Groundwater Conditions in Southern Ventura County after a Decade of Drought,

and New Water Supply Projects and Policies to Address Overdraft

Presented by Dan Detmer, Water Resources Manager

United Water Conservation District

August 31, 2022

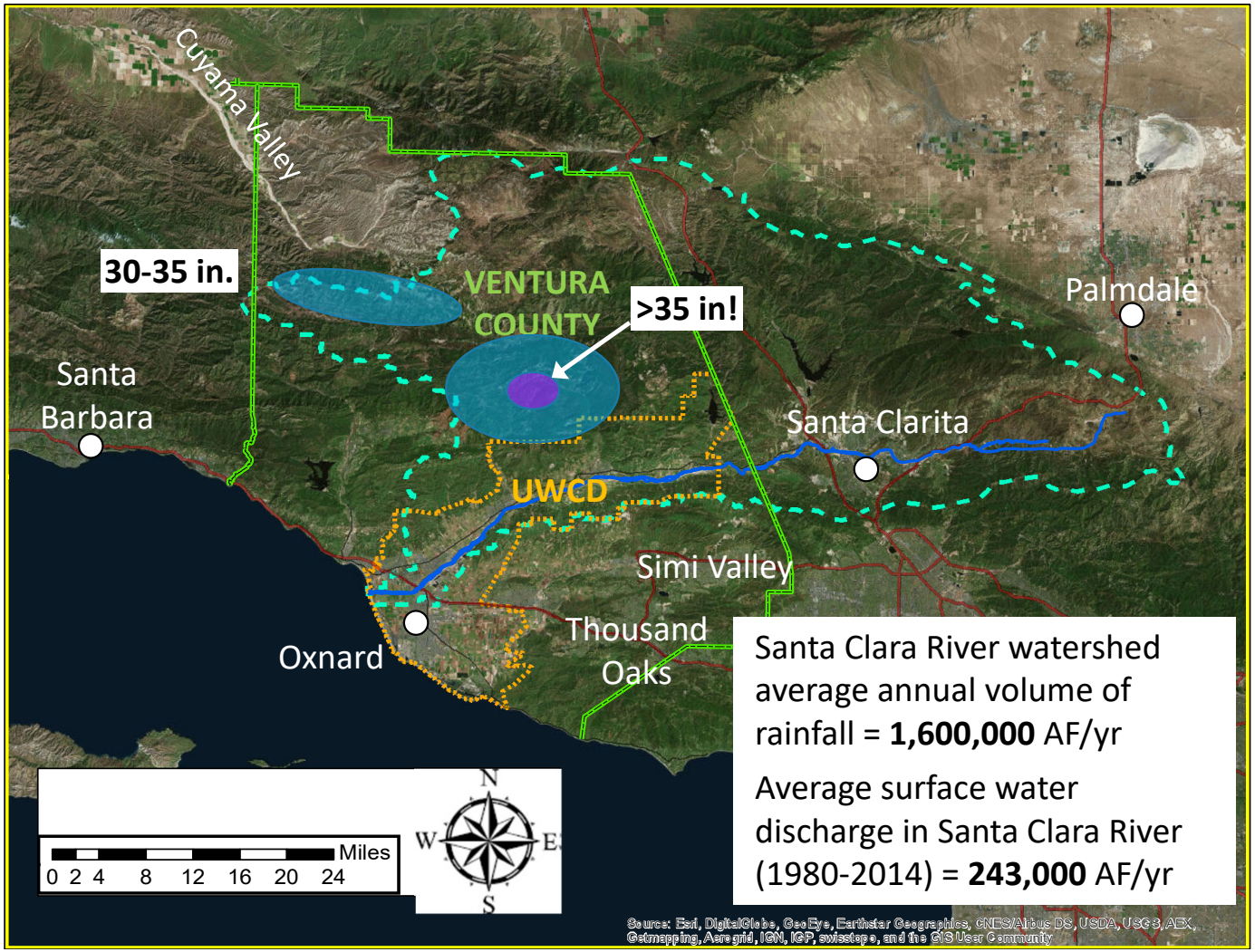
Ventura County relies extensively on local water

Thanks to our groundwater basins and large watersheds!

Great climate and soils!

But…

- We have 6-month-long droughts every year, and major droughts every 2 or 3 decades



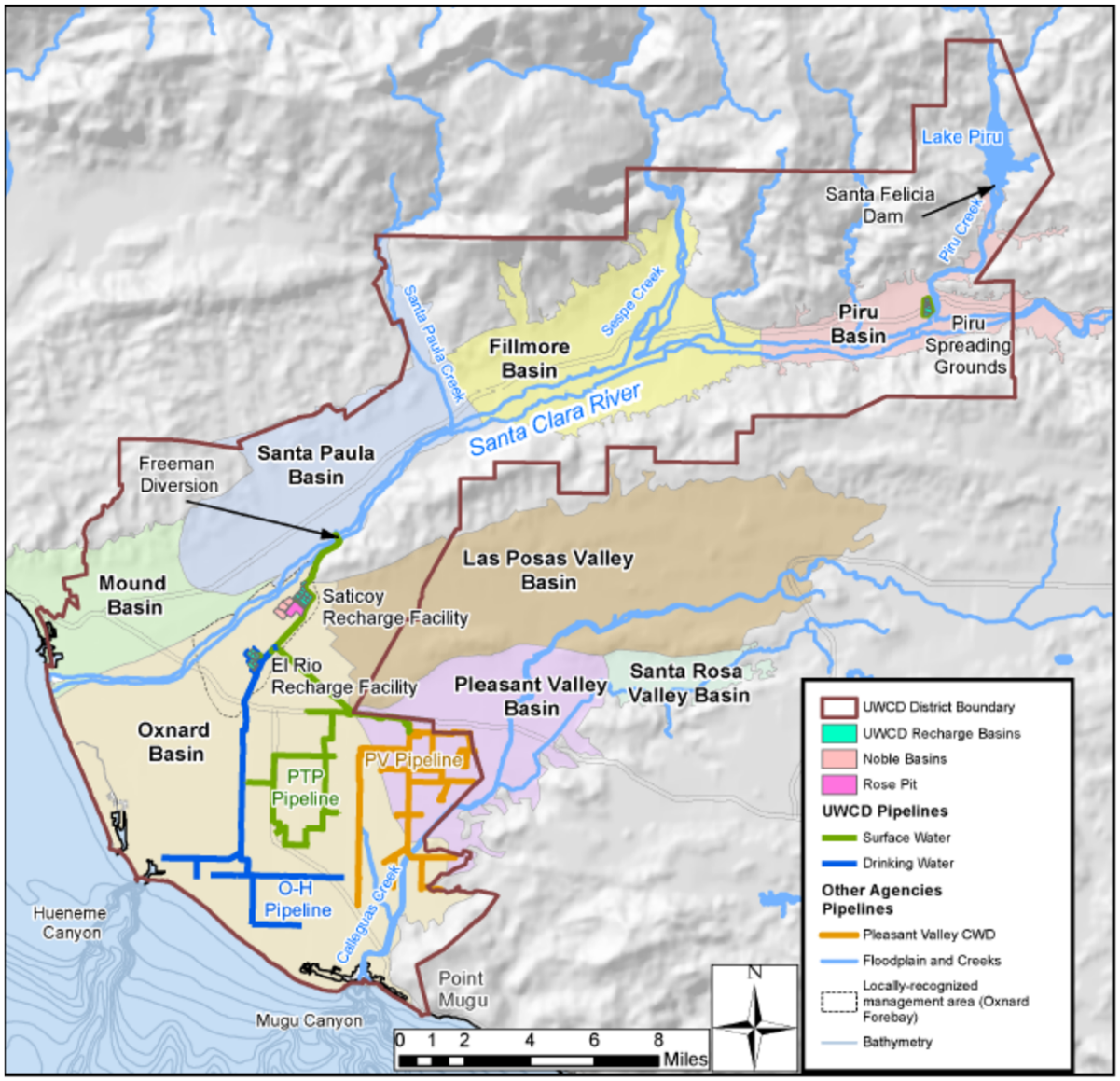
Santa Clara River watershed average annual volume of rainfall = **1,600,000** AF/yr

Average surface water discharge in Santa Clara River (1980-2014) = **243,000** AF/yr

Large groundwater basins in southern Ventura County

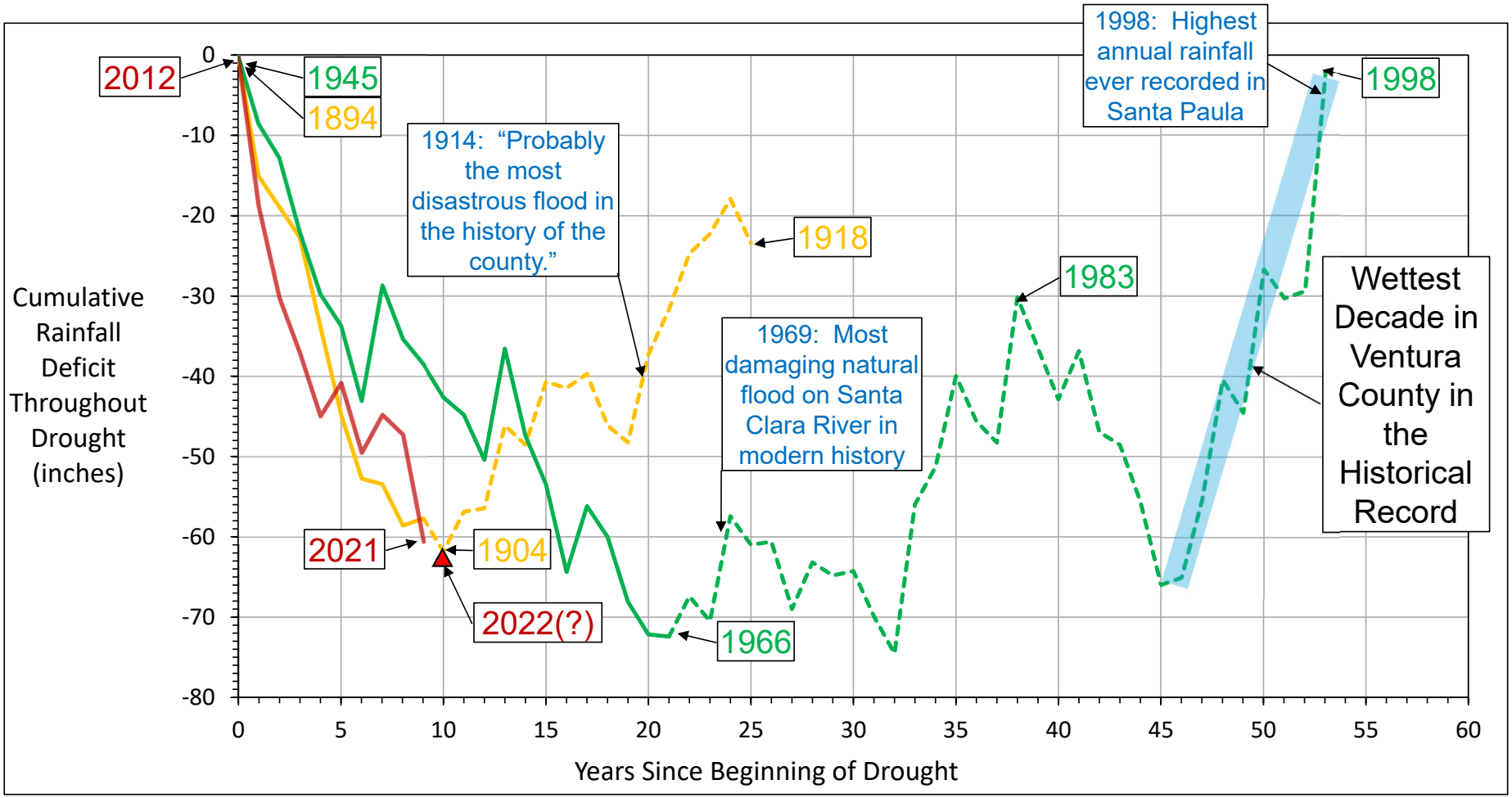
Extensive reliance on groundwater for both Ag and Urban supply

Conjunctive use strategies – use surface water and imported water when it is available

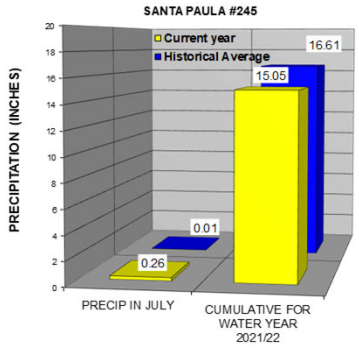


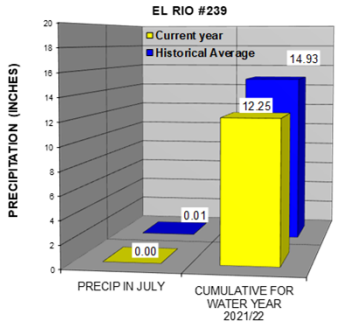
Cumulative Rainfall Deficit During Major Droughts

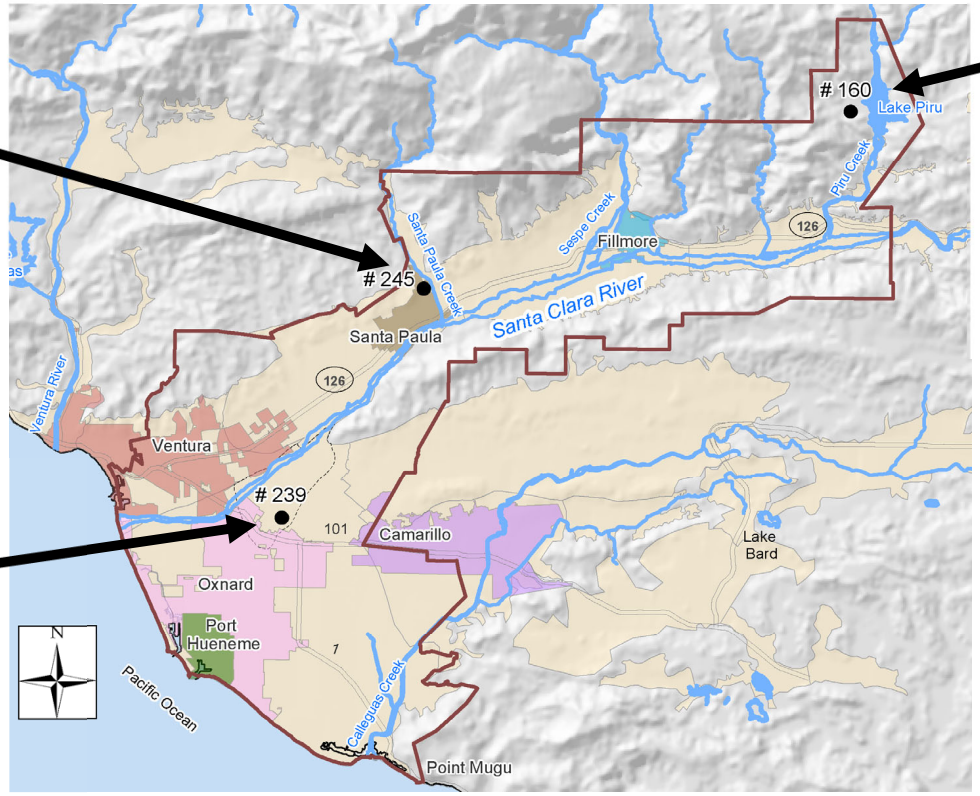
(based on measured water-year rainfall at Santa Paula, CA, 1891-present)

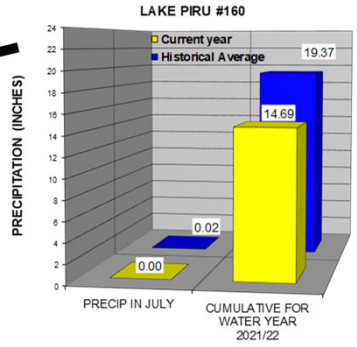


Current Water Year Precipitation



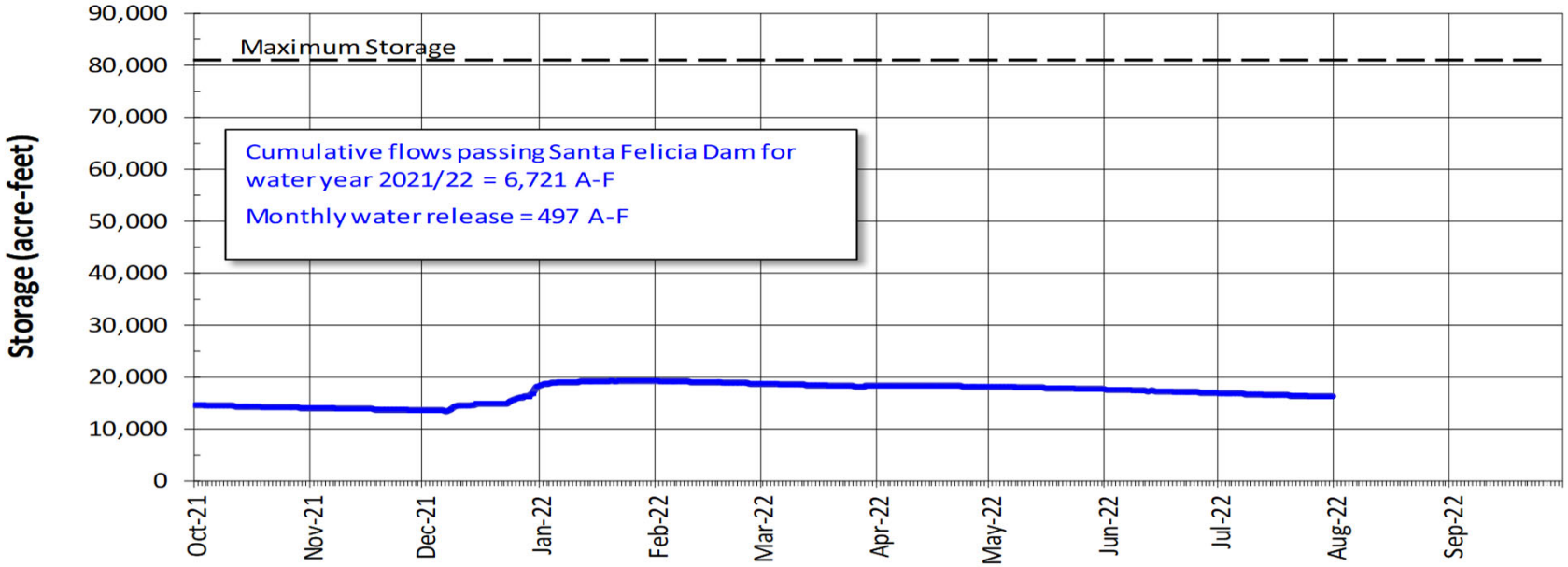






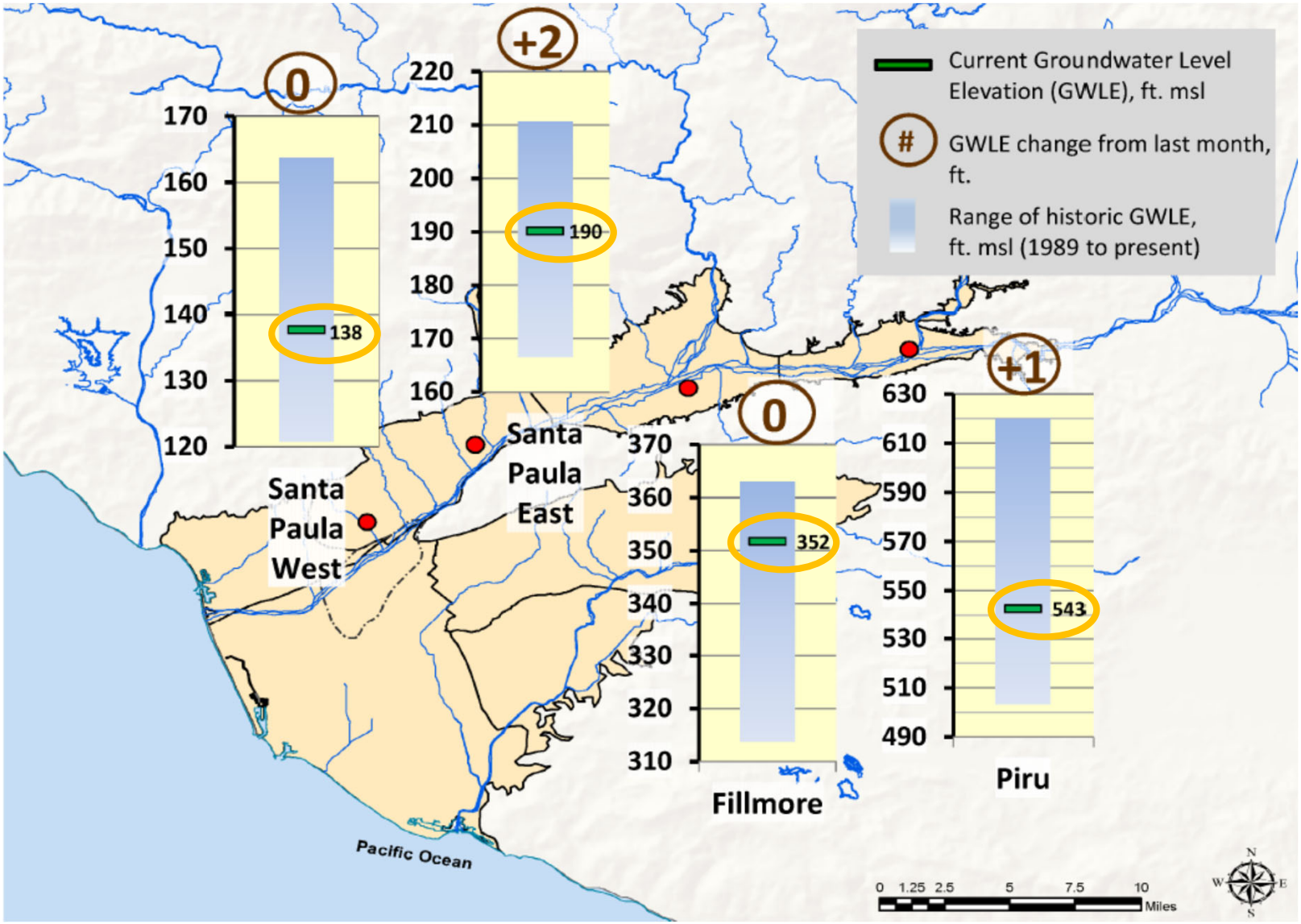
District-wide percent of normal precipitation = 82%

Lake Piru Storage

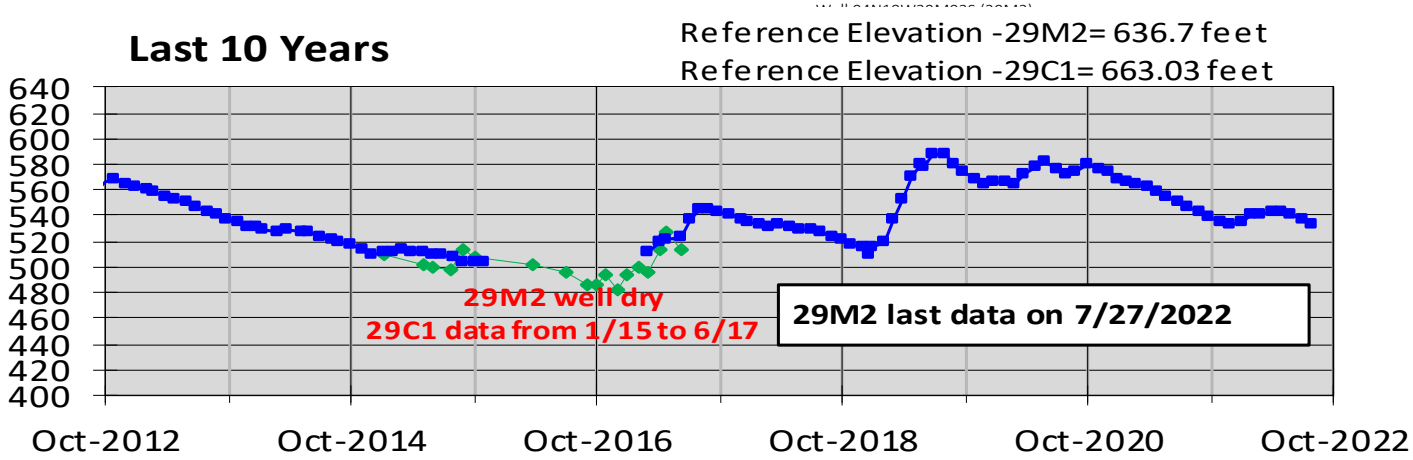


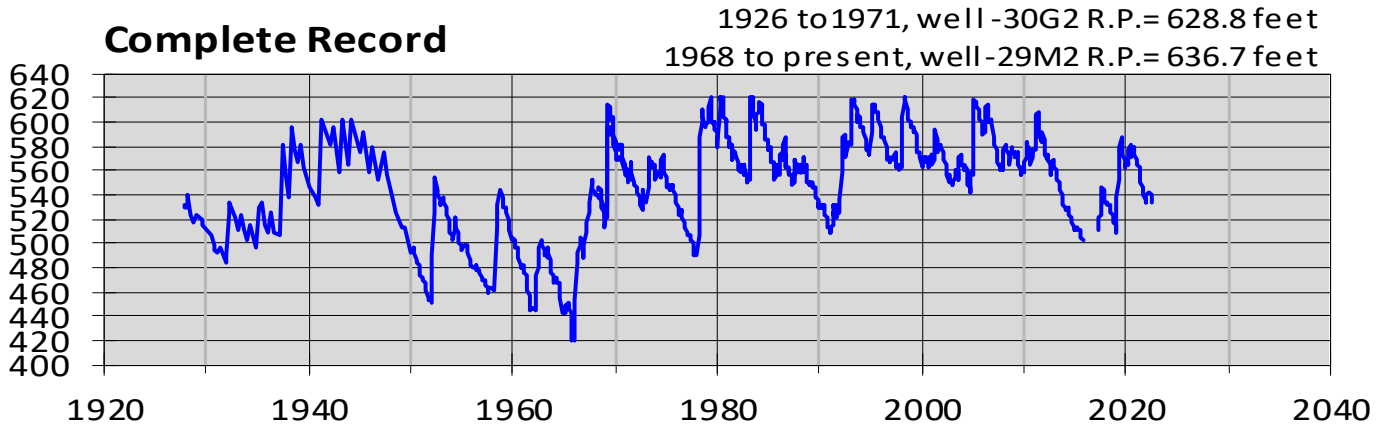
Continuous release of 7-20 cfs required to maintain habitat along lower Piru Creek

Recent Groundwater Levels in Piru, Fillmore, and Santa Paula Basins (March 2022)

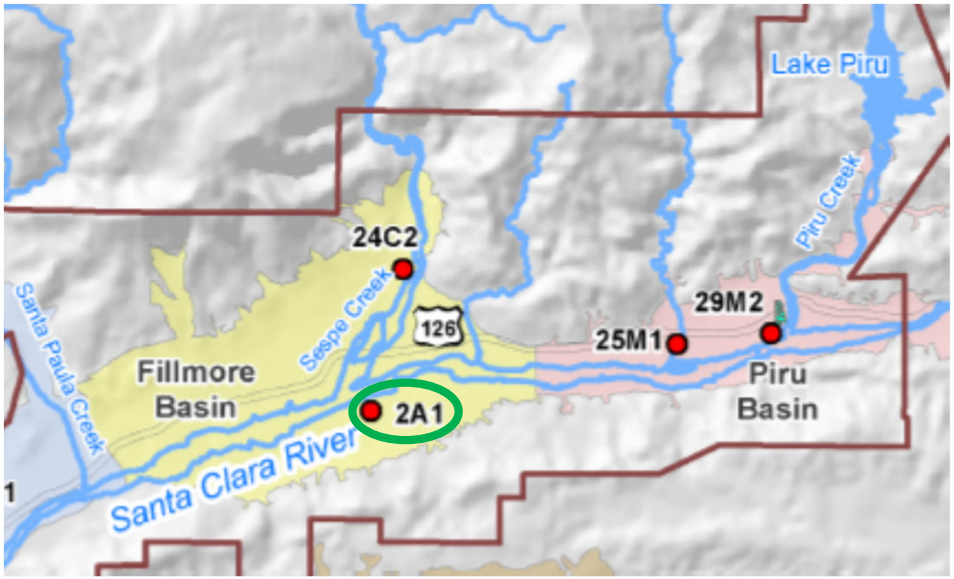


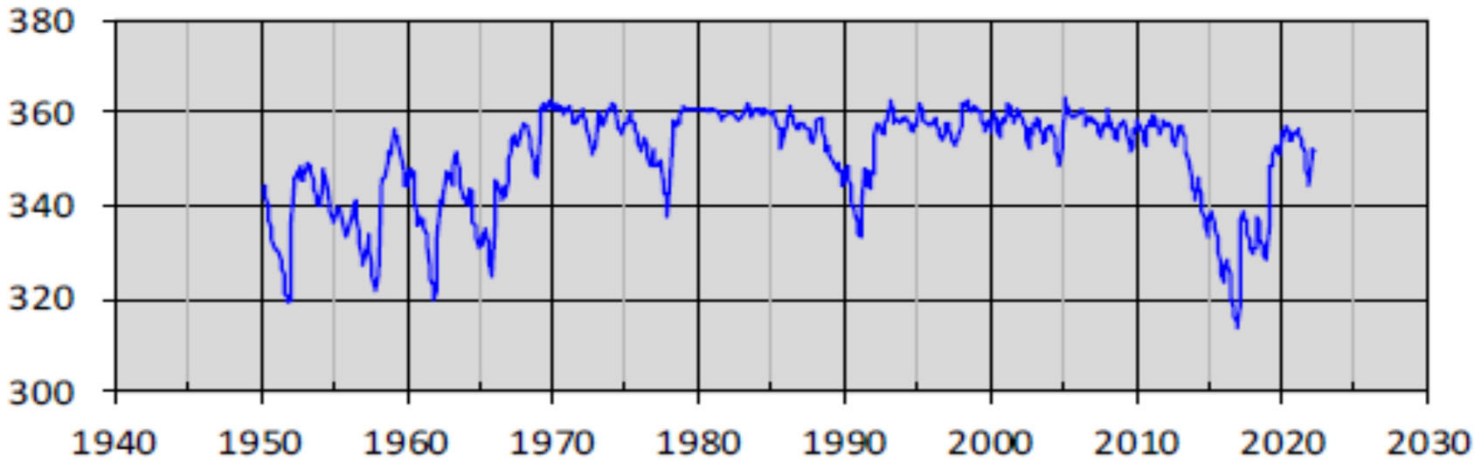
Groundwater Elevation Records – Piru Basin Key Well



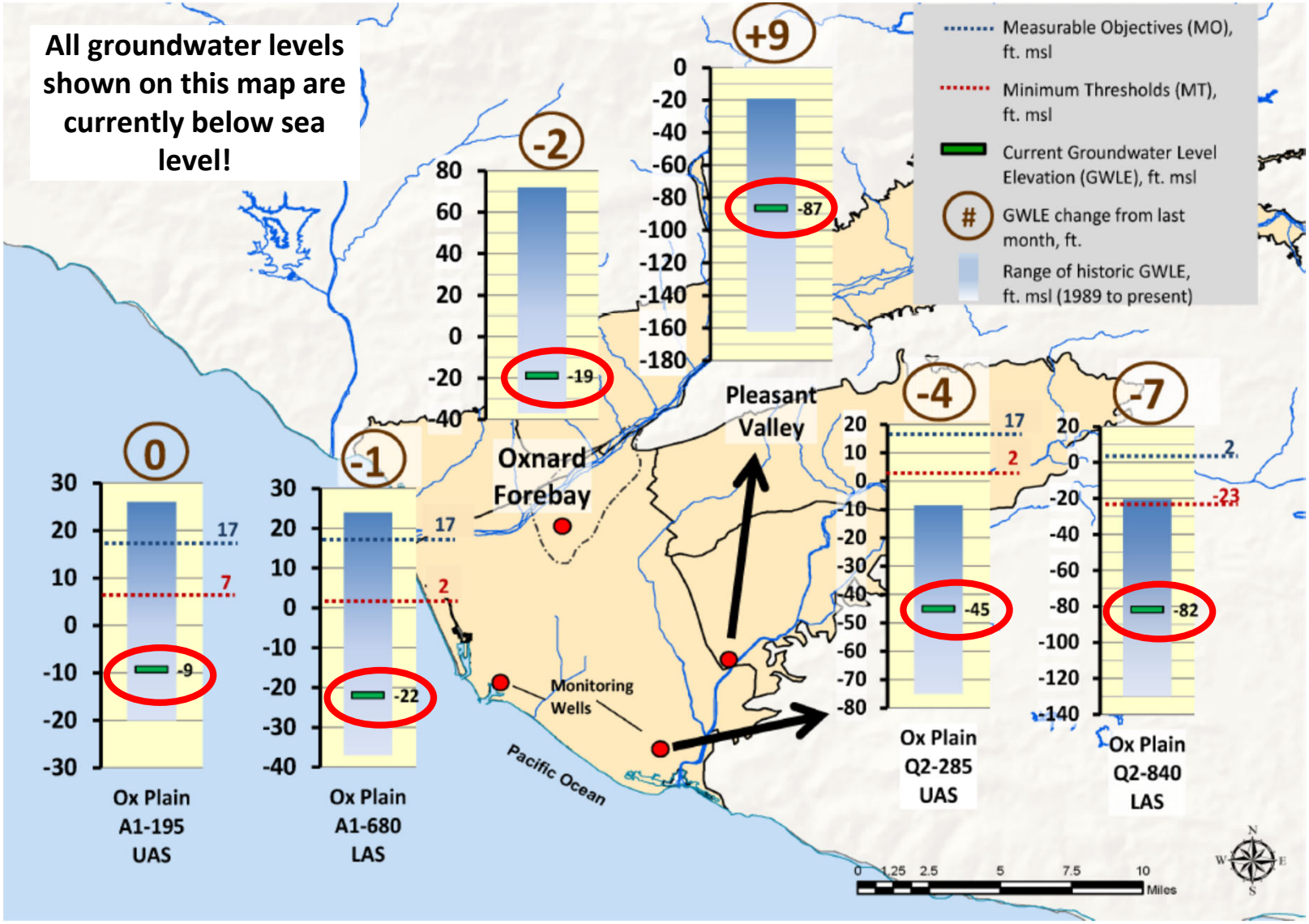


Groundwater Elevation History at Well 2A1, Fillmore Basin

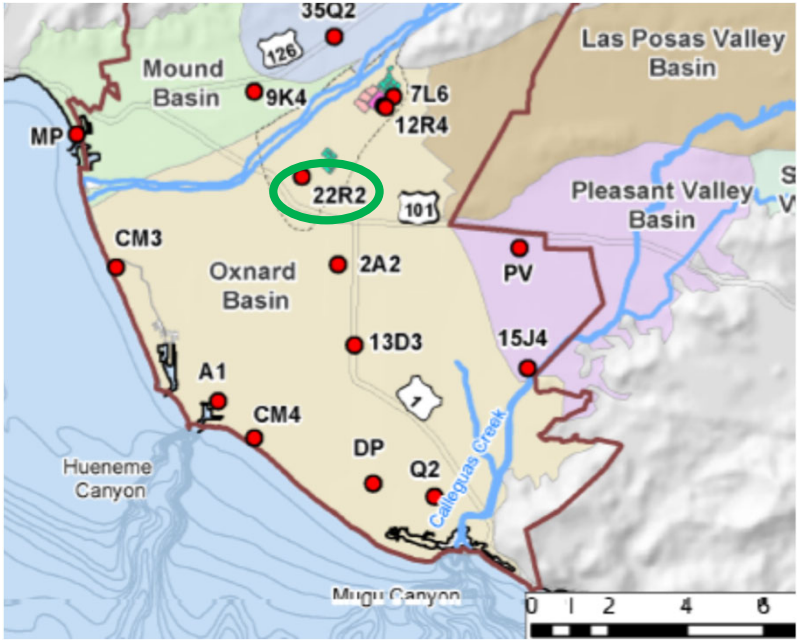


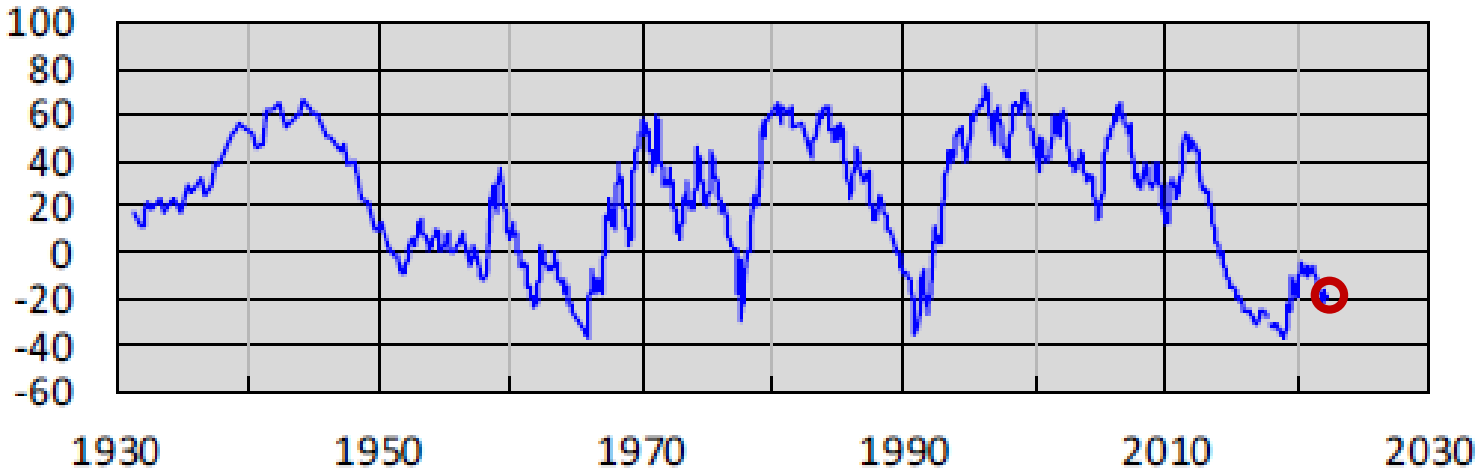


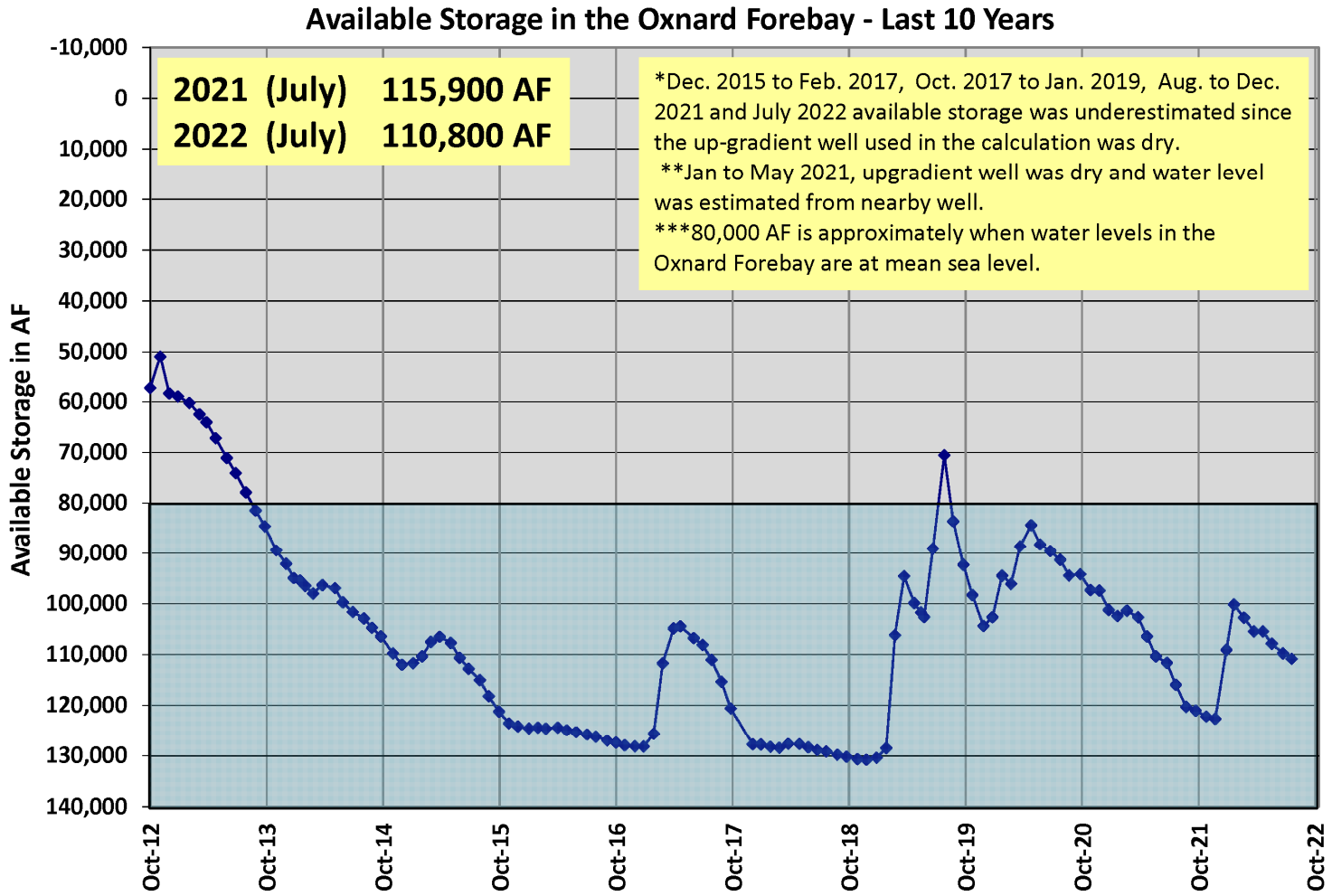
Recent Groundwater Levels in Oxnard and Pleasant Valley Basins (March 2022)



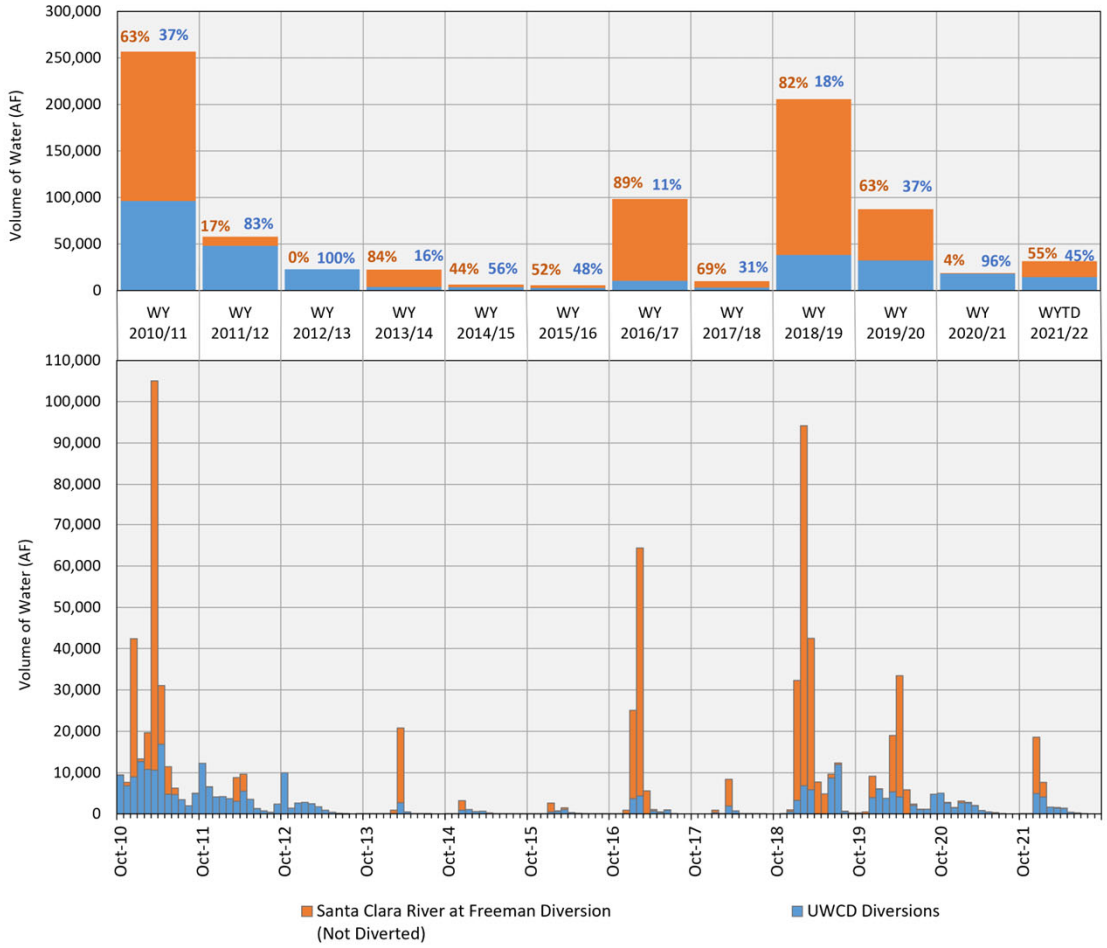
Groundwater Elevation History at Well 22R2, Key Well in Forebay Area of the Oxnard Basin






Available Storage in the Oxnard Forebay - Last 10 Years
2021 (July) 115,900 AF
2022 (July) 110,800 AF
*Dec. 2015 to Feb. 2017, Oct. 2017 to Jan. 2019, Aug. to Dec. 2021 and July 2022 available storage was underestimated since the up-gradient well used in the calculation was dry.
**Jan to May 2021, upgradient well was dry and water level was estimated from nearby well.
***80,000 AF is approximately when water levels in the Oxnard Forebay are at mean sea level.
Available Storage in AF
-10,000
0
10,000
20,000
30,000
40,000
50,000
60,000
70,000
80,000
90,000
100,000
110,000
120,000
130,000
140,000
Oct-12
Oct-13
Oct-14
Oct-15
Oct-16
Oct-17
Oct-18
Oct-19
Oct-20
Oct-21
Oct-22

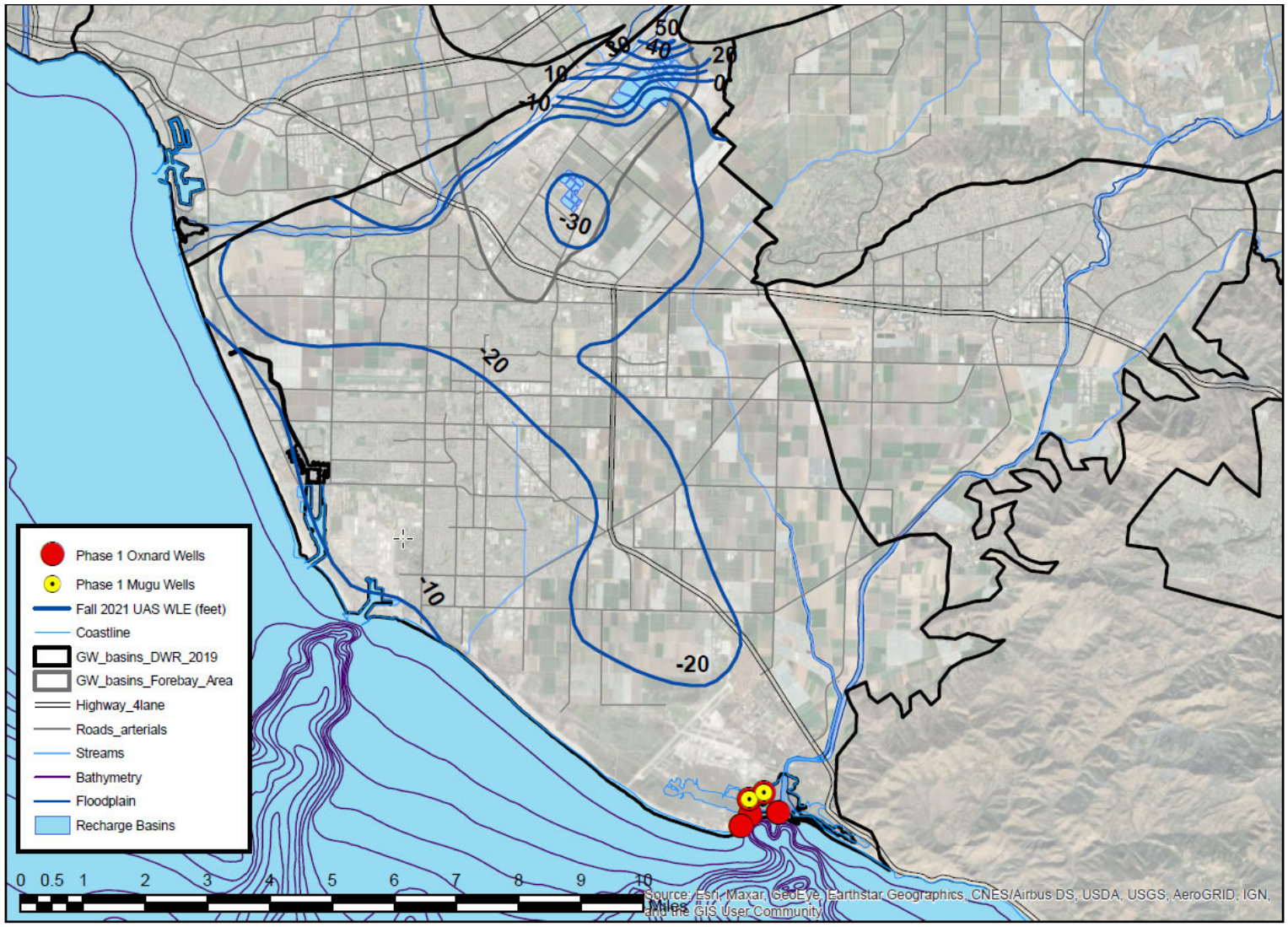
Freeman Diversion Records, Diverted and Bypassed Flows in Recent Years



Water Year (WY) = October 1 to September 30; WYTD = Water Year To Date

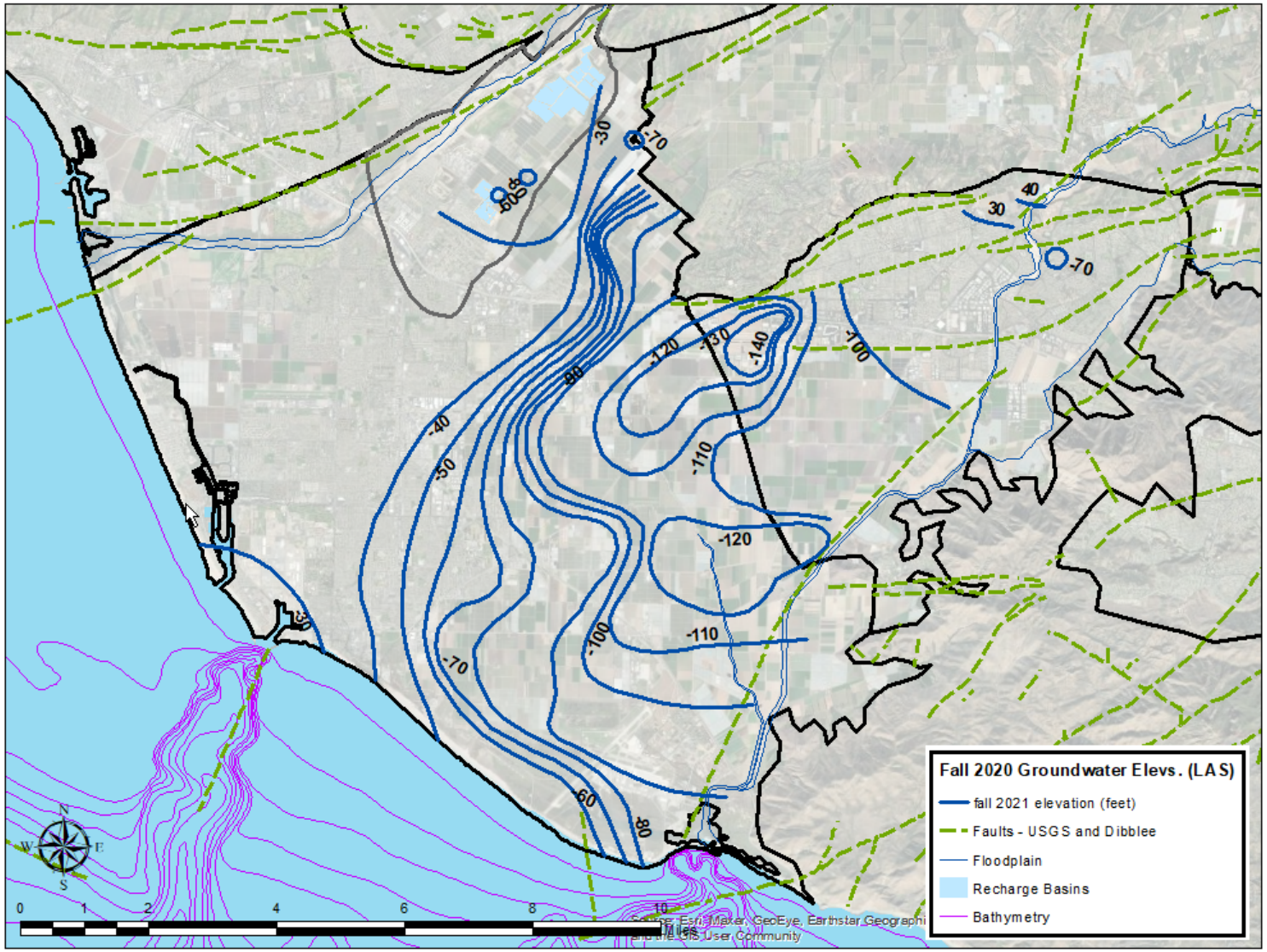
Fall 2021 groundwater elevations, Upper Aquifer System

Onshore gradients in all coastal areas



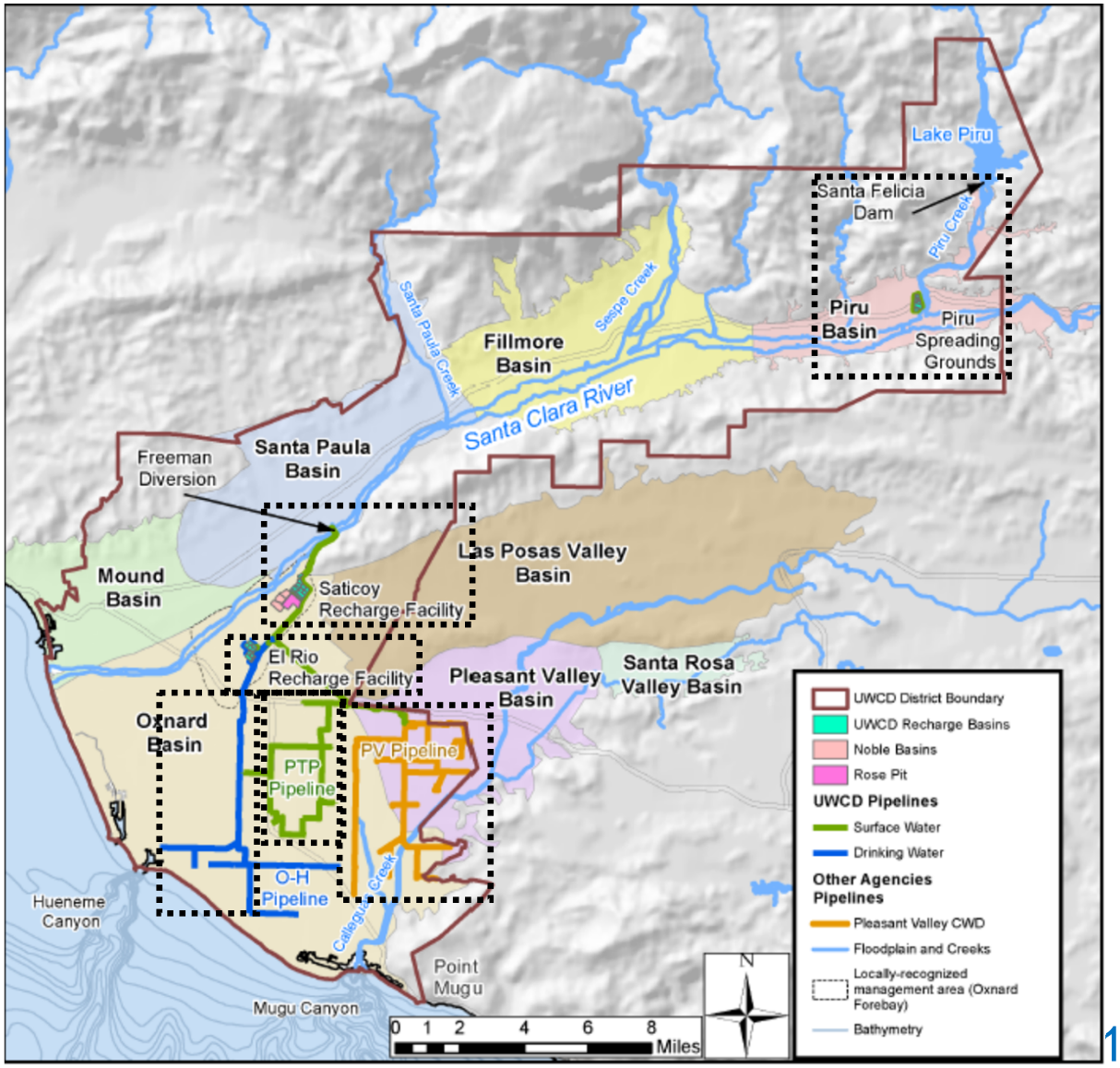
Fall 2021 groundwater elevations, Upper Aquifer System

Onshore gradients, and strong vertical gradients from UAS down to LAS

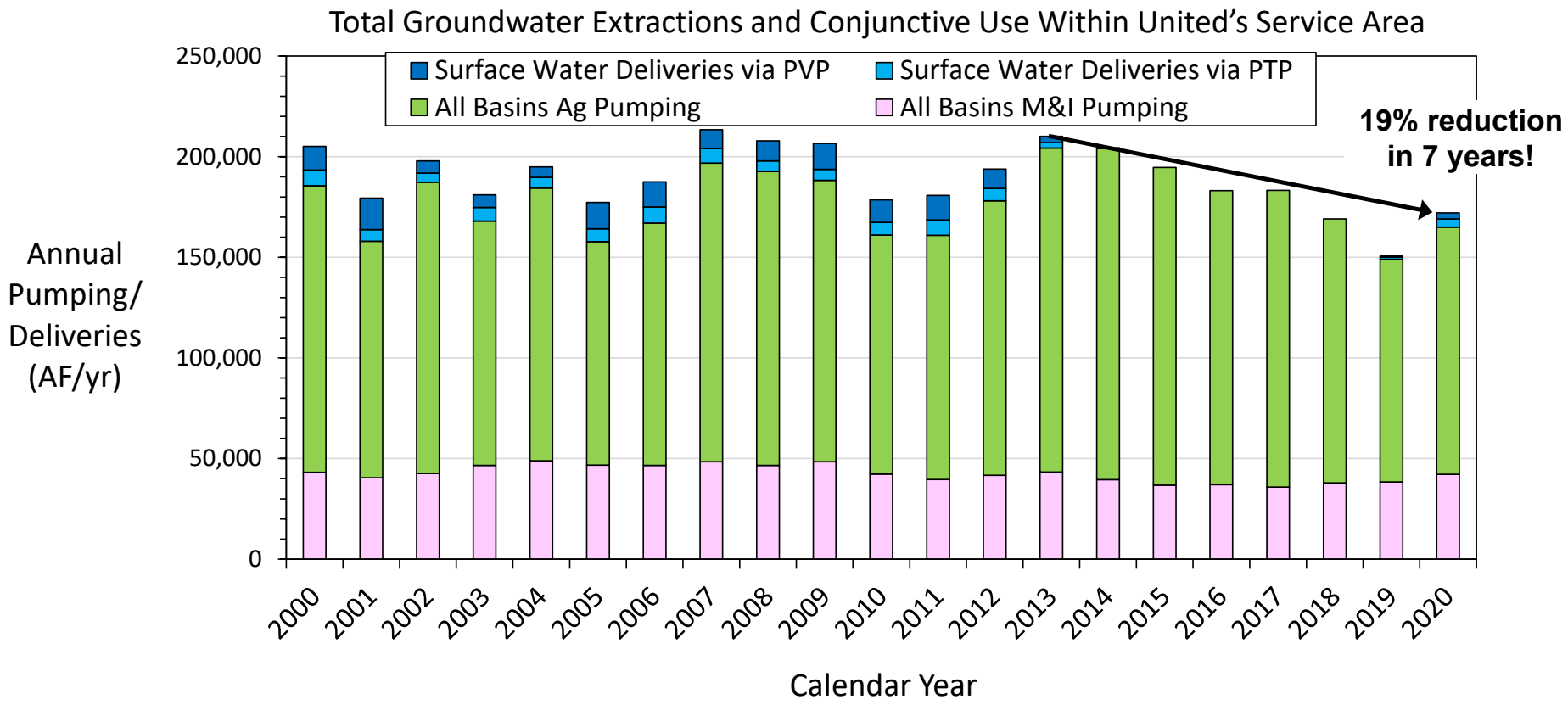


Past Water-Supply and Conjunctive Use Projects Have Played a Major Role

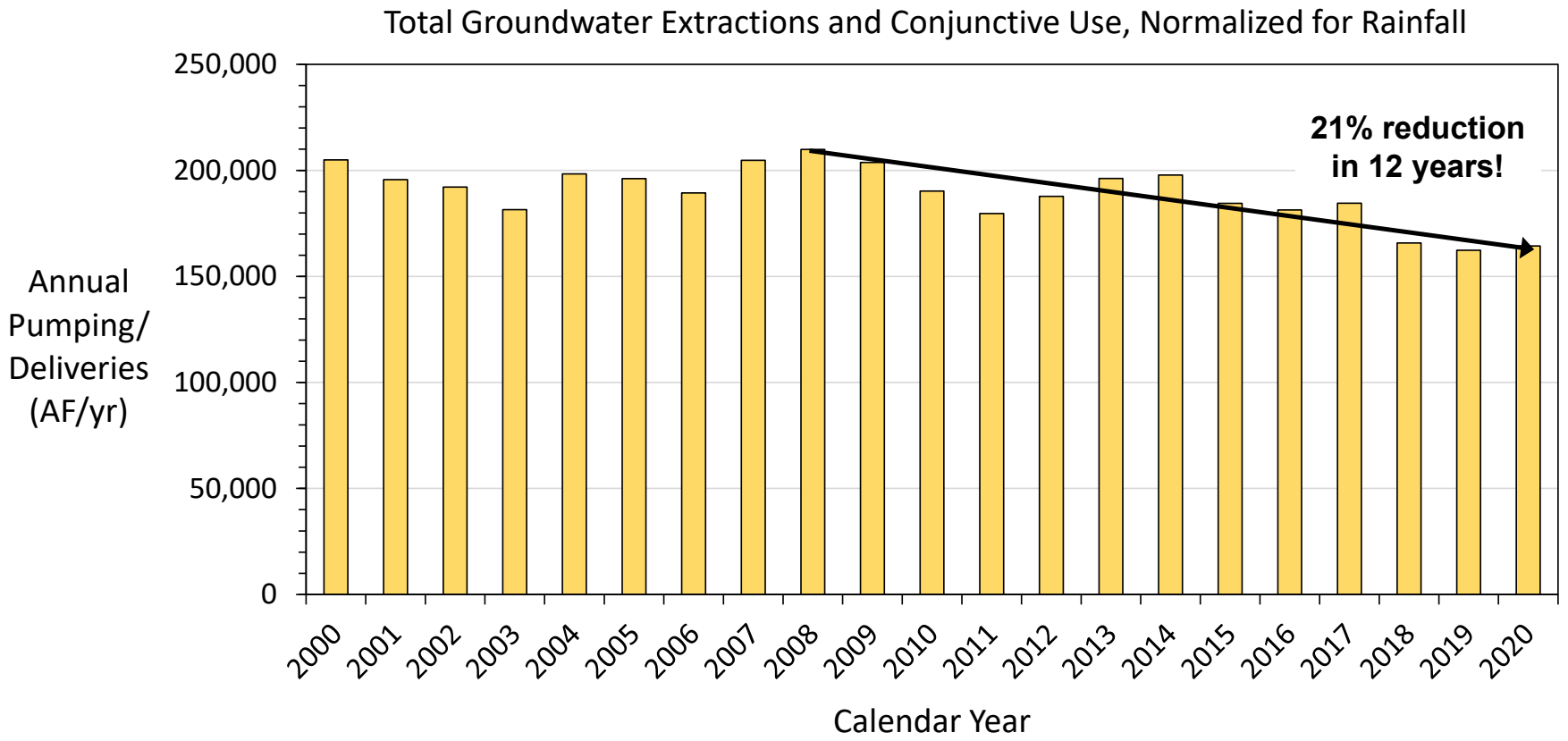
But they weren't quite enough to get us to a sustainable future.



Everyone Is Doing Their Part to Reduce Groundwater Use



The Trend is More Apparent if the "Noise" from Annual Rainfall is Removed



Sustainable Groundwater Management Act (2014)

- Required formation of Groundwater Sustainability Agencies
- Requires development of Groundwater Sustainability Plans for all basins

- Requires GSAs to define sustainability in terms of water levels, water in storage, water quality, seawater intrusion, land subsidence and surface water-groundwater interactions

- Requires plans to achieve basin sustainability within 20 years

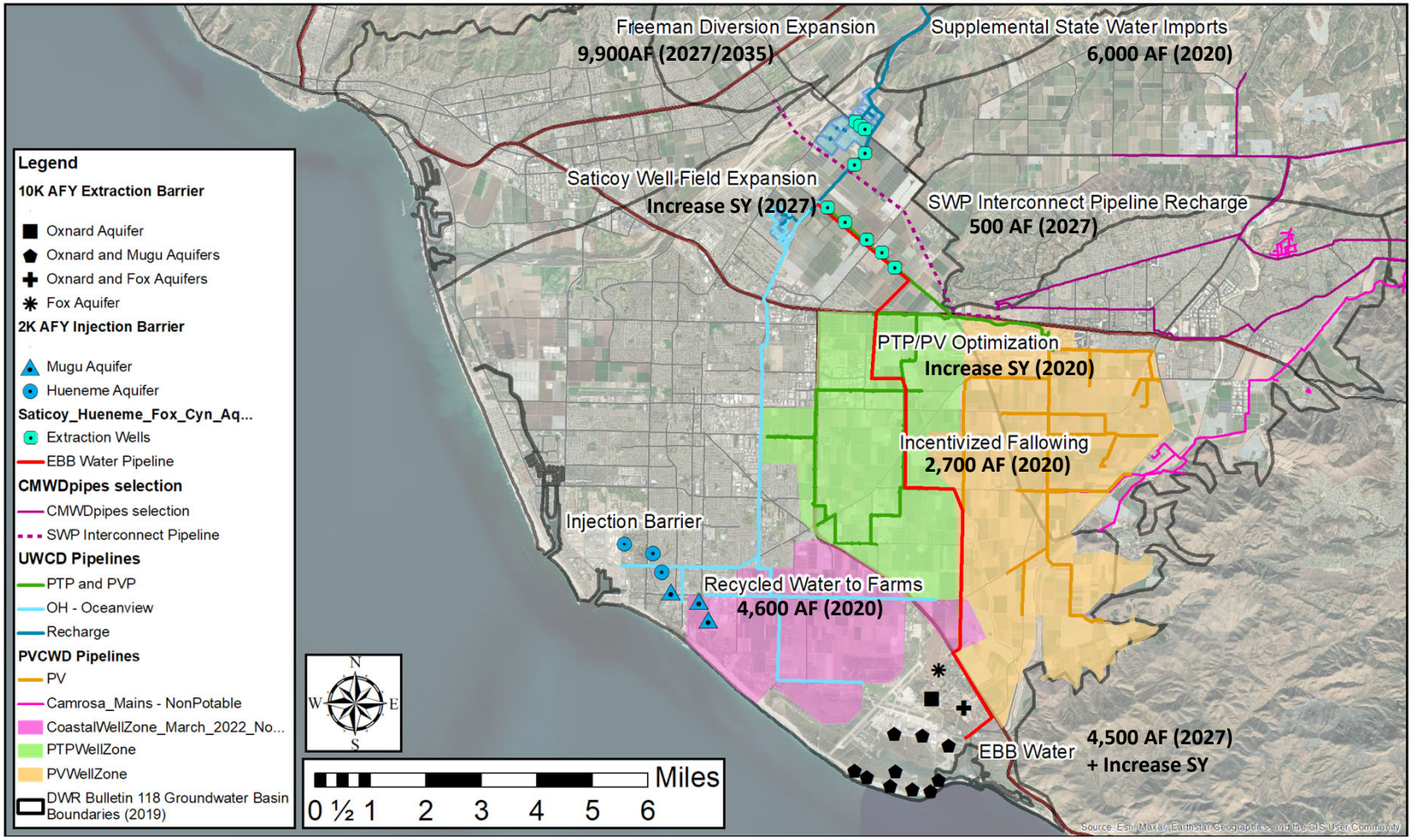
- Check websites of local GSAs for details

- New well permit applications are reviewed by GSAs

For Oxnard Plain To Thrive, We'll Need to Expand our Portfolio of Sustainable and Resilient Sources of Water

Project	Resilience (drought-proof)	Water Quality	Reduce GHGs	Benefit DACs	Preserve Farmland	Low Cost for Water
Purchase more SWP water	✓	✓		✓	✓	✓
Freeman Expansion		✓	✓	✓	✓	✓
Extraction Barrier and Brackish Treatment (product water + sustainable yield gain)	✓	✓		✓	✓	
Recycled Water	✓	✓			✓	
Conejo Creek and PV Private Reservoirs			✓		✓	✓
Combined Benefit	✓✓✓	✓✓✓✓	✓✓	✓✓✓	✓✓✓✓✓	✓✓✓

HYBRID SCENARIO PROJECTS:
EXTRACTION BARRIER + INCREASE SUPPLIES



EXAMPLE HYDROGRAPH, OXNARD AQUIFER

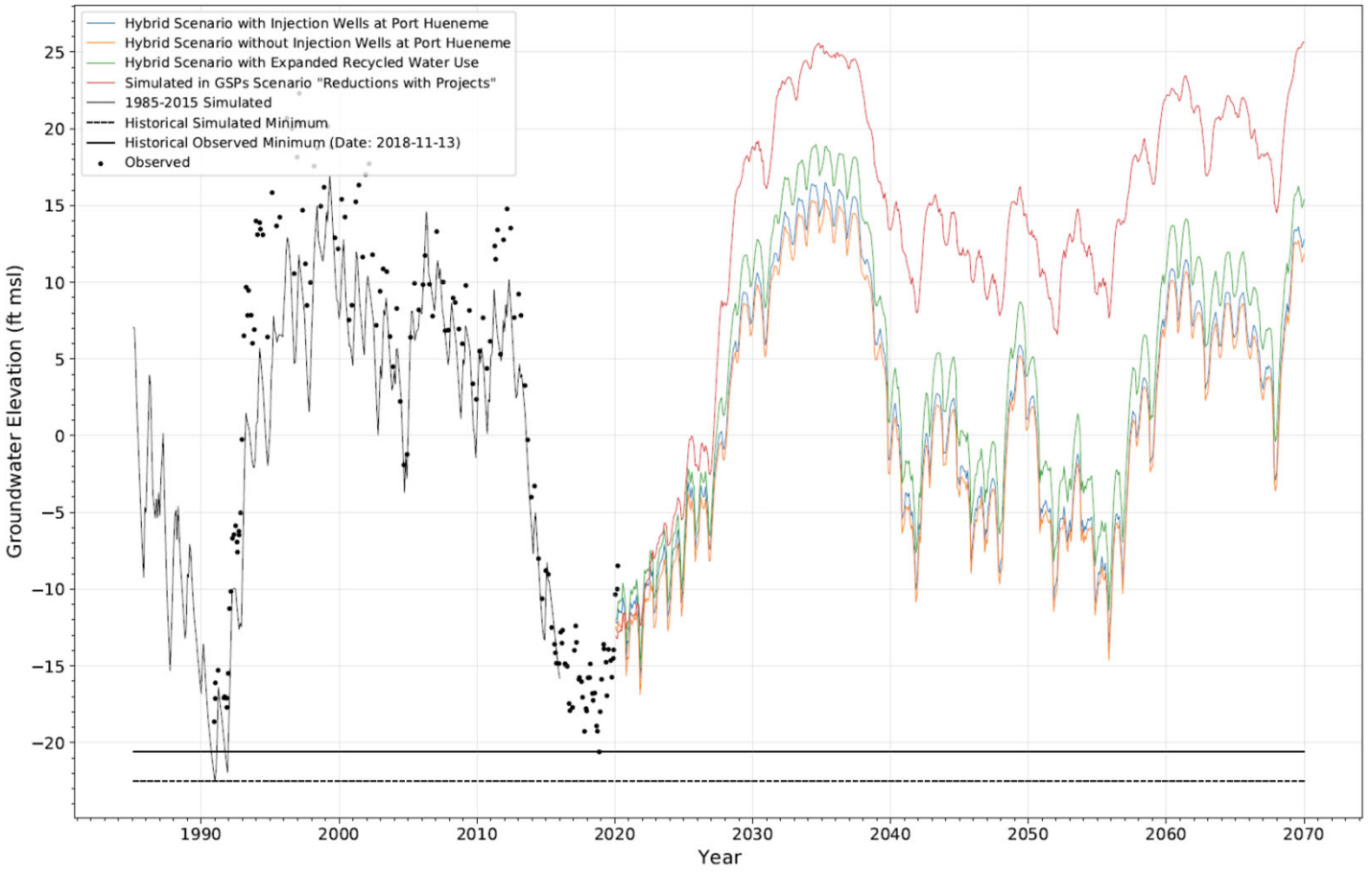
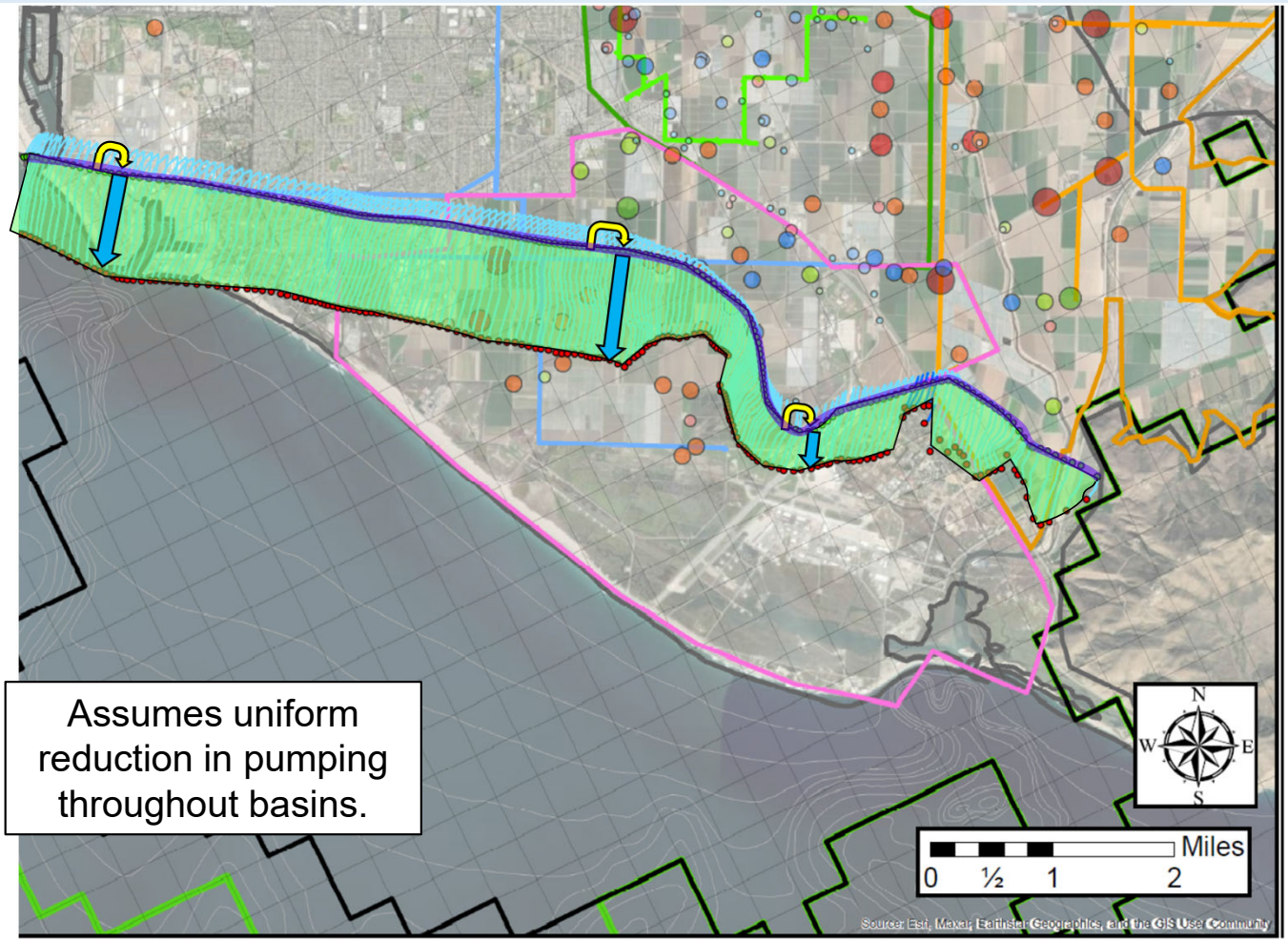


Figure B-5. Modeled and Measured Groundwater Elevations at Well 01N22W27C03S, Screened in Oxnard Aquifer

GSP "REDUCTION WITH PROJECTS" SCENARIO: OXNARD AQUIFER SEAWATER PARTICLE TRACKS



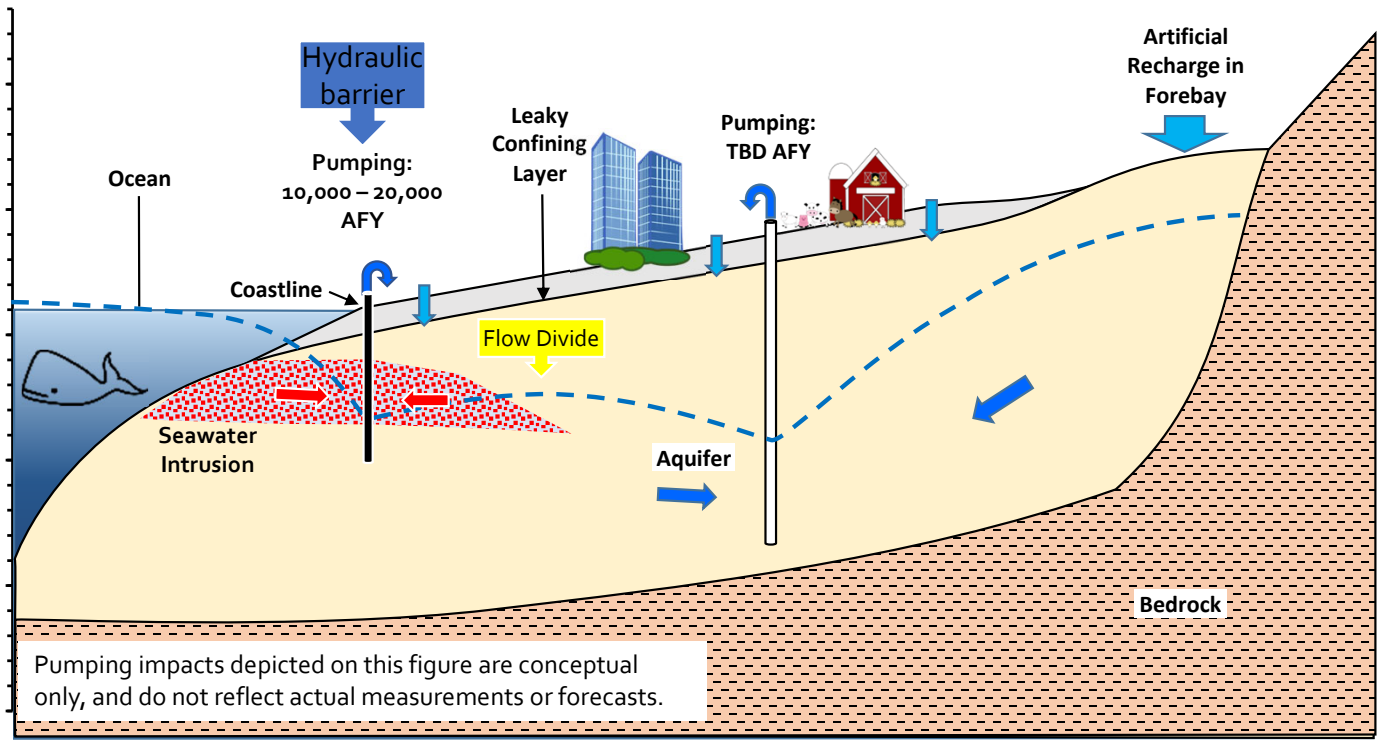
Pros:

- Over 50 years, seawater intrusion front in Oxnard Aquifer migrates south 0.5 to 0.8 miles

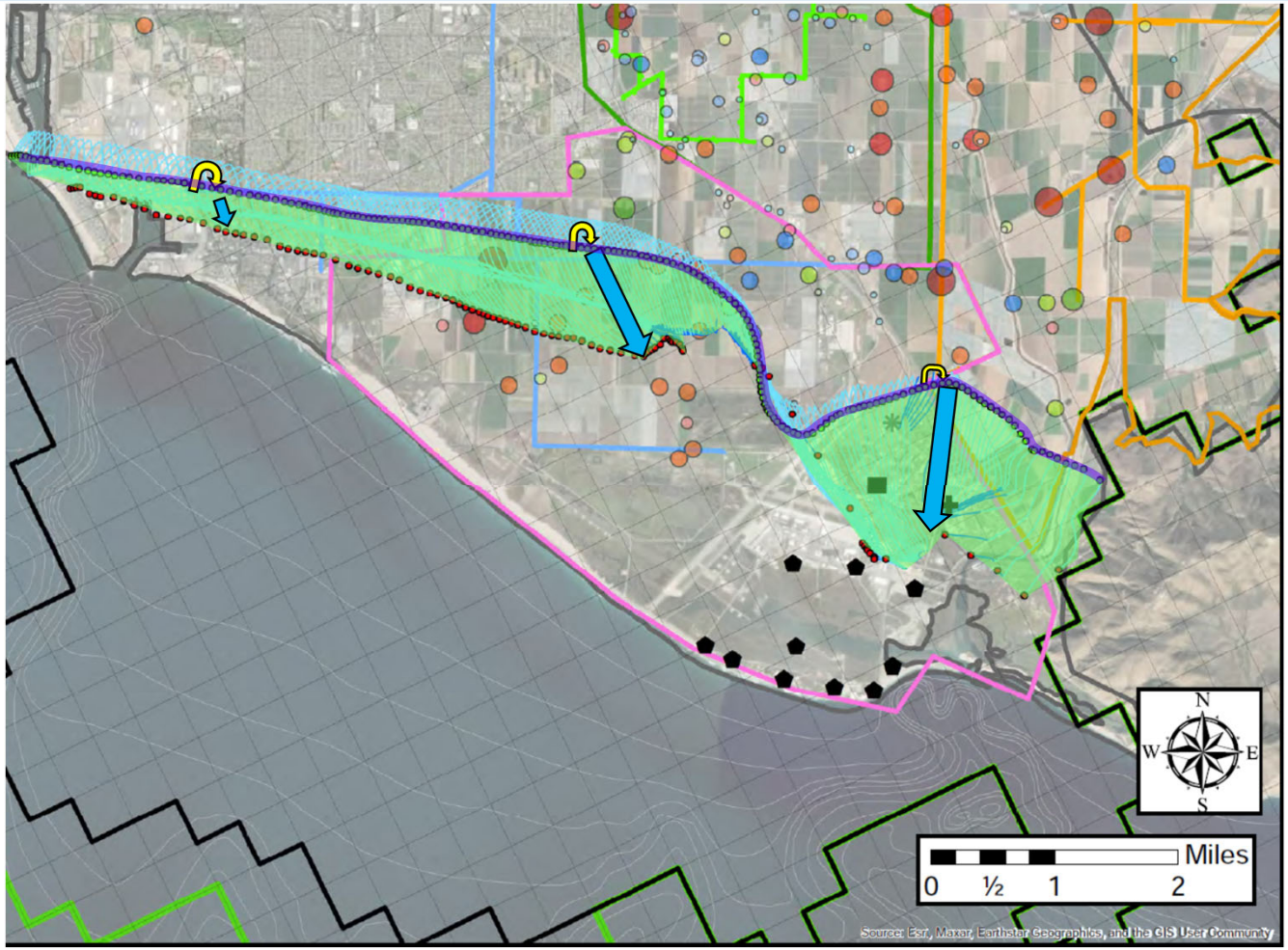
Cons:

- ~27,000 AFY less local water supplies available to Ag + M&I
- 3,300 AFY discharge from Upper Aquifer System (UAS) to Pacific Ocean
- 1,500 AFY seawater intrusion continues in Lower Aquifer System (LAS)
- Elimination of seawater intrusion in LAS requires further cutbacks, more discharge to Pacific Ocean

Extraction Barrier Concept



HYBRID SCENARIO : OXNARD AQUIFER SEAWATER PARTICLE TRACKS



Pros:

- **No reduction in total supply (compared to 2017-21 averages) except incentivized fallowing**
- **Provides new high-quality, sources of water (some are "drought-proof")**
- Over 50 years, pulls seawater intrusion in Oxnard Aquifer back south 0.5 to 1.5 miles
- No discharge from UAS to Pacific Ocean southeast from Channel Islands Harbor

Cons:

- None

Extraction Barrier and Brackish Water Treatment Project (Phase 1B)

- Up to 7 extraction wells – 3,500 AFY (2,170 gpm, 3.1 mgd).
  - Oxnard Aquifer – 5 wells
  - Mugu Aquifer – 2 wells
- 7,200 LF of extraction well manifold pipelines
- Up to 18 new monitoring well completions (6 clusters)
- Groundwater Discharge:
  - 2,500 LF of diffuser pipeline into Mugu Lagoon (preferred)
  - Alternative: direct discharge to Pacific Ocean
  - Alternative: ocean discharge via Calleguas Salinity Management Pipeline

EBB Water Phase 1B

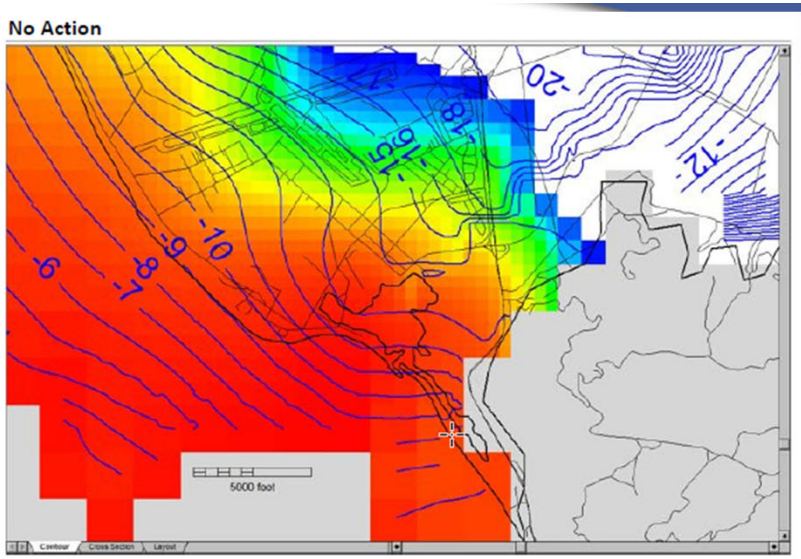
United is coordinating with U.S. Navy to develop this project

Have applied for Prop 1 Round 3 implementation grant

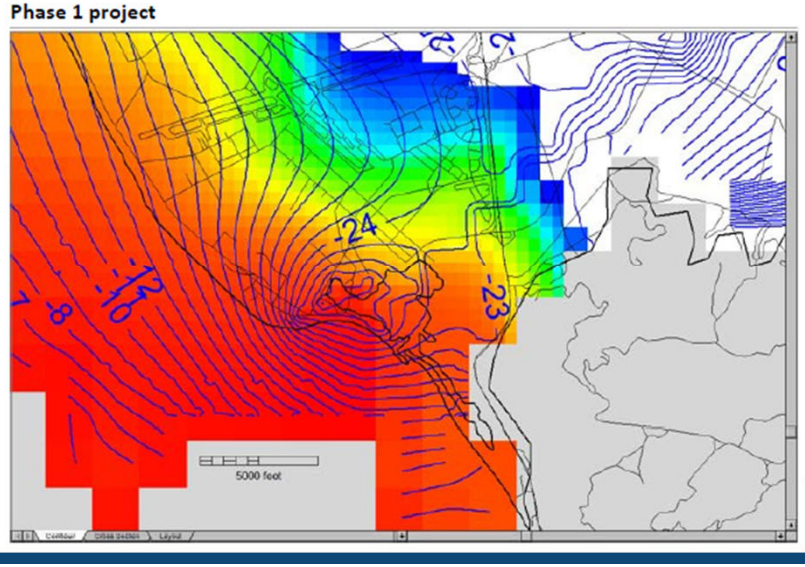
Oxnard Aquifer
2,500 AFY Pumping

Phase 1 EBB Water extraction wells radius of influence on groundwater elevations, and chloride concentrations after 5 years of project operation.

No Action



Phase 1 project



Thank you!

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