supply, at least according to early talks between district and city staff.

“We are in a situation where we cannot win … using the existing resources that we have. It’s like the game of tic-tac-toe,” Monterey City Manager Hans Uslar said at Tuesday’s meeting. “Once we know how to play, you always arrive at a situation where you will never have sufficient water for the challenges that are ahead of us in the foreseeable future.”

Historically, the Peninsula has been served by two sources of water: the Carmel River and a local underground aquifer (the Seaside Groundwater Basin). The Monterey Peninsula Water Management District regulates the resources, while California American Water Company distributes water to customers. But sources are limited, not just by availability alone but through regulatory oversight.

For years, the Peninsula’s water supply has been restricted by the State Water Resources Control Board, which – in 2009 – slapped a cease-and-desist order on any additional water hookups because of over-pumping from the Carmel River. Needing additional water to support development, local officials have tried to get the order rescinded, but to no avail. Without revocation, localities are scrambling to find other sources of water outside of what’s historically supported the area.

The urgency of diversifying sources is apparent now more than ever, as Peninsula cities work to meet state-required construction goals.

Through a process called the Regional Housing Needs Assessment (RHNA), cities and counties across the state are given targets every eight years for how much housing – split into different income levels – that they need to satisfy projected lodging needs for their communities. Though the process doesn’t obligate local governments to build out the aspirational housing, it does mandate that they demonstrate appropriate zoning, development regulations and policies to support homebuilding goals.

Monterey has been tasked with planning for 3,654 homes over the next eight years, including nearly 2,000 low income units. Moreover, city officials have stated that they don’t want to just do the bare minimum with planning, but put a concerted effort into building out imagined units. That kind of development needs water, and a lot of it – a lot more than Monterey currently has.

A long anticipated dilemma, some prospects are already out there to help fill the gap. One potential new source is Monterey One Water’s expansion of the Pure Water Monterey (recycled water) project, which, when complete, would provide an extra 2,250-acre feet of water to the Peninsula. There’s also Cal Am’s proposed desalination project, which was conditionally approved by the California Coastal Commission in November but is still years out from coming to fruition.

It’s in this web of needs, options and caveats that city staff started to think outside Monterey’s usual repertoire of water supply, they say. Though alternatives are on the

table, whether they will provide enough water – in a timely fashion – for the kind of growth Monterey is not only planning for but wants to support over the next eight years is unclear. Wanting backups they could rely on, city staff asked, what else?

“Our city takes (the Regional Housing Needs Assessment) very seriously,” Uslar said in a call Wednesday. “We could elect to plan (for growth) then point to an insufficient supply of water on the Peninsula and sit on our hands. But that’s not what we’re doing. We’re looking at other options.”

In working with the Marina Coast Water District, staff think there could be a few. Chief among them: funneling water from Marina Coast, which is primarily supplied by the Salinas Valley Groundwater Basin, to Monterey customers.

Uslar said that though they are very early into fleshing the idea out, “it looks absolutely feasible that (the district) has sufficient water that they can provide us here in the Peninsula.”

What needs some figuring out is how Marina Coast-supplied water would actually get to Monterey. According to Uslar, that will take bringing Cal Am into the fold. Because Monterey is mostly a Cal Am customer, Uslar says that to realize hopes of collaborating with Marina Coast, the utility company would need to agree to wheel in water from the district into its pipes that service the city.

“Cal Am is for sure a player here,” Uslar said. “They need to be approached and negotiated with. Are they willing to transport the water, and at what cost?”

Wheeling water aside, other options staff suggested Tuesday night included securing additional water from Marina Coast to support development of Monterey’s former Fort Ord properties. Staff even suggested the city take advantage of burgeoning plans by Marina Coast to revamp its old desalination plant on Reservation Road. Opportunities abound, the City Council welcomed continued partnership with the district Tuesday night.

“I think we’re in a situation where we have to pursue every possible water source solution and this seems like a very viable one,” Councilman Alan Haffa said.

Receiving general consensus support from the council, staff can start to meet formally with partners – Marina Coast and Cal Am, first and foremost – to see how far aspirations can go, Uslar said.

“There’s a lot of work ahead of us, but we feel that these are all challenges in the general environment of pro-affordable housing and increased supply of housing that will get a lot of political attention and pragmatic solutions,” he said.

In other council news out of Tuesday's meeting, the body unanimously decided to move forward with a long-awaited fire services agreement between the city and the Monterey Peninsula Airport District. It is now up to the district to OK next steps for the arrangement, which would see the Monterey Fire Department service the airport for the next five years. The Monterey Peninsula Airport District Board of Director's next meeting is set for Aug. 16.

- Tags:
- **Newsletter**

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Partial Collapse of Gulf Stream Threatens Climate Chaos in Europe

By **guest** July 31, 2023

The Atlantic Ocean. Credit: milan boers , CC BY 2.0.

New findings suggest the Atlantic meridional overturning circulation, or Amoc, could collapse maybe even within the next few years causing climate disaster in Europe.

By Robert Marsh

Amid news of lethal heatwaves across the Northern Hemisphere comes the daunting prospect of a climate disaster on an altogether grander scale.

New findings published in Nature Communications suggest the Atlantic meridional overturning circulation, or Amoc, could collapse within the next few decades – maybe even within the next few years – driving European weather to even greater extremes.

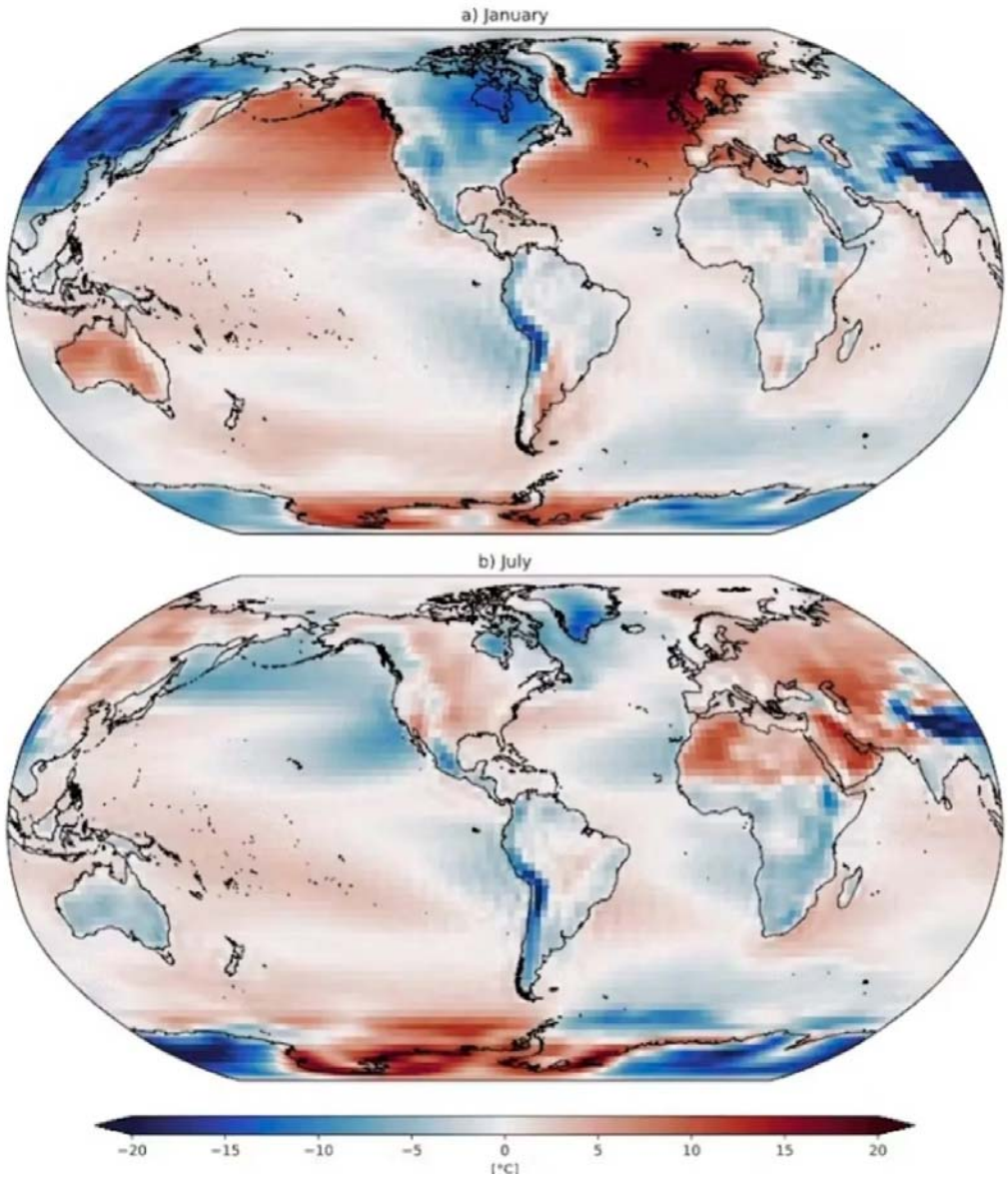
The Amoc amounts to a system of currents in the Atlantic that bring warm water northwards where it then cools and sinks. It is a key reason why Europe's climate has been stable for thousands of years, even if it's hard to recognise this chaotic summer as part of that stability.

There is much uncertainty in these latest predictions and some scientists are less convinced a collapse is imminent. Amoc is also only one part of the wider Gulf Stream system, much of which is driven by winds that will continue to blow even if the Amoc collapses. So part of the Gulf Stream will survive an Amoc collapse.

But I have studied the links between Atlantic currents and the climate for decades now, and know that an Amoc collapse would still lead to even greater climate chaos across Europe and beyond. At minimum, it is a risk worth being aware of.

Atlantic circulation helps keep Europe warm and stable

To appreciate how much Amoc influences the climate in the northeast Atlantic, consider how much warmer north Europeans feel compared to people at similar latitudes elsewhere. The following maps show how surface air temperatures depart from the average at each latitude and highlight patterns of warm and cool spots around the planet:



Surface air temperature departure from 1948-2018 zonal average in January (top) and July (bottom). Marsh & van Sebille, 2021; Data: NCEP/NCAR, Author provided

Most striking in the northern winter (January) is a red spot centred to the west of Norway where temperatures are 20°C warmer than the latitude average, thanks to Amoc. The northeast Pacific – and therefore western Canada and Alaska – enjoys a more modest 10°C warming from a similar current, while prevailing westerly winds mean the northwest Atlantic and northwest Pacific are much colder, as are the adjacent land masses of eastern Canada and Siberia.

The weather and climate of Europe, and northern Europe in particular, is highly variable from day to day, week to week and year to year, with competing air masses (warm and moist, cold and dry, and so on) gaining or losing influence, often guided by the high-altitude jet stream. Changes in weather and climate can be triggered by events located far away – and over the ocean.

How ocean temperatures are linked to weather

Over recent years Europe has witnessed some particularly unusual weather, in both winter and summer. At the same time, peculiar patterns of sea surface temperatures have appeared across the North Atlantic. Across great swathes of the ocean from the tropics to the Arctic, temperatures have persisted 1°C-2°C above or below normal levels, for months or even years on end. These patterns appear to exert a strong influence on the atmosphere, even influencing the path and strength of the jet stream.

To an extent, we can attribute some of these sea surface temperature patterns to a changing Amoc, but it's often not that straightforward. Nevertheless, the association of extreme seasons and weather with unusual sea temperatures might give us an idea of how a collapsed Amoc would unsettle the status quo. Here are three examples.

Northern Europe experienced successive severe winters in 2009/10 and 2010/11, subsequently attributed to a brief slowdown of the Amoc. At the same time heat had built up in the tropics, fuelling an unusually active June-November hurricane season in 2010.

In the mid 2010s a "cold blob" formed in the North Atlantic, reaching its most extreme in the summer of 2015 when it coincided with heatwaves in central Europe and was one of the only parts of the world cooler than its long-term average.

The cold blob looked suspiciously like the fingerprint of a weakened Amoc, but colleagues and I subsequently attributed this transient episode to more local atmospheric influences.

In 2017, the tropical Atlantic was again warmer than average and once again an unusually active hurricane season ensued, although the Amoc was not as clearly involved as 2010. Extensive warmth to the northeast in late 2017 may have sustained hurricane Ophelia, emerging around the Azores and making landfall in Ireland in October.

Based on just these few examples, we can expect that a more substantial reorganisation of North Atlantic surface temperatures will have profound consequences for the climate in Europe and beyond.

Larger ocean temperature extremes may alter the character of weather systems that are powered by heat and moisture from the sea – when and where temperatures rise beyond current extremes, Atlantic storms may grow more destructive. More extreme ocean temperature patterns may exert further influences on tropical

hurricane tracks and the jet stream, sending storms to ever more unlikely destinations.

If the Amoc collapses we can expect larger extremes of heat, cold, drought and flooding, a range of "surprises" to exacerbate the current climate emergency. The potential climate impacts – on Europe in particular – should add urgency to our decision-making.

Robert Marsh is a Professor of Oceanography and Climate, University of Southampton.

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THE CONVERSATION

Academic rigor, journalistic flair

Solving water challenges is complex – learn how law, health, climate and Indigenous rights all intersect in developing solutions

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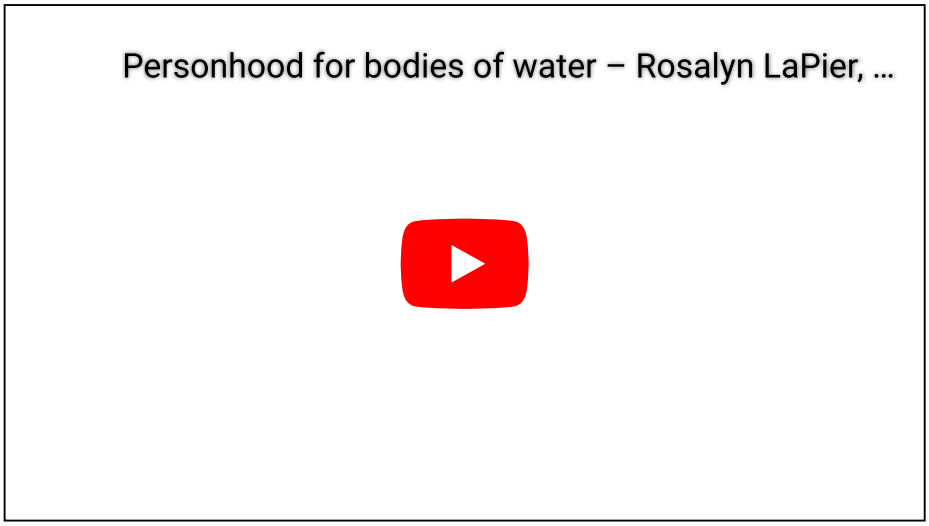
Americans have come to expect abundant clean water, but there are many stressors on water quality and availability. Jessica/flickr, CC BY-NC-ND

In the U.S., most consumers take clean and available fresh water for granted, and water usually becomes front-page news only when there's a crisis. And the past year has seen its share of water-related crises, whether it's the effects of a prolonged drought in the U.S. Southwest or floods that covered more than one third of Pakistan last year.

But seeing water problems as only environmental disasters does not capture the deeply interconnected nature of water in our society. To mark the release of the book "The Conversation on Water," a collection of previously published articles on water, The Conversation hosted a webinar with experts with a range of expertise and different perspectives on water issues and potential solutions.

The edited text and video clips below convey one or two of the key points each speaker made. The full webinar is available on YouTube.



Indigenous scholar Rosalyn LaPier explains Native Americans' efforts to gain legal personhood status for natural entities to protect waterways.

Rosalyn LaPier, Professor of History, University of Illinois

Native American tribes in the United States think of particular waterways – whether it's a river, a lake, or an underground aquifer – as a part of the supernatural realm. Tribal communities make an effort to protect certain waterways because it is a sacred place to them, which benefits other people as well. The Taos Pueblo, for example, spent almost an entire century fighting for the Blue Lake in New Mexico because it was a sacred site. They wanted to protect not just the lake but also the watershed of the lake, which they succeeded in doing.

Today, tribes are using different approaches both within the federal legal system and tribal systems. One approach is to set aside water systems that they view as sacred and apply personhood status to them. This has been done in other parts of the world and is beginning to be done in the United States as well, mostly now only within tribal communities.

There are different ways that tribes are thinking more creatively, but it's connected back to their own religious expression. The reason they're doing this is not necessarily to protect water from environmental degradation – it often is because of religion and religious practice. We have to distinguish between how we use water in America versus how we revere water in America. Tribes are addressing how to work within the system, because the United States does not protect sacred sites, especially Native American sacred places such as rivers, lakes or other water systems.

Read more: For Native Americans, a river is more than a 'person,' it is also a sacred place

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Water law expert Burke Griggs explains how policy around agriculture encourages overuse rather than conservation.

Burke Griggs, Professor of Law, Washburn University

We're pumping so much groundwater out of the planet right now that it has changed the way the Earth is rotating. It is a massive problem that is not very visible but is extremely worrisome. Agriculture uses anywhere between 80% and 95% of the water that exists in the West. Rivers are just the icing on the cake of groundwater supplies, winter snowpack and reservoir storage.

Farmers are not breaking the law. They have property rights to pump this water. The fundamental problem is, since the 1850s, and especially since the 1950s, we've granted more water rights to pump and to divert than the water systems can support. That's a bureaucratic problem. It's called overappropriation.

There's also a problem in farm policy. Ever since the 1970s, when the agricultural secretary famously said, "Get big or get out" and win the cold war for agriculture, we've seen the size of farms increase and get bigger and bigger. In order to make money and keep property, farmers have to continually borrow to add acreage, either as owners or as tenants. That in turn encourages them to pump more water to meet their bank loans and their other financial commitments.

So if people are not breaking the law, farmers are not stealing water – and if these subsidy systems promote overproduction and overpumping – what can the U.S. do?

The first thing to do is reform the subsidy system. Instead of rewarding overproduction and making a fetish out of grain yields, we should focus on conservation. We should pay farmers to not irrigate in sensitive areas and during years they don't need to.

The state law system is critical, because most water rights are state rights. Here, I think it makes sense to make water rights more flexible. Farmers will be willing to trade less water use over the long term for more flexible water use year to year. Most water rights have an annual limit, and if you allow more variability there, then I think that gets us a long way.

Water conservation can happen, but you've got to understand water reform within the context of property rights. Property is a very creative tool, and markets can be very creative tools.

Read more: Farmers are depleting the Ogallala Aquifer because the government pays them to do it

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Gabriel Filippelli of Indiana University explains how climate change is making it more challenging to build resilient water infrastructure.

Gabriel Filippelli, Chancellor's Professor of Earth Sciences and Executive Director of the Indiana University Environmental Resilience Institute

In 2014, Toledo, Ohio, suffered a massive harmful algal bloom, likely triggered by climate change and related runoff in that area. It occurred right over the only water intake line for the Toledo water system. That meant that they had to issue a rare warning – not only "do not drink the water," but "do not boil the water," because these harmful algal blooms produce a toxin that gets even worse if they're boiled. It showed that a lot of our water systems are not particularly resilient because we built them for 1920 and not for today or tomorrow.

I and a lot of scholars are thinking through the challenges in water security in a lot of parts of the U.S. Around the Great Lakes in the Midwest there are these prolonged episodes of flooding and drought. Flooding causes the redistribution of harmful algal blooms and pathogens like *E. coli* in waterways, which are very harmful. Of course, drought also causes its own stress on water supplies.

Unfortunately, a lot of water infrastructure is not built based on our understanding of water today. These massive sewer stormwater upgrades in a lot of cities are only built to hold the capacity of rainfall today, while in the Midwest extreme precipitation events are coming in fast and furious.

The US$2 billion upgrade to Indianapolis' water infrastructure was built for the extreme rainfall events that we had in the year 2000. Here we are in 2023, and we already have about 15% more extreme rainfall events, and we'll have another 15% more by 2050.

So rather than only relying on gray infrastructure consisting of tubes, tunnels and pipes to protect and secure our water systems and our safety, we have to also think about the role that green infrastructure – nature-based solutions – can play in augmenting some of those solutions.

We also should not be building new infrastructure based on the capacity we have today but based on the capacity we will have in the year 2050 and beyond. A lot of these very large infrastructure projects will and should last until then.

Read more: Climate change threatens drinking water quality across the Great Lakes

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Andrea K. Gerlak, water policy expert at the University of Arizona, talks about the progress cities around the world are making in water availability and equity.

Andrea Gerlak, Director at the Udall Center for Studies in Public Policy and Professor in the School of Geography, Development, and Environment at the University of Arizona

I've studied cities around the world and in the U.S., and at the end of the day, there is no perfect city that is doing everything right. But there are little examples. Since the pandemic, we've seen South Africa make a large investment at the city scale around water access and sanitation. Singapore has been focusing on reusing a lot of their water supply. It's been imperfect, but we've seen some pretty good developments made by Australia's First Nations to achieve their appropriate water allocations through a legal process.

In the U.S., Tucson has won awards for its green infrastructure and, along with Los Angeles, views stormwater as a resource. Los Angeles recently announced that in the coming decade, the majority of their drinking water will come from capturing stormwater, treating it and using it for potable water supply.

Other cities have been good at recognizing equity concerns, like Philadelphia and Baltimore. Municipal ordinances have been changed to make water available to people who cannot afford to pay their water bills and whose homes would have historically been repossessed as a result.

There are shining moments here and there, but there's not any perfect package or perfect city.