MINUTES
WATER RESOURCES COMMITTEE
Tuesday, October 3, 2023, at 9:00 a.m.
UNITED WATER CONSERVATION DISTRICT
Boardroom, 1701 N. Lombard Street, Oxnard CA 93030

Committee Members Present:
Gordon Kimball, director
Mohammed A. Hasan, director
Bruce E. Dandy, director (substitute for Chair Daniel Naumann)

Committee Members Absent:
Daniel C. Naumann, chair

Staff Present:
Mauricio Guardado, general manager
Anthony Emmert, assistant general manager
Dr. Maryam Bral, chief engineer
Dr. Jason Sun, supervisory water resources engineer
Dr. Bram Sercu, senior hydrologist
Dr. Zachary Hanson, water resources engineer
Christopher Coppinger, senior hydrogeologist
Patrick O'Connell, senior hydrogeologist
Murray McEachron, hydrologist supervisor
Kathleen Kuepper, hydrogeologist
Luke Bryden, associate hydrologist
Josh Perez, chief human resources officer
Zachary Plummer, technology systems manager
Ed Reese, technology systems specialist
Vanessa Vasquez, clerk of the committee
Brian Zahn, chief financial officer

Public Present:
Alden Broome- Guadalasca Mutual Water Company
Martin Gramckow-Southland Sod Farms
Burt Handy
Abraham Maldonado-City of Oxnard
Monica Noeng-Ventura Water

Call to Order – Open Session
Director Hasan called the committee meeting to order at 9:00 a.m. The clerk of the committee called roll. Two committee members were present (Kimball and Hasan), Chair Naumann was absent.

1. **Public Comment**
   Directors asked if there were any public comments. There were none offered.

2. **Approval of Minutes**
   Motion to approve the Minutes from July 5, 2023, Water Resources Committee meeting. Director Hasan; second, Director Kimball. Voice vote: two ayes (Hasan, Kimball); none opposed; one absent (Naumann). Motion carries 2/0/1.

   Director Dandy joined the meeting at 9:05 a.m. to substitute for Chair Naumann.

3. **Update on Reservoir Releases and Diversions (Dr. Bram Sercu)**
   United Water Conservation District's senior hydrologist Dr. Bram Sercu presented an update on reservoir releases and diversions covering 2023 diversions, operations, Saticoy recharge basin rotations, Saticoy groundwater elevation, El Rio groundwater elevation, El Rio surface clogging, Santa Felicia dam releases, and diversion forecast for 2023 (presentation attached).

   Director Kimball expressed his gratitude for the presentation and stated that it was impressive.

   No additional questions or comments offered.

4. **Update on Groundwater Conditions (Kathleen Kuepper)**
   Hydrogeologist Kathleen Kuepper presented an update on groundwater conditions covering the 2023 wet winter in California, historical local precipitation, monthly local precipitation, Santa Clara River flow and diversions, groundwater levels in the Piru basin, Fillmore basin, Santa Paula basin, Mound basin, Oxnard Forebay, in the Oxnard and PV (various) basins and along the Oxnard coast, and groundwater quality, including nitrates (presentation attached).

   Director Hasan asked if there are additional wells being monitored by United than the key wells in the report referencing Piru/Fillmore basins in the presentation (slides seven and eight) and asked about the relevance of key wells. Ms. Kuepper responded that there are more than two wells being measured, however the monthly report only shows data for key wells to give a snapshot of conditions. Director Hasan asked about the connectivity of Mound Basin with adjacent basins. Ms. Kuepper responded that there is connectivity between basins. Director Hasan offered a thank you to her response.

   No additional questions or comments offered.

5. **Summary of the Updated Recycled Water Pumping Allocation (RWPA) Impact Analysis Conducted by United Staff in Response to a Request from the City of Oxnard (Dr. Jason Sun)**
   Dr. Jason Sun presented a summary of the updated recycled water pumping allocation (RWPA) impact analysis that covered a background on the City of Oxnard's Recovery Enhancement and Treatment Program, Resolution 2013-02, Forebay available storage, new FCGMA resolution preparation, UWCD groundwater models, model scenarios, RWPA extraction at 3,000 acre-ft/yr. and 6000 acre-ft/yr. in dry years. The presentation also included coastal groundwater flow, reduction in groundwater level in the Forebay and concluded with key findings from his analysis (presentation attached).

   At the conclusion of Dr. Sun's presentation, Director Hasan asked the public for any questions.

   A member of the public, Martin Gramckow, posed a three-part question. Firstly, if there was a limit on pumping allocation, would it be possible to go up to 1,000 AF further away from the coast, would

it be better to re-write the resolution, take water from the Forebay; OR if the city could pump one or part of the allocation, would there be restrictions on how much could be pumped before running into issues; and would the water double? In response, Dr. Sun explained that if the RWPA program were to double its delivery, the anticipated impact and benefits could double with doubled extraction, but he cautioned against pushing too far. He highlighted that despite the technical analysis, it ultimately falls on regulators to formulate and approve a new resolution. Dr. Sun emphasized the District's commitment to support collaborative efforts for groundwater conservation.

Director Hasan asked about TDS (total dissolved solids) and explained that even small amounts of TDS can be harmful and asked how the 1:2 ratio for each line was determined. Dr. Sun clarified that the updated RWPA Impact Analysis does not simulate water quality. Considerations for water quality in the Forebay during dry years were part of the original resolution. Intrusion may become a potential issue when the Forebay available storage is over 80,000 AF and could be a cause for concern. Director Hasan re-directed the conversation to discuss who determines facility ownership to which Dr. Sun replied that he volunteered the Oxnard-Hueneme wells to do the analysis.

No additional questions or comments offered.

6. **Water Resources Department and GSA Activities Update (Dr. Sun)**
Dr. Sun provided verbal updates for the Water Resources Departments without a slide deck. He highlighted that the FCGMA will hold a special board meeting to explore the potential of establishing its independent staff. Additionally, he mentioned the impending departure of one senior FCGMA staff member, and the District is actively monitoring staff changes. The District is working closely with FCGMA to update the GSP (Groundwater Sustainability Plan) with the FCGMA preparing to send a consulting agreement to the District.

Director Kimball offered a thank you to Dr. Sun for providing such an analysis, referencing his RWPA Impact Analysis. He is hopeful that the results will be effective for the city and beneficial to the basins. Member of the public Alden Broome echoed director Kimball's sentiment on the analysis done by Dr. Sun. He expressed his appreciation for the collaborative efforts and the technical study.

Dr. Bral asked if there was any further feedback for staff regarding their presentations. Director Dandy suggested staff provide a quick summary to the Board, highlight positive benefits, and emphasized that the Board be made aware of Dr. Sun's analysis.

FUTURE AGENDA ITEMS

No future agenda items. No questions or comments offered.

ADJOURNMENT 10:10 a.m.

Director Hasan adjourned the meeting at 10:10 a.m.

I certify that the above is a true and correct copy of the Minutes of the Water Resources Committee Meeting of October 3, 2023.

ATTEST: _____

Daniel Naumann, Chair

United Water
CONSERVATION DISTRICT

ATTENDANCE LIST

MEETING DATE: Tuesday, October 3, 2023 at 9:00 am

MEETING: UWCD Water Resources Committee Meeting

The signing or registering of your name on this sign-up form is not required but is voluntary. All persons may attend the meetings of the Board of Directors of United Water Conservation District without signing or registering their names on this form.

Name (Please Print)	Representing
MARTIN GRAMCKOW	Southland Sod Farms
Helen Browne	Guadalasca Mutual Water Co.
Bret Haney	
Monica Noeng	Ventura Water
Abraham Maldonado	City of Oxnard

United Water CONSERVATION DISTRICT

UPDATE ON RESERVOIR RELEASES AND DIVERSIONS

Presented by: Bram Sercu, Senior Hydrologist
Water Resources Committee Meeting
October 3, 2023

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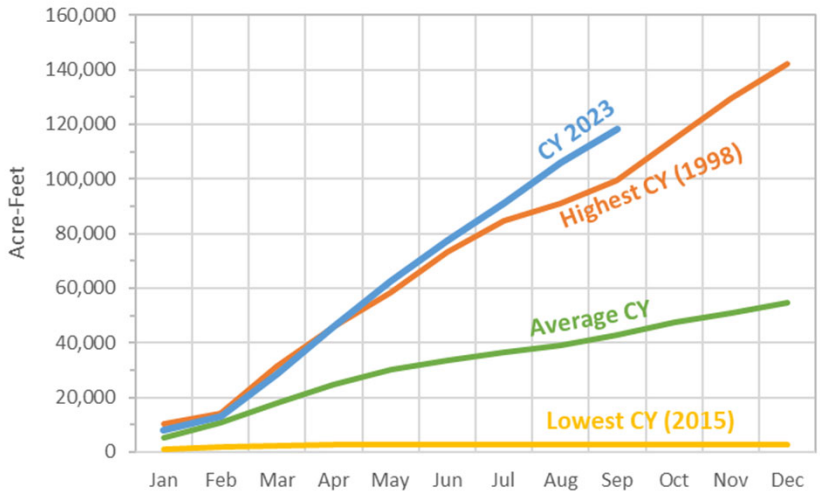
2023 Diversions



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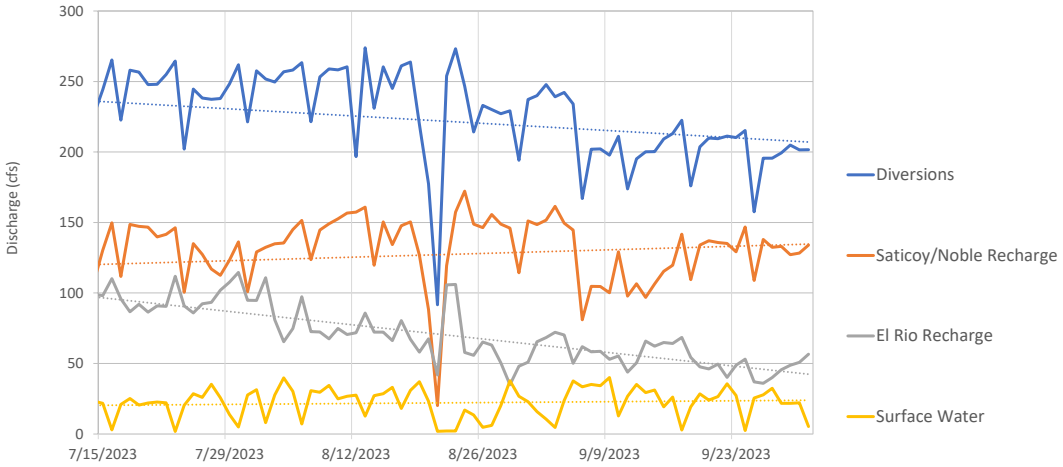
Operations Summary



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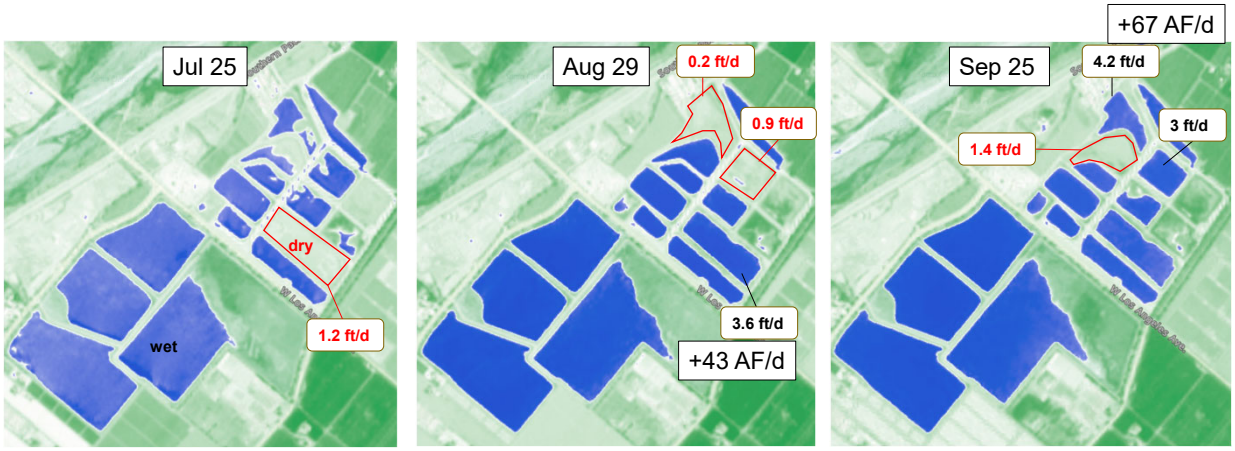
Saticoy Recharge Basin Rotations



Drying/disking basins restores recharge rates

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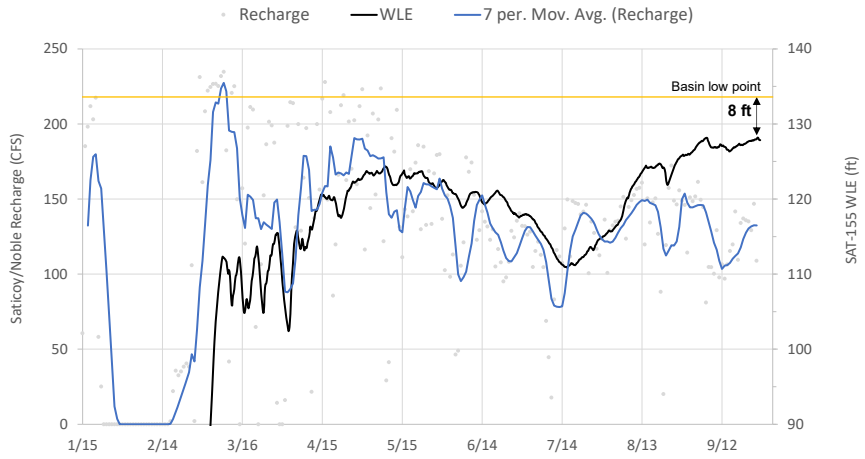
Saticoy Groundwater Elevation



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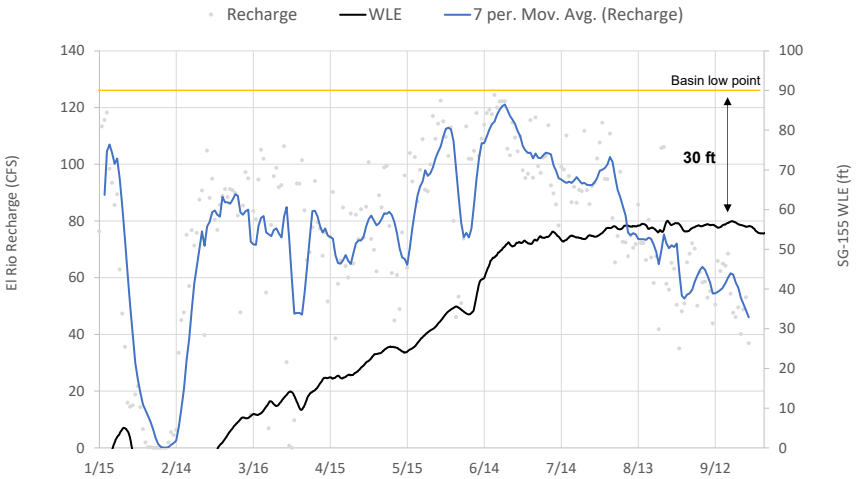
El Rio Groundwater Elevation



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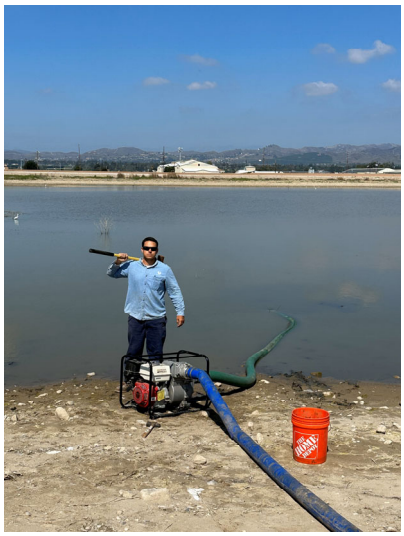
El Rio Surface Clogging



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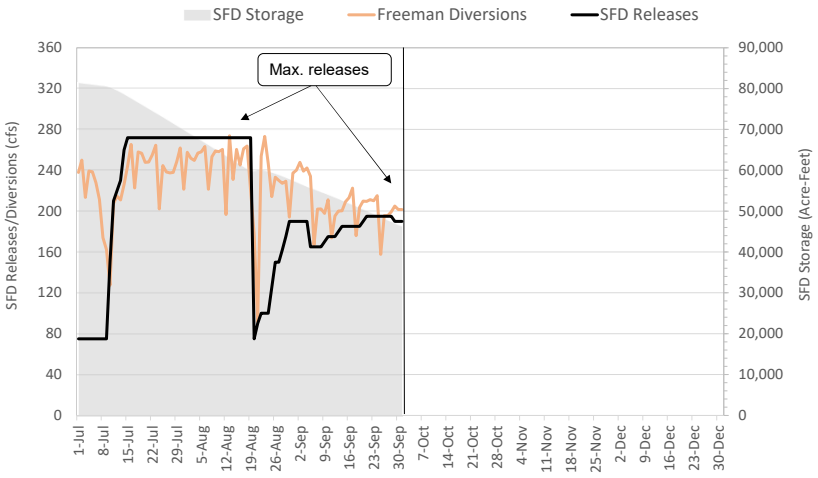
Santa Felicia Dam Releases



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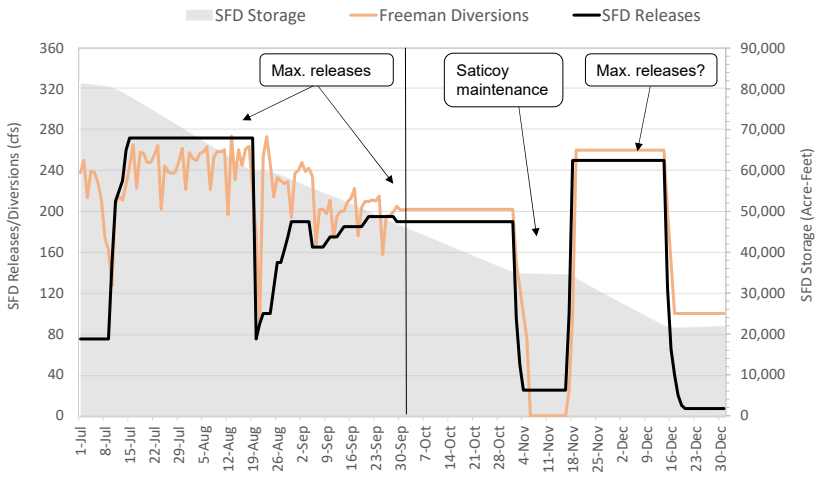
Santa Felicia Dam Releases



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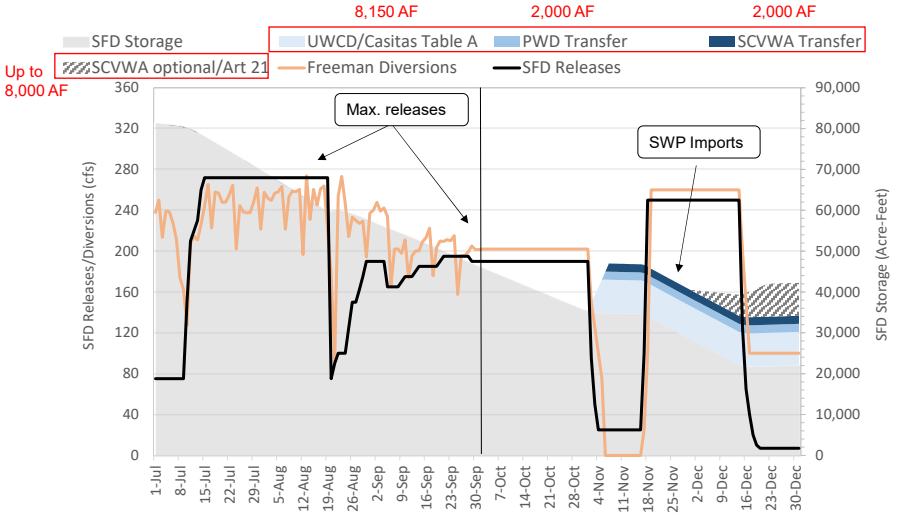
Santa Felicia Dam Releases



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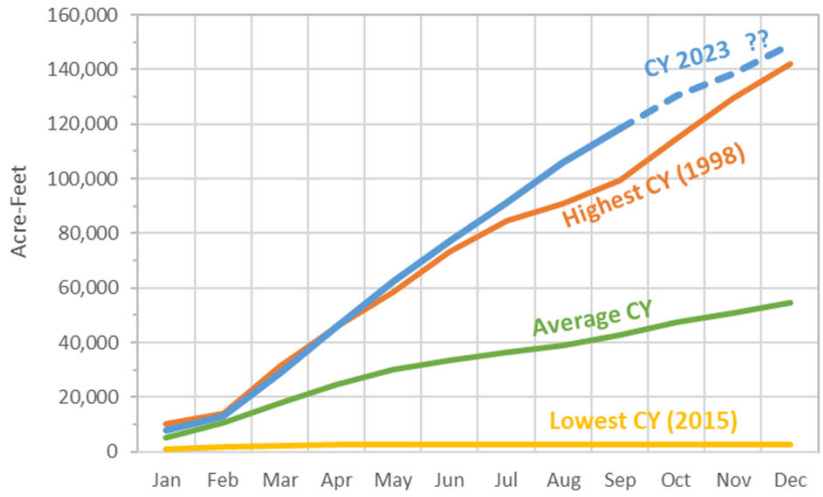
2023 Diversion Forecast



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Questions?

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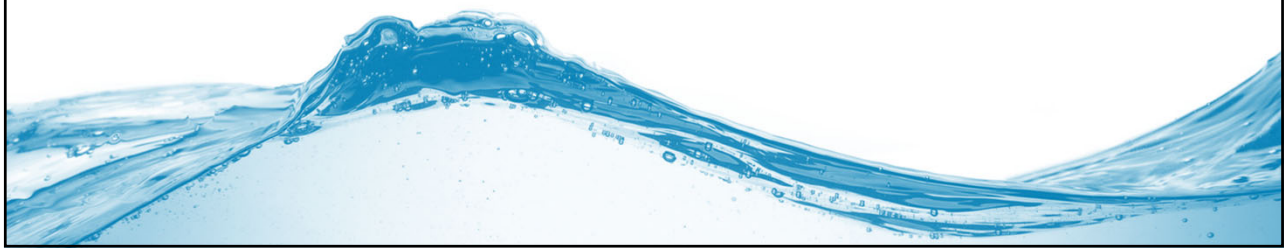
United Water CONSERVATION DISTRICT

UPDATE ON GROUNDWATER CONDITIONS

Presented by: Kathleen Kuepper, Hydrogeologist
Water Resources Committee Meeting
October 3, 2023



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Outline

1. Drought in California
2. Local Precipitation
3. Santa Clara River Flows and Diversions
4. Groundwater Levels
5. Water Quality – Nitrates

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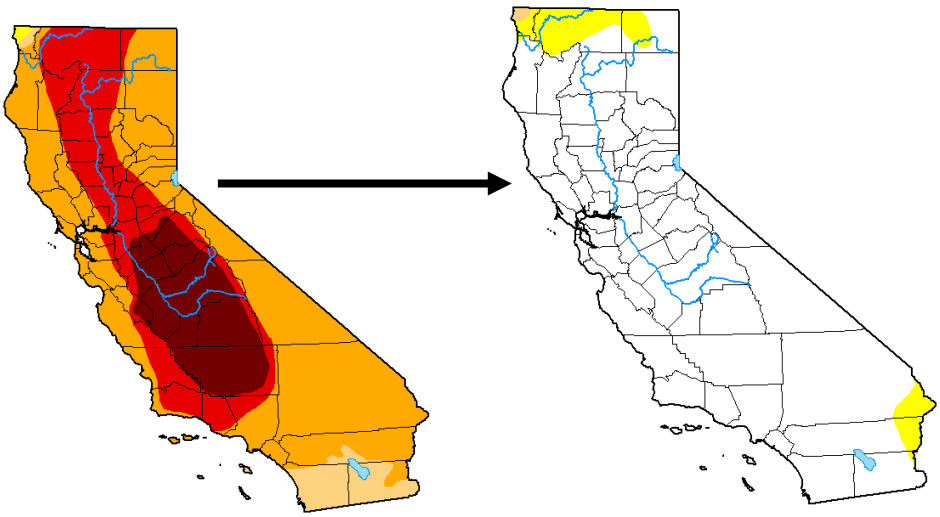
Wet Winter in California



October 4, 2022

September 12, 2023

Intensity:
None
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

Author:
Brad Pugh
CPC/NOAA

droughtmonitor.unl.edu

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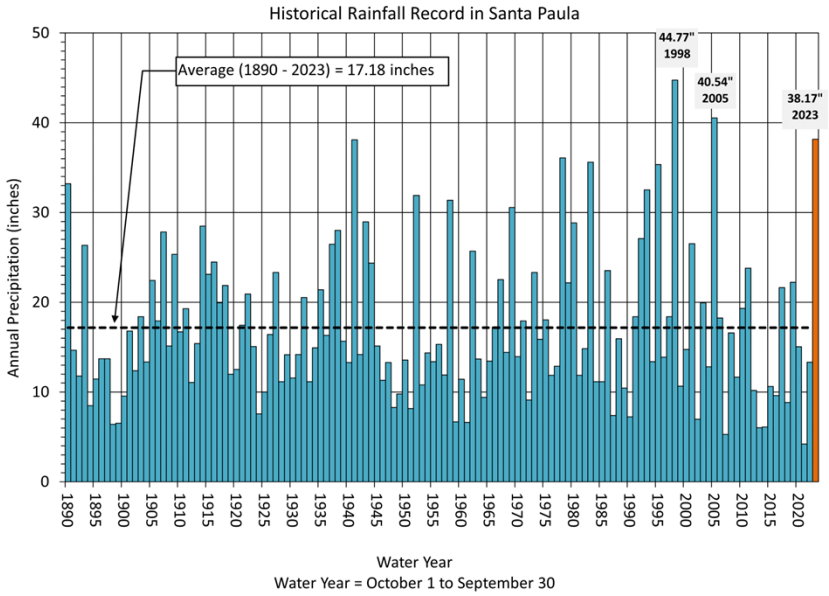
Historical Local Precipitation



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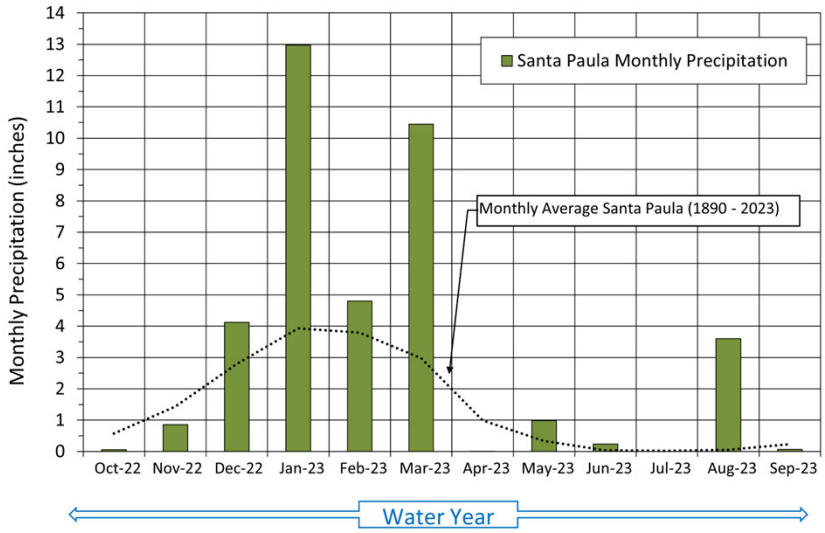
Monthly Local Precipitation



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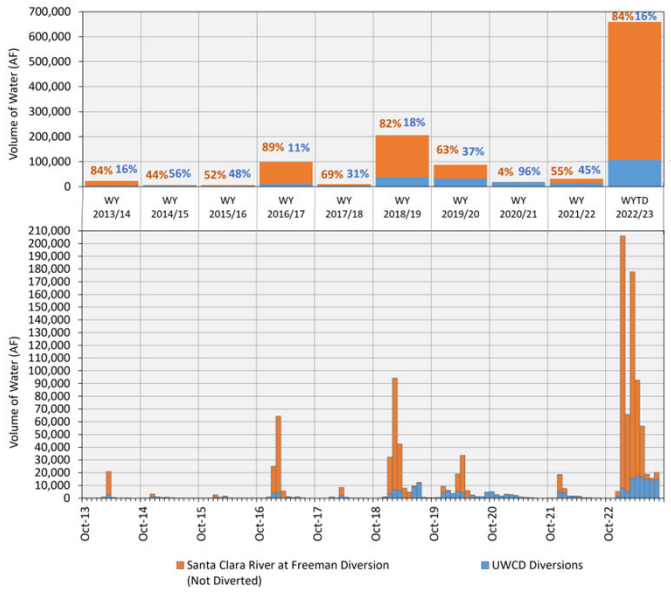
Santa Clara River Flow and Diversions



2023 Water Year To Date
(Oct 2022- Aug 2023)
Diversions = 107, 248 AF

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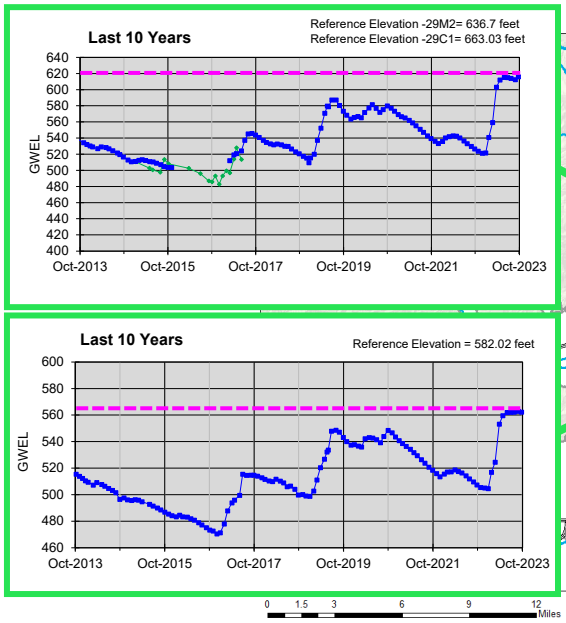
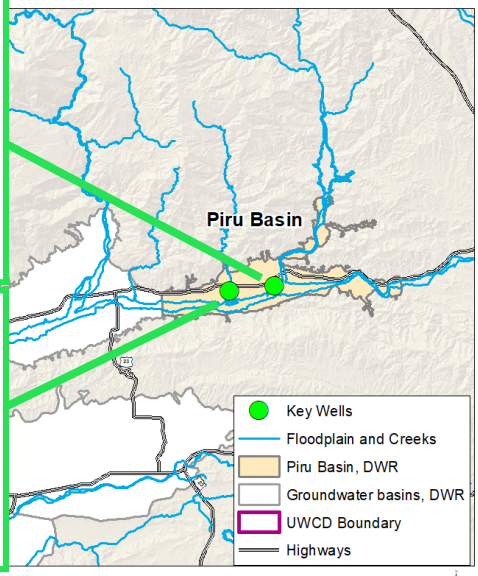
Groundwater Levels – Piru Basin





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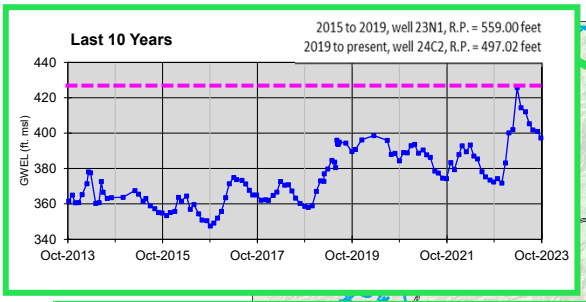
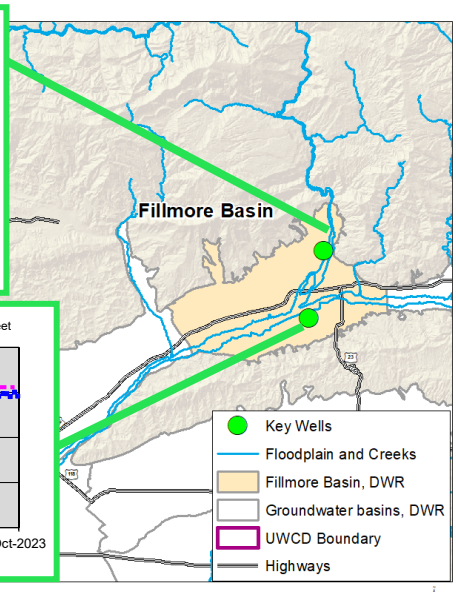
Groundwater Levels – Fillmore Basin





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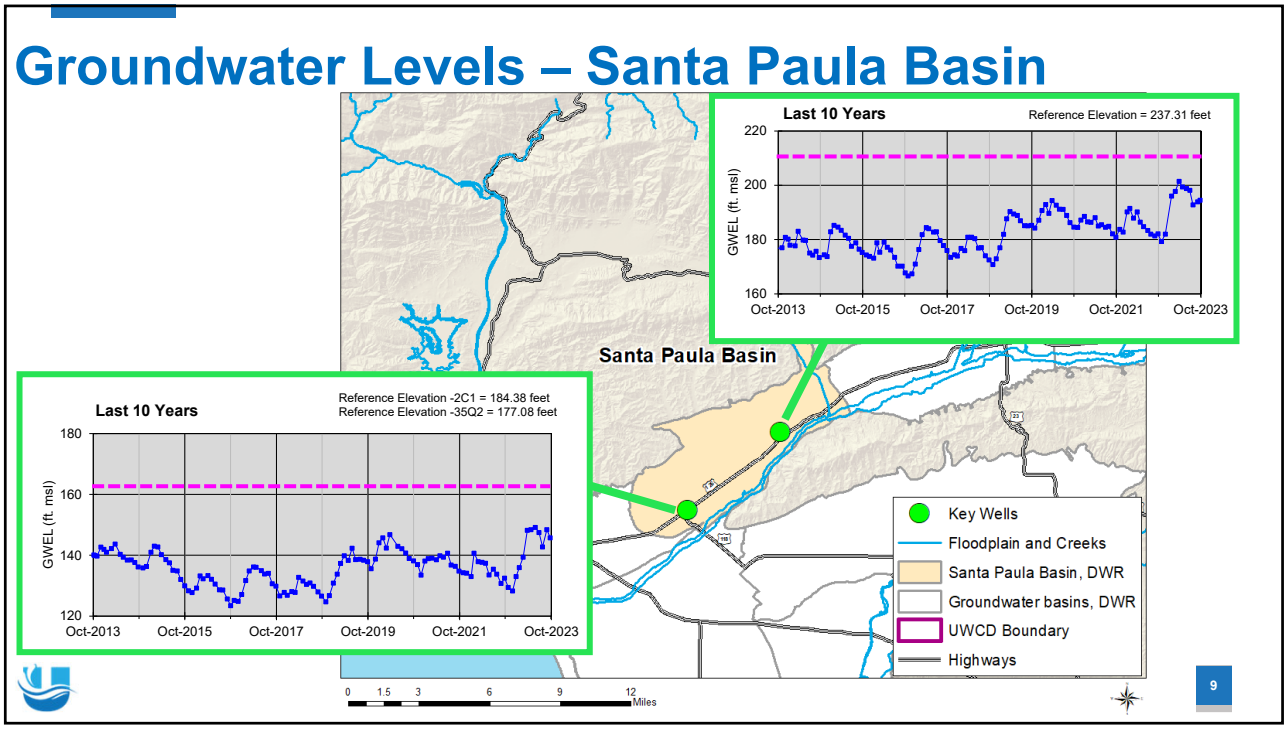
Groundwater Levels – Santa Paula Basin
Last 10 Years
Reference Elevation = 237.31 feet
GWEL (ft. msl)
220
200
180
160
Oct-2013
Oct-2015
Oct-2017
Oct-2019
Oct-2021
Oct-2023
Santa Paula Basin
Last 10 Years
Reference Elevation -2C1 = 184.38 feet
Reference Elevation -35Q2 = 177.08 feet
GWEL (ft. msl)
180
160
140
120
Oct-2013
Oct-2015
Oct-2017
Oct-2019
Oct-2021
Oct-2023
Key Wells
Floodplain and Creeks
Santa Paula Basin, DWR
Groundwater basins, DWR
UWCD Boundary
Highways
0 1.5 3 6 9 12 Miles
9

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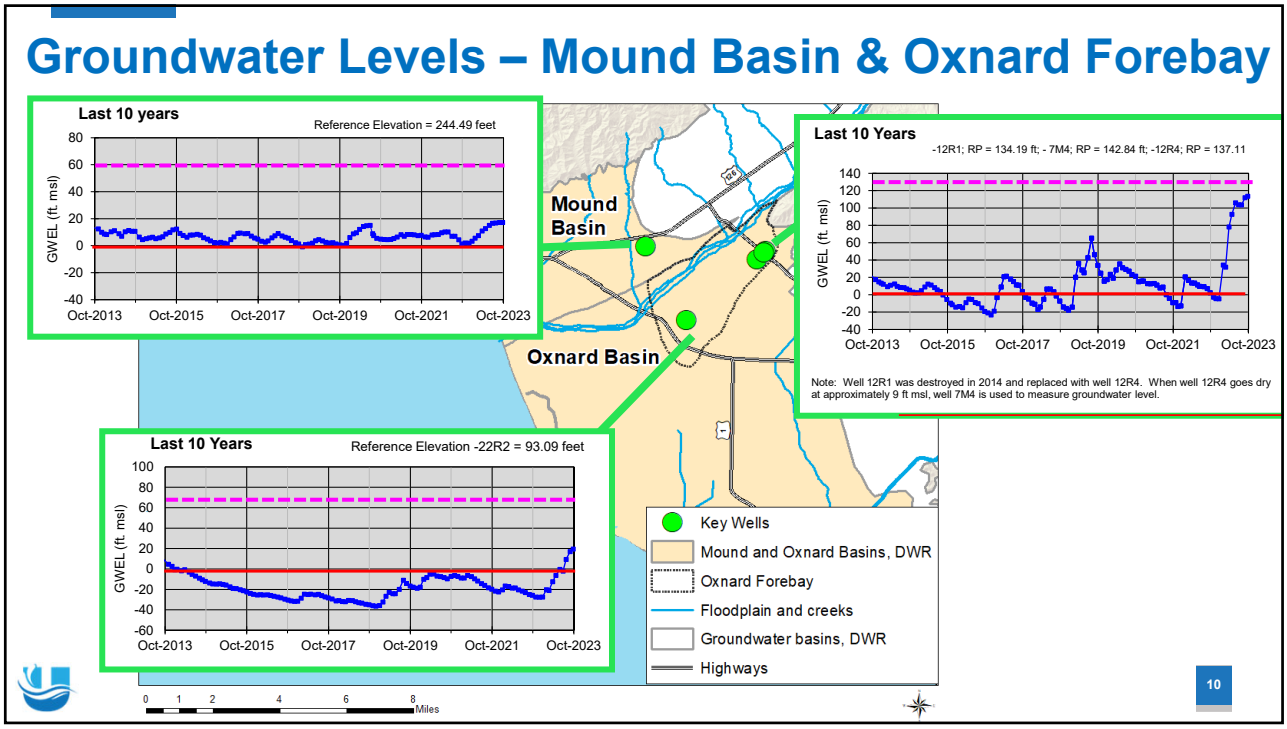
Groundwater Levels – Mound Basin & Oxnard Forebay
Last 10 years
Reference Elevation = 244.49 feet
GWEL (ft. msl)
80
60
40
20
0
-20
-40
Oct-2013
Oct-2015
Oct-2017
Oct-2019
Oct-2021
Oct-2023
Mound Basin
Oxnard Basin
Last 10 Years
-12R1; RP = 134.19 ft; - 7M4; RP = 142.84 ft; -12R4; RP = 137.11
GWEL (ft. msl)
140
120
100
80
60
40
20
0
-20
-40
Oct-2013
Oct-2015
Oct-2017
Oct-2019
Oct-2021
Oct-2023
Note: Well 12R1 was destroyed in 2014 and replaced with well 12R4. When well 12R4 goes dry at approximately 9 ft msl, well 7M4 is used to measure groundwater level.
Last 10 Years
Reference Elevation -22R2 = 93.09 feet
GWEL (ft. msl)
100
80
60
40
20
0
-20
-40
-60
Oct-2013
Oct-2015
Oct-2017
Oct-2019
Oct-2021
Oct-2023
Key Wells
Mound and Oxnard Basins, DWR
Oxnard Forebay
Floodplain and creeks
Groundwater basins, DWR
Highways
0 1 2 4 6 8 Miles
10

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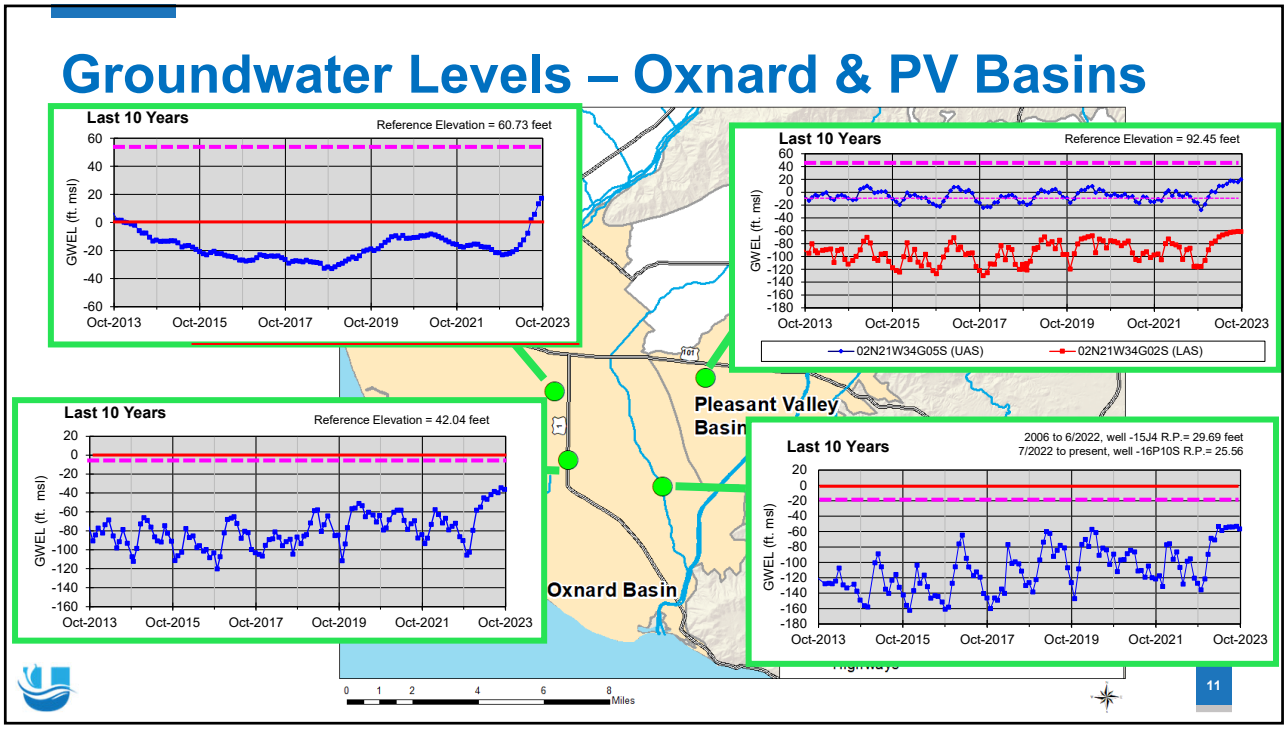
Groundwater Levels – Oxnard & PV Basins
Last 10 Years
Reference Elevation = 60.73 feet
GWEL (ft. msl)
Oct-2013 Oct-2015 Oct-2017 Oct-2019 Oct-2021 Oct-2023
Last 10 Years
Reference Elevation = 92.45 feet
02N21W34G05S (UAS)
02N21W34G02S (LAS)
Last 10 Years
Reference Elevation = 42.04 feet
Last 10 Years
2006 to 6/2022, well -15J4 R.P.= 29.69 feet
7/2022 to present, well -16P10S R.P.= 25.56
Pleasant Valley Basin
Oxnard Basin
0 1 2 4 6 8 Miles
11

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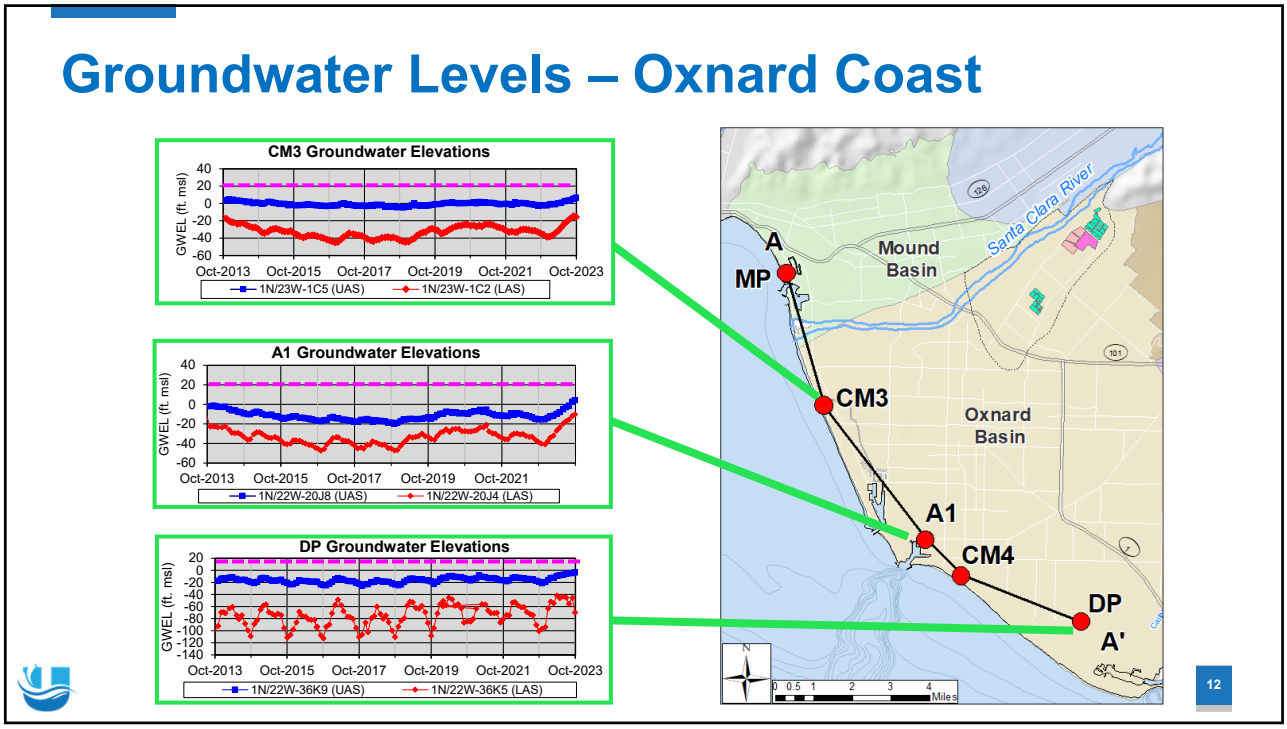
Groundwater Levels – Oxnard Coast
CM3 Groundwater Elevations
1N/23W-1C5 (UAS)
1N/23W-1C2 (LAS)
A1 Groundwater Elevations
1N/22W-20J8 (UAS)
1N/22W-20J4 (LAS)
DP Groundwater Elevations
1N/22W-36K9 (UAS)
1N/22W-36K5 (LAS)
Santa Clara River
Mound Basin
Oxnard Basin
A
MP
CM3
A1
CM4
DP
A'
0 0.5 1 2 3 4 Miles
12

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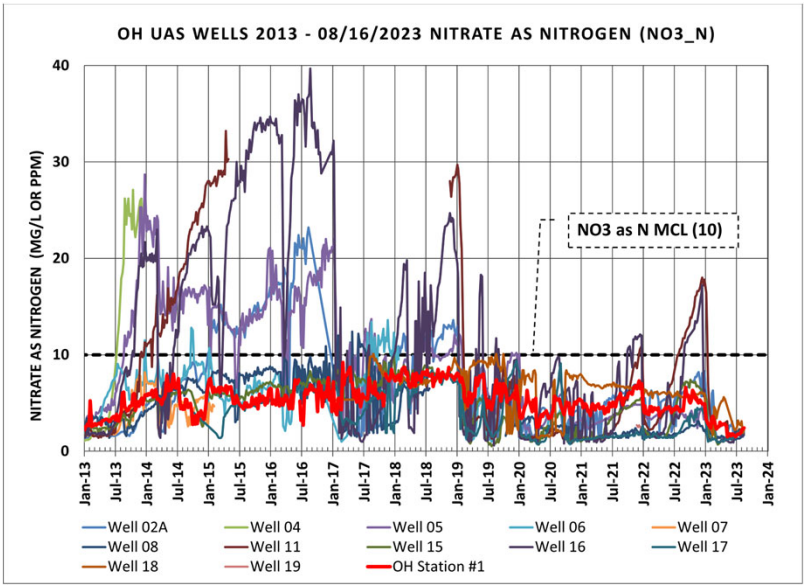
Groundwater Quality – Nitrates



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Questions?

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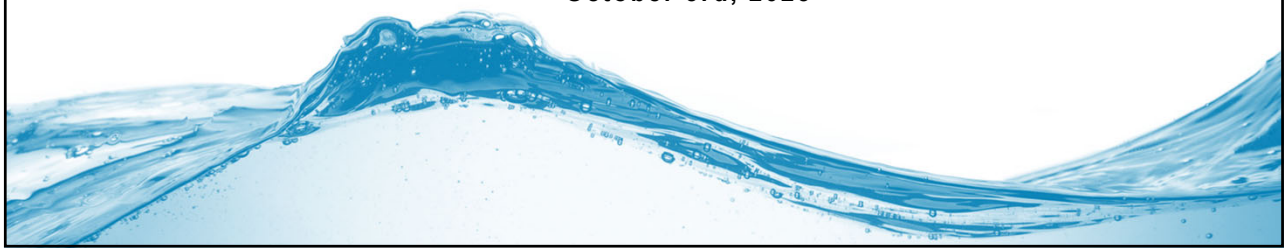
United Water CONSERVATION DISTRICT

SUMMARY OF THE UPDATED RECYCLED WATER PUMPING ALLOCATION (RWPA) IMPACT ANALYSIS

Presented by Jason Sun, Ph.D., P.E., Supervisory Water Resources Engineer

October 3rd, 2023



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Background

- The City of Oxnard's Groundwater Recovery Enhancement and Treatment Program (GREAT Program):
  Supply recycled water from the City of Oxnard's Advanced Water Purification Facility (AWPF) for agricultural and landscape irrigation, and injection into the groundwater basin.
- Fox Canyon Groundwater Agency (FCGMA) passed Resolution 2013-02 designed to reduce pumping along the coast:
  - Reduce pumping by applying the City of Oxnard's recycled water to agricultural users.
  - City of Oxnard accrues recycled water pumping allocation.

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Resolution 2013-02

- The City of Oxnard accrues pumping allocation (1:1 ratio to recycled water sent to agricultural users)
- RWPA extraction can occur at
  - City's Water Yard,
  - City's Rice Ave. Facility
  - El Rio Facility owned by United
- RWPA extraction subject to the Forebay groundwater conditions

- Implementation so far:
  City has not been able to access RWPA water (6,600 acre-ft) due to multi-year drought and low Forebay groundwater conditions until 2023.

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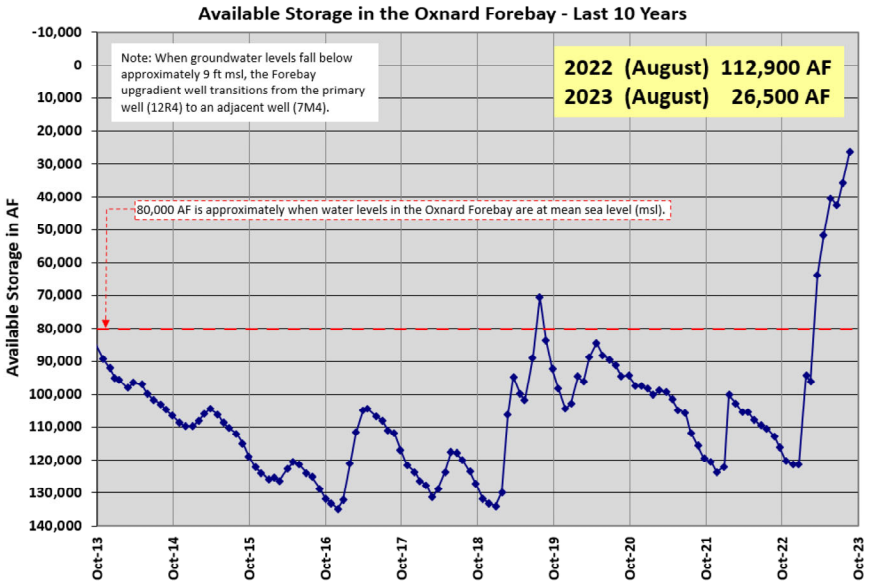
Forebay Available Storage



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Forebay Available Storage

The Forebay available storage (measured in acre-ft) is calculated based on the Forebay representative water level (measured in ft) with the following formula:

$$\textbf{Forebay Available Storage} = (87.0 - \textbf{Forebay Representative Water Level}) \times 1176.4706$$

where the Forebay representative water level is determined based on the average water level at two wells (02N22W12R01S and 02N22W22R01S) located in the Forebay.

When the Forebay representative water level is 19 ft, the Forebay available storage is calculated to be 80,000 acre-ft. When the Forebay representative water level falls below 19 ft a.m.s.l. or the Forebay available storage exceeds 80,000 acre-ft, there might be potential seawater intrusion due to a landward gradient.

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New Resolution in Preparation

- The City of Oxnard seeks to extract in dry years
- RWPA extraction can occur at
  - City's Water Yard,
  - City's Rice Ave. Facility
  - OH wells owned by United
- United updated the RWPA impact analysis
  - Dr. Steve Bachman prepared the impact analysis in 2013 to support Resolution 2013-02 and linked the extraction condition to the Forebay available storage.
  - This time United employs a numerical groundwater model.

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UWCD Groundwater Model

Coastal Plain Model	Regional Model	Coastal Plain Model Upgrade	Unstructured Grid Model
Flow (MODFLOW-NWT)	Flow (MODFLOW-NWT)	Flow (MODFLOW-NWT)	Flow + **Transport** + **Density** **(MODFLOW-USG-Transport)**
GSPs for FCGMA	GSPs for Fillmore, Piru and Mound		Brackish water
Monthly	Daily	Monthly	Monthly
1985-2015	1985-2019	1985-2019	1985-2019
Jun-2018	Aug-2020	Mar-2022	Completed/Ongoing

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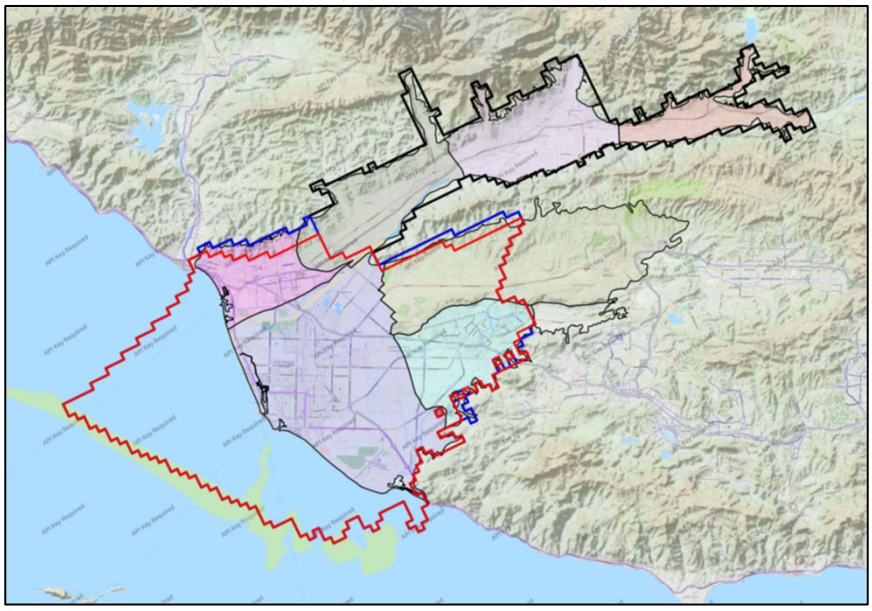

- Coastal Plain Model in **red line**
- Regional Model in **black line**
- Upgraded Coastal Plain Model in **blue line**

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Model Scenarios

- The City of Oxnard annually provides 1,000 or 2,000 acre-ft of advanced treated recycled water from the Advanced Water Purification Facility (AWPF) to agricultural users.
- RWPA extraction, 3,000 or 6,000 acre-ft/yr in dry years, occurs at the City's Water Yard and Rice Avenue Facility, or the OH wells owned by UWCD.
- FCGMA's baseline GSP scenario is based on the 1930-1979 hydrologic condition adjusted by 2070 climate factor – no pumping cutback and no projects.

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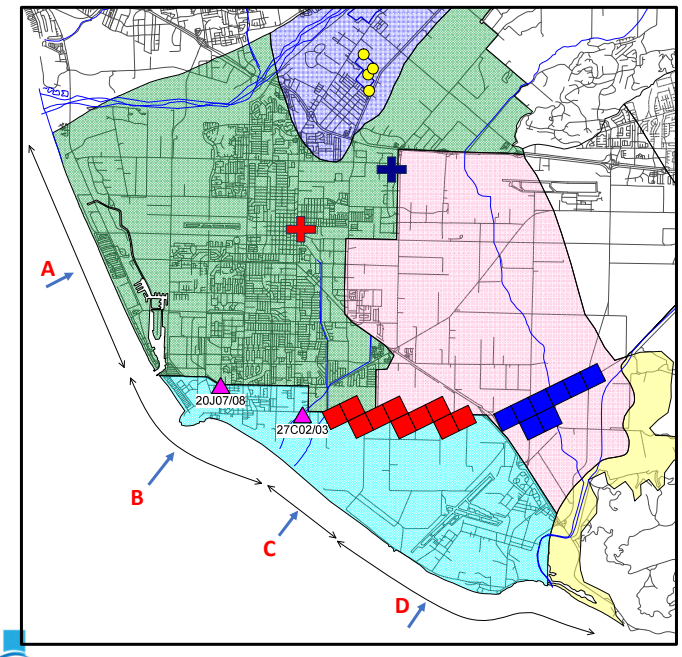

Letter	Coastline
A	North to Channel Islands Harbor
B	Channel Islands Harbor to Ormond Beach
C	Ormond Beach to Arnold Road
D	Mugu Canyon

The Saline Intrusion Management Area
The Pumping Depression Management Area
The West Oxnard Plain Management Area
The Forebay Management Area
The East Oxnard Plain Management Area

Users in or near the Saline Intrusion Management Area
Users in the Pumping Depression Management Area
The City of Oxnard's Rice Avenue Facility
The City of Oxnard's Water Yard
OH Wells owned by UWCD
20J07/08: Wells 01N22W20J07S/08S
27C02/03: Wells 01N22W27C02S/03S

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Scenario	Extraction Well Location	Maximum Annual Extraction (acre-ft)	Annaul AWPF Recycled Water Delivered (acre-ft)	Percentage of AWPF Recycled Water Delivery	
				to Saline Intrusion Management Area	to Pumping Depression Management Area
P1	City of Oxnard's Water Yard	3,000	1,000	25%	75%
S1	City of Oxnard's Water Yard	3,000	1,000	75%	25%
P1R	City of Oxnard's Rice Avenue Facility	3,000	1,000	25%	75%
P1RC	City of Oxnard's Water Yard and Rice Avenue Facility	3,000	1,000	25%	75%
P1F	OH Wells in Forebay	3,000	1,000	25%	75%
P2	City of Oxnard's Water Yard	6,000	2,000	25%	75%
S2	City of Oxnard's Water Yard	6,000	2,000	75%	25%
P2R	City of Oxnard's Rice Avenue Facility	6,000	2,000	25%	75%
P2RC	City of Oxnard's Water Yard and Rice Avenue Facility	6,000	2,000	25%	75%
P2F	OH Wells in Forebay	6,000	2,000	25%	75%

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RWPA Extraction at 3,000 acre-ft/yr in Dry Years

WY	WYT	SP Precip	Credit	Accrual	Extraction	WY	WYT	SP Precip	Credit	Accrual	Extraction
				6000		1955	Below Normal	13.38	1000	3000	0
1930	Dry	11.59	1000	4000	3000	1956	Below Normal	15.33	1000	4000	0
1931	Dry	14.19	1000	2000	3000	1957	Below Normal	11.91	1000	5000	0
1932	Below Normal	20.54	1000	3000	0	1958	Wet	31.37	1000	6000	0
1933	Below Normal	11.15	1000	4000	0	1959	Above Normal	6.67	1000	7000	0
1934	Dry	14.94	1000	2000	3000	1960	Critical	11.43	1000	5000	3000
1935	Below Normal	21.39	1000	3000	0	1961	Critical	6.62	1000	3000	3000
1936	Below Normal	16.32	1000	4000	0	1962	Above Normal	25.7	1000	4000	0
1937	Wet	26.49	1000	5000	0	1963	Below Normal	13.69	1000	5000	0
1938	Wet	28.02	1000	6000	0	1964	Dry	9.42	1000	6000	0
1939	Wet	15.68	1000	7000	0	1965	Dry	13.46	1000	4000	3000
1940	Dry	13.29	1000	5000	3000	1966	Above Normal	17.24	1000	5000	0
1941	Wet	38.11	1000	6000	0	1967	Wet	22.52	1000	6000	0
1942	Wet	14.19	1000	7000	0	1968	Above Normal	14.42	1000	7000	0
1943	Wet	28.98	1000	8000	0	1969	Wet	30.58	1000	8000	0
1944	Wet	24.37	1000	9000	0	1970	Wet	13.95	1000	9000	0
1945	Above Normal	15.13	1000	10000	0	1971	Below Normal	17.93	1000	7000	3000
1946	Below Normal	11.32	1000	11000	0	1972	Dry	9.11	1000	5000	3000
1947	Below Normal	13.29	1000	10000	2000	1973	Above Normal	23.32	1000	6000	0
1948	Critical	8.27	1000	8000	3000	1974	Wet	15.88	1000	7000	0
1949	Critical	9.79	1000	6000	3000	1975	Above Normal	18.06	1000	8000	0
1950	Critical	13.57	1000	4000	3000	1976	Below Normal	11.87	1000	6000	3000
1951	Critical	8.15	1000	2000	3000	1977	Dry	12.88	1000	4000	3000
1952	Wet	31.91	1000	3000	0	1978	Wet	36.08	1000	5000	0
1953	Above Normal	10.82	1000	4000	0	1979	Wet	22.17	1000	6000	0
1954	Dry	14.37	1000	2000	3000	SUM			50000		50000

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RWPA Extraction at 6,000 acre-ft/yr in Dry Years

WY	WYT	SP Precip	Credit	Accrual	Extraction	WY	WYT	SP Precip	Credit	Accrual	Extraction
				6000		1955	Below Normal	13.38	2000	0	4000
1930	Dry	11.59	2000	2000	6000	1956	Below Normal	15.33	2000	2000	0
1931	Dry	14.19	2000	4000	0	1957	Below Normal	11.91	2000	4000	0
1932	Below Normal	20.54	2000	0	6000	1958	Wet	31.37	2000	6000	0
1933	Below Normal	11.15	2000	2000	0	1959	Above Normal	6.67	2000	8000	0
1934	Dry	14.94	2000	4000	0	1960	Critical	11.43	2000	4000	6000
1935	Below Normal	21.39	2000	0	6000	1961	Critical	6.62	2000	0	6000
1936	Below Normal	16.32	2000	2000	0	1962	Above Normal	25.7	2000	2000	0
1937	Wet	26.49	2000	4000	0	1963	Below Normal	13.69	2000	4000	0
1938	Wet	28.02	2000	6000	0	1964	Dry	9.42	2000	6000	0
1939	Wet	15.68	2000	8000	0	1965	Dry	13.46	2000	2000	6000
1940	Dry	13.29	2000	4000	6000	1966	Above Normal	17.24	2000	4000	0
1941	Wet	38.11	2000	6000	0	1967	Wet	22.52	2000	6000	0
1942	Wet	14.19	2000	8000	0	1968	Above Normal	14.42	2000	8000	0
1943	Wet	28.98	2000	10000	0	1969	Wet	30.58	2000	10000	0
1944	Wet	24.37	2000	12000	0	1970	Wet	13.95	2000	12000	0
1945	Above Normal	15.13	2000	14000	0	1971	Below Normal	17.93	2000	8000	6000
1946	Below Normal	11.32	2000	16000	0	1972	Dry	9.11	2000	4000	6000
1947	Below Normal	13.29	2000	12000	6000	1973	Above Normal	23.32	2000	6000	0
1948	Critical	8.27	2000	8000	6000	1974	Wet	15.88	2000	8000	0
1949	Critical	9.79	2000	4000	6000	1975	Above Normal	18.06	2000	10000	0
1950	Critical	13.57	2000	0	6000	1976	Below Normal	11.87	2000	6000	6000
1951	Critical	8.15	2000	2000	0	1977	Dry	12.88	2000	2000	6000
1952	Wet	31.91	2000	4000	0	1978	Wet	36.08	2000	4000	0
1953	Above Normal	10.82	2000	6000	0	1979	Wet	22.17	2000	6000	0
1954	Dry	14.37	2000	2000	6000	SUM			100000		100000

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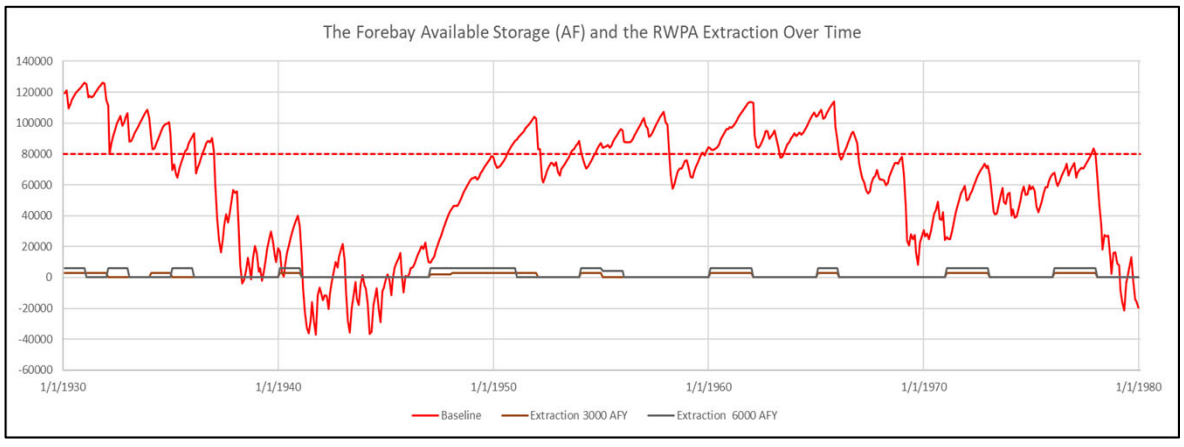

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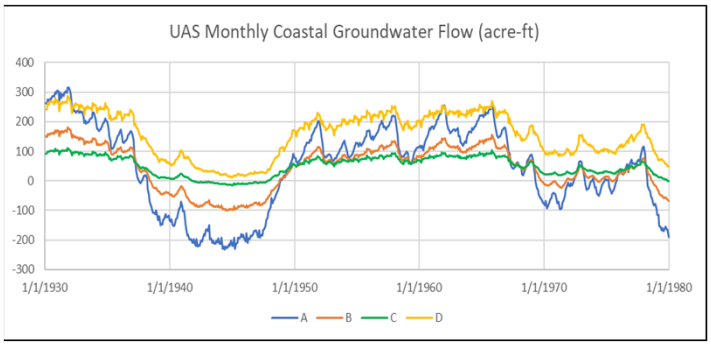

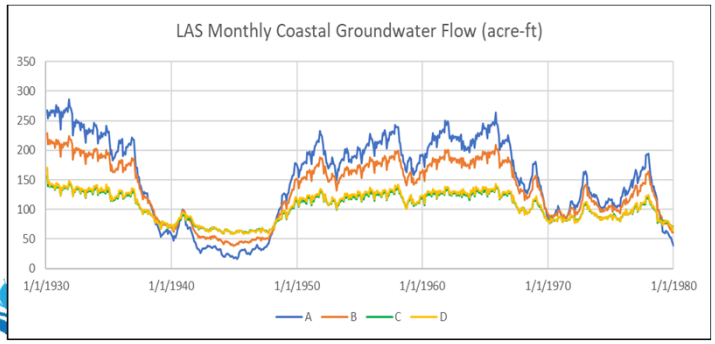

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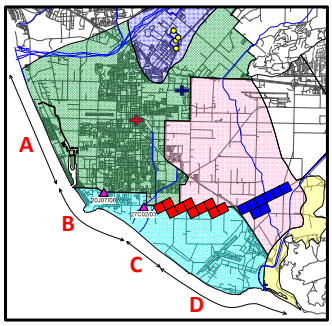

Annual Coastal flow (acre-ft) from the 1930-1979 Baseline GSP Scenario						
Aquifer System	A	B	C	D	B+C+D	SUM (A+B+C+D)
UAS	553.9	544.0	601.3	1877.1	3022.4	3576
LAS	1824.4	1618.1	1248.9	1267.8	4134.9	5959
SUM	2378	2162	1850	3145	7157	9535

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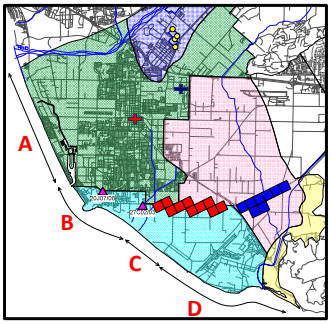
Coastal Groundwater Flow

Extraction: 3,000 acre-ft/yr at the City's Water Yard and/or Rice Avenue Facility

Annual Coastal flow (acre-ft) from the 1930-1979 Baseline GSP Scenario						
Aquifer System	A	B	C	D	B+C+D	SUM (A+B+C+D)
UAS	553.9	544.0	601.3	1877.1	3022.4	3576
LAS	1824.4	1618.1	1248.9	1267.8	4134.9	5959
SUM	2378	2162	1850	3145	7157	9535



P1							P1R						
Aquifer System	A	B	C	D	B+C+D	SUM (A+B+C+D)	Aquifer System	A	B	C	D	B+C+D	SUM (A+B+C+D)
UAS	74.0	29.7	-9.9	-72.4	-52.7	21	UAS	52.9	14.0	-12.4	-70.7	-69.2	-16
LAS	11.2	-16.8	-32.0	-41.9	-90.7	-80	LAS	8.1	-17.7	-31.4	-41.1	-90.2	-82
SUM	85	13	-42	-114	-143	-58	SUM	61	-4	-44	-112	-159	-98
S1							P1RC						
Aquifer System	A	B	C	D	B+C+D	SUM (A+B+C+D)	Aquifer System	A	B	C	D	B+C+D	SUM (A+B+C+D)
UAS	72.1	25.8	-16.8	-67.8	-58.8	13	UAS	63.4	21.8	-11.2	-71.6	-60.9	3
LAS	4.2	-33.3	-54.1	-40.7	-128.0	-124	LAS	9.7	-17.3	-31.7	-41.5	-90.5	-81
SUM	76	-8	-71	-108	-187	-111	SUM	73	5	-43	-113	-151	-78

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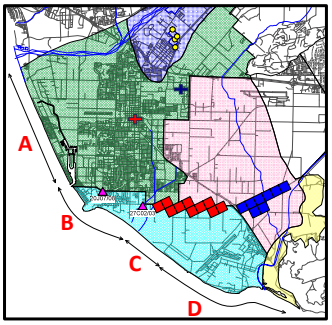
Coastal Groundwater Flow

Extraction: 6,000 acre-ft/yr at the City's Water Yard and/or Rice Avenue Facility



Annual Coastal flow (acre-ft) from the 1930-1979 Baseline GSP Scenario						
Aquifer System	A	B	C	D	B+C+D	SUM (A+B+C+D)
UAS	553.9	544.0	601.3	1877.1	3022.4	3576
LAS	1824.4	1618.1	1248.9	1267.8	4134.9	5959
SUM	2378	2162	1850	3145	7157	9535

P2						
Aquifer System	A	B	C	D	B+C+D	SUM (A+B+C+D)
UAS	146.6	58.7	-20.1	-145.6	-107.0	40
LAS	21.9	-33.9	-64.1	-84.1	-182.2	-160
SUM	168	25	-84	-230	-289	-121

P2R						
Aquifer System	A	B	C	D	B+C+D	SUM (A+B+C+D)
UAS	104.3	27.2	-25.2	-142.4	-140.4	-36
LAS	15.7	-35.8	-63.0	-82.5	-181.3	-166
SUM	120	-9	-88	-225	-322	-202

S2						
Aquifer System	A	B	C	D	B+C+D	SUM (A+B+C+D)
UAS	142.7	50.8	-33.8	-136.3	-119.3	23
LAS	7.9	-66.9	-108.4	-81.5	-256.8	-249
SUM	151	-16	-142	-218	-376	-226

P2RC						
Aquifer System	A	B	C	D	B+C+D	SUM (A+B+C+D)
UAS	125.4	42.9	-22.7	-144.0	-123.7	2
LAS	18.8	-34.9	-63.6	-83.3	-181.7	-163
SUM	144	8	-86	-227	-305	-161

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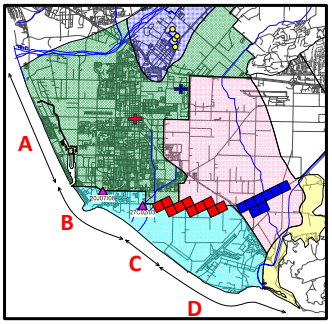
Coastal Groundwater Flow

Extraction: 3,000 or 6,000 acre-ft/yr



Annual Coastal flow (acre-ft) from the 1930-1979 Baseline GSP Scenario						
Aquifer System	A	B	C	D	B+C+D	SUM (A+B+C+D)
UAS	553.9	544.0	601.3	1877.1	3022.4	3576
LAS	1824.4	1618.1	1248.9	1267.8	4134.9	5959
SUM	2378	2162	1850	3145	7157	9535

Extraction at OH wells in the Forebay

P1F						
Aquifer System	A	B	C	D	B+C+D	SUM (A+B+C+D)
UAS	60.1	12.5	-15.3	-77.3	-80.1	-20
LAS	-1.6	-25.2	-34.2	-43.3	-102.7	-104
SUM	58	-13	-50	-121	-183	-124

P2F						
Aquifer System	A	B	C	D	B+C+D	SUM (A+B+C+D)
UAS	118.5	24.2	-31.0	-155.5	-162.4	-44
LAS	-3.8	-50.7	-68.7	-86.8	-206.2	-210
SUM	115	-27	-100	-242	-369	-254

Extraction at the City's Water Yard

P1						
Aquifer System	A	B	C	D	B+C+D	SUM (A+B+C+D)
UAS	74.0	29.7	-9.9	-72.4	-52.7	21
LAS	11.2	-16.8	-32.0	-41.9	-90.7	-80
SUM	85	13	-42	-114	-143	-58

P2						
Aquifer System	A	B	C	D	B+C+D	SUM (A+B+C+D)
UAS	146.6	58.7	-20.1	-145.6	-107.0	40
LAS	21.9	-33.9	-64.1	-84.1	-182.2	-160
SUM	168	25	-84	-230	-289	-121

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Reduction in Groundwater Level in the Forebay

Scenario	Forebay Management Area						
	Areal Average Monthly Groundwater Level Drawdown (ft) over 50 Years			Cell-Based Monthly Groundwater Level Drawdown (ft) Over 50 Years			Impact
	Mean	Maximum	Standard Deviation	Mean	Maximum	Standard Deviation	
P1	0.52	1.64	0.42	0.81	2.30	0.62	I
S1	0.51	1.63	0.42	0.81	2.28	0.62	I
P1R	0.70	2.02	0.51	0.99	2.58	0.67	I
P1RC	0.61	1.83	0.46	0.89	2.40	0.64	I
P1F	1.11	3.17	0.78	1.63	4.58	1.18	II
P2	1.02	3.04	0.76	1.60	4.42	1.16	II
S2	1.01	3.01	0.75	1.59	4.37	1.15	II
P2R	1.38	3.73	0.92	1.95	4.89	1.25	II
P2RC	1.20	3.39	0.84	1.75	4.56	1.18	II
P2F	2.20	5.86	1.43	3.24	8.53	2.21	III

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Conclusions

- The RWPA program has a net benefit in reducing the coastal seawater flow.
- Extraction at 3,000 acre-ft/yr in dry years has minimal impact on the Forebay groundwater elevation except extracting in the Forebay.
- Extraction at 6,000 acre-ft/yr in dry years has moderate to significant impact on the Forebay groundwater elevation.
- The extraction in the Forebay reduces coastal seawater flow more significantly with a more pronounced effect on the Forebay groundwater level.

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Questions / Comments

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