

TODAY'S ACTION

Consider Receiving
the 2016, 2017, and 2018
Groundwater Extraction Summary Reports



Committee Action/Financial Impact

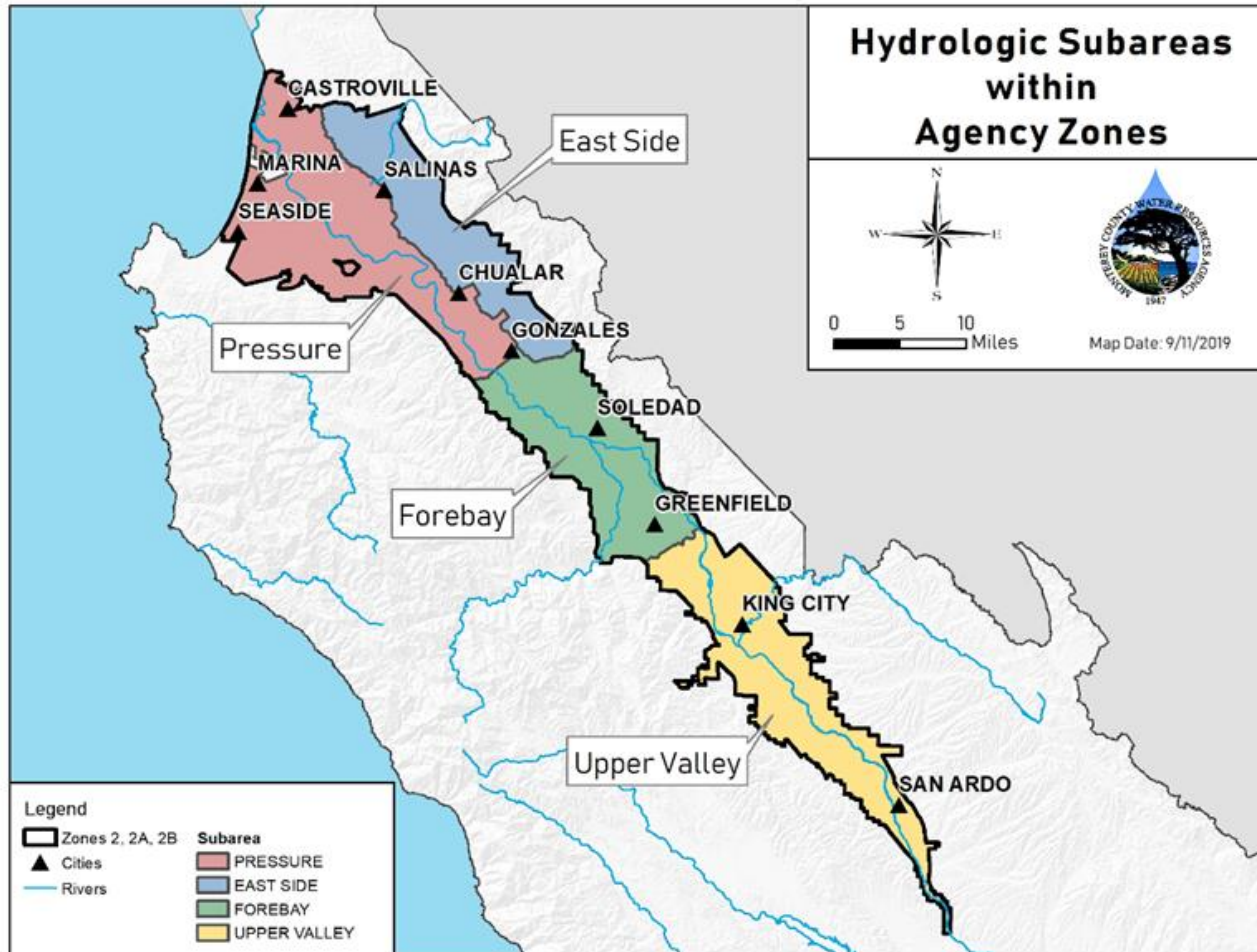
- This item was presented to the Basin Management Advisory Committee (BMAC) on January 8, 2020 and to the Agency's BOD on January 21, 2020.
- No Financial Impact for Receiving These Reports. Activities Associates with Completing These Reports and Funded through Fund 116.



Program Data Uses

- Groundwater Level Contour Maps
- Seawater Intrusion Maps
- Model Development (Historical and Current)
- Well Permit Application Review
- Ord. 5302/5303 Required Evaluation of Replacement Wells
- Deep Aquifers Pumping Data – Updated Well Permit Application Activities monthly report (BOD Packets)
- Refining and Understanding Salinas River Operations
- Ongoing Conceptual Understanding of the Hydrogeologic System of the Salinas Valley Basin
- Support of Local GSAs and their GSPs

Program Area & Background



- Long Term Program ~ Began in 1993
- Ordinance Driven
- Zone 2, 2A, 2B Boundaries



Components of the GEMS Program

1. Well Extraction Reporting
2. Conservation Practices Reporting
3. Water & Land Use Reporting



2016-2018 Total Annual Extractions

- **2016**

- 96% Wells Reported (of 1,908)

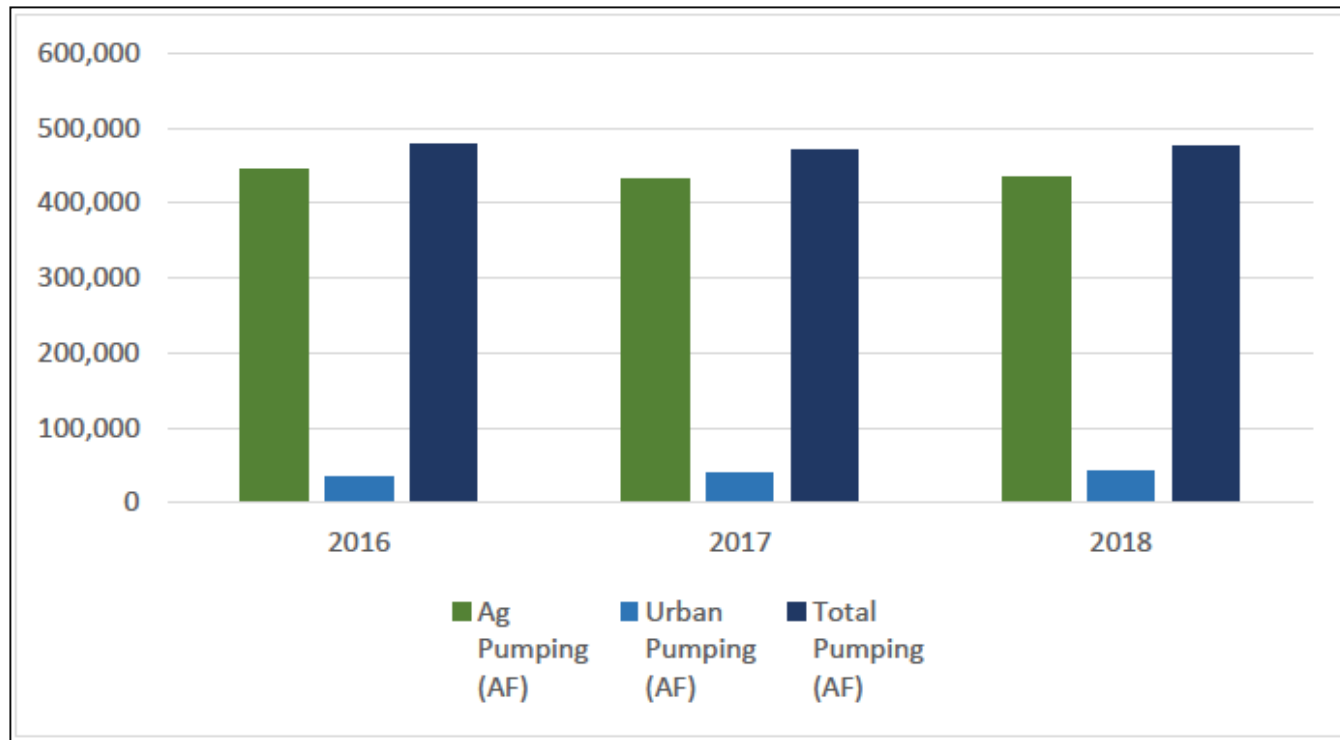
- **2017**

- 95% Wells Reported (of 1,913)

- **2018**

- 94% Wells Reported (of 1,931)

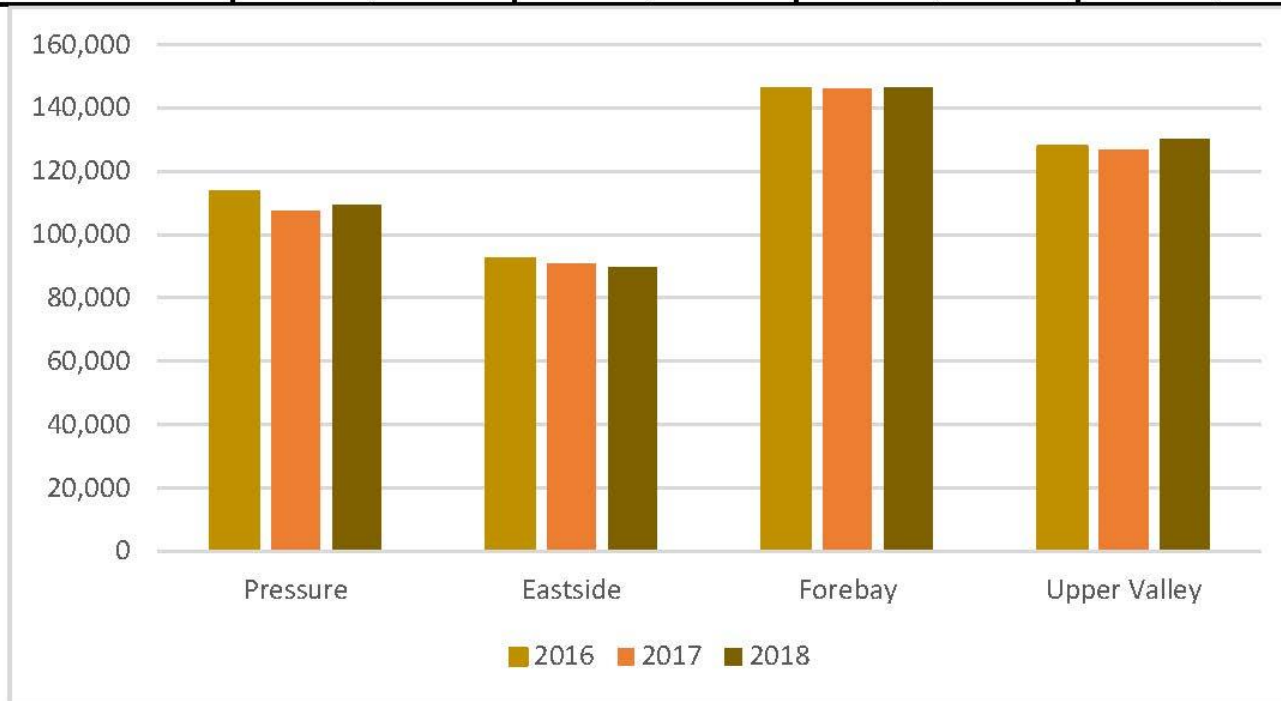
2016-2018 Total Annual Extractions



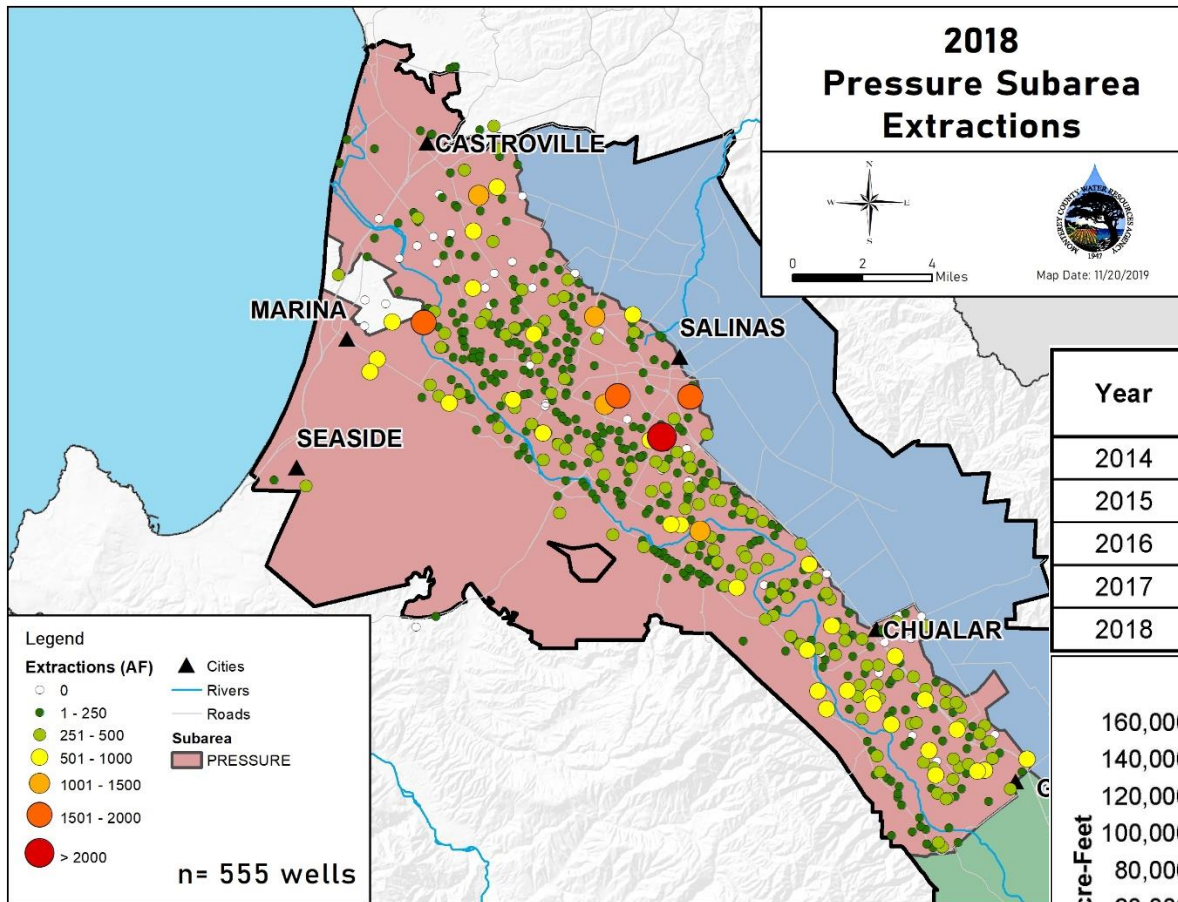
Extraction Year	Ag Pumping (AF)	Urban Pumping (AF)	Total Pumping (AF)
2016	445,110	34,264	479,374
2017	432,059	38,952	471,011
2018	433,396	41,905	475,301

2016-2018 Extractions by Subarea

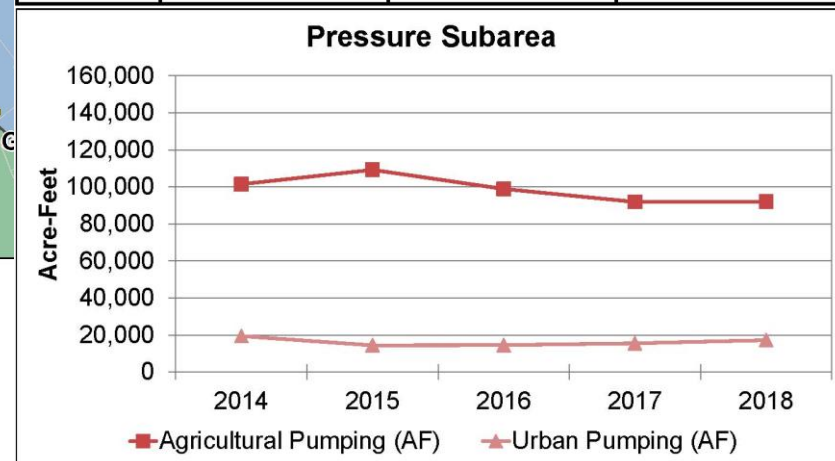
Extraction Year	Pressure	Eastside	Forebay	Upper Valley
2016	113,495	92,181	146,029	127,669
2017	107,424	90,611	146,123	126,853
2018	109,256	89,567	146,141	130,337



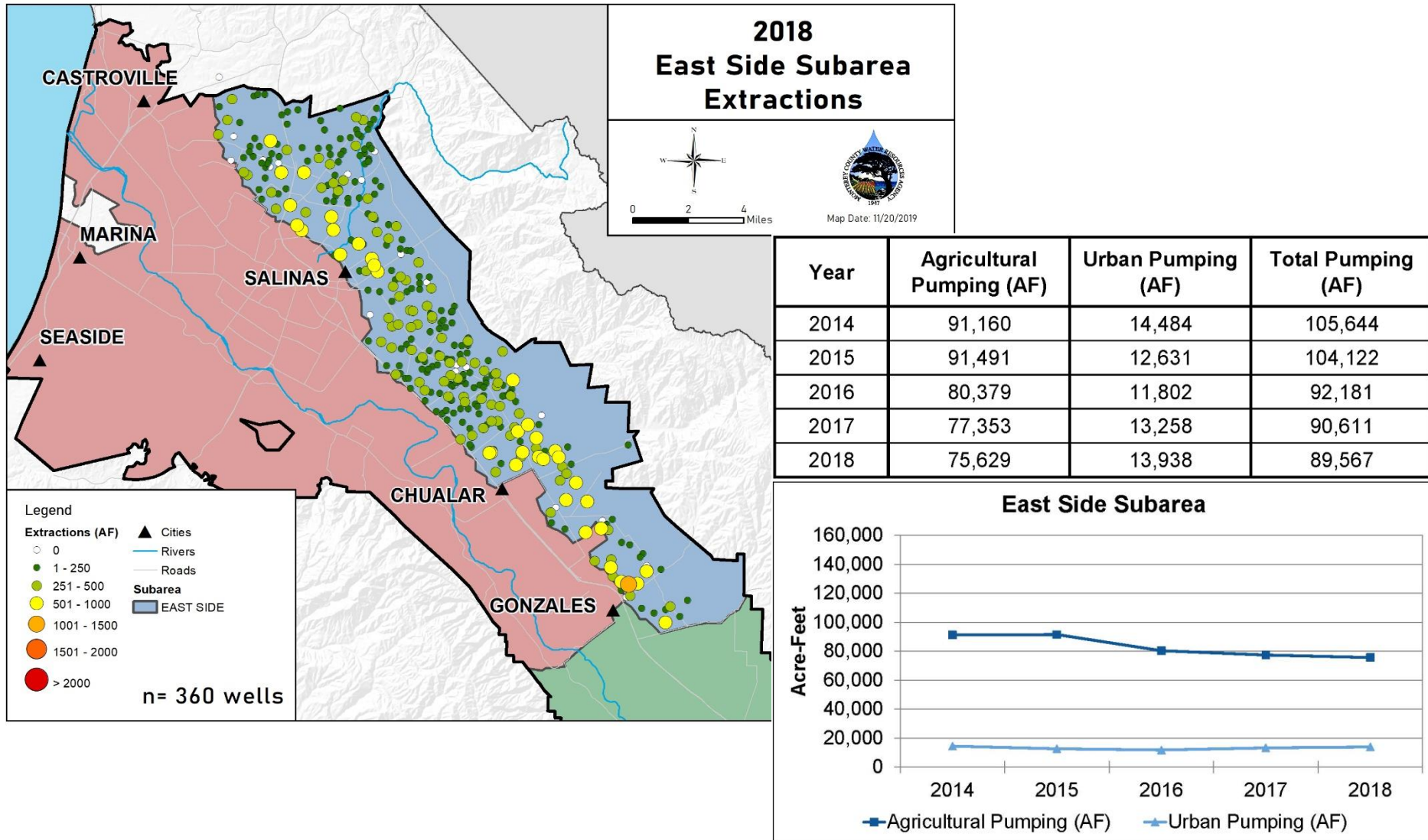
Total Extractions - Pressure



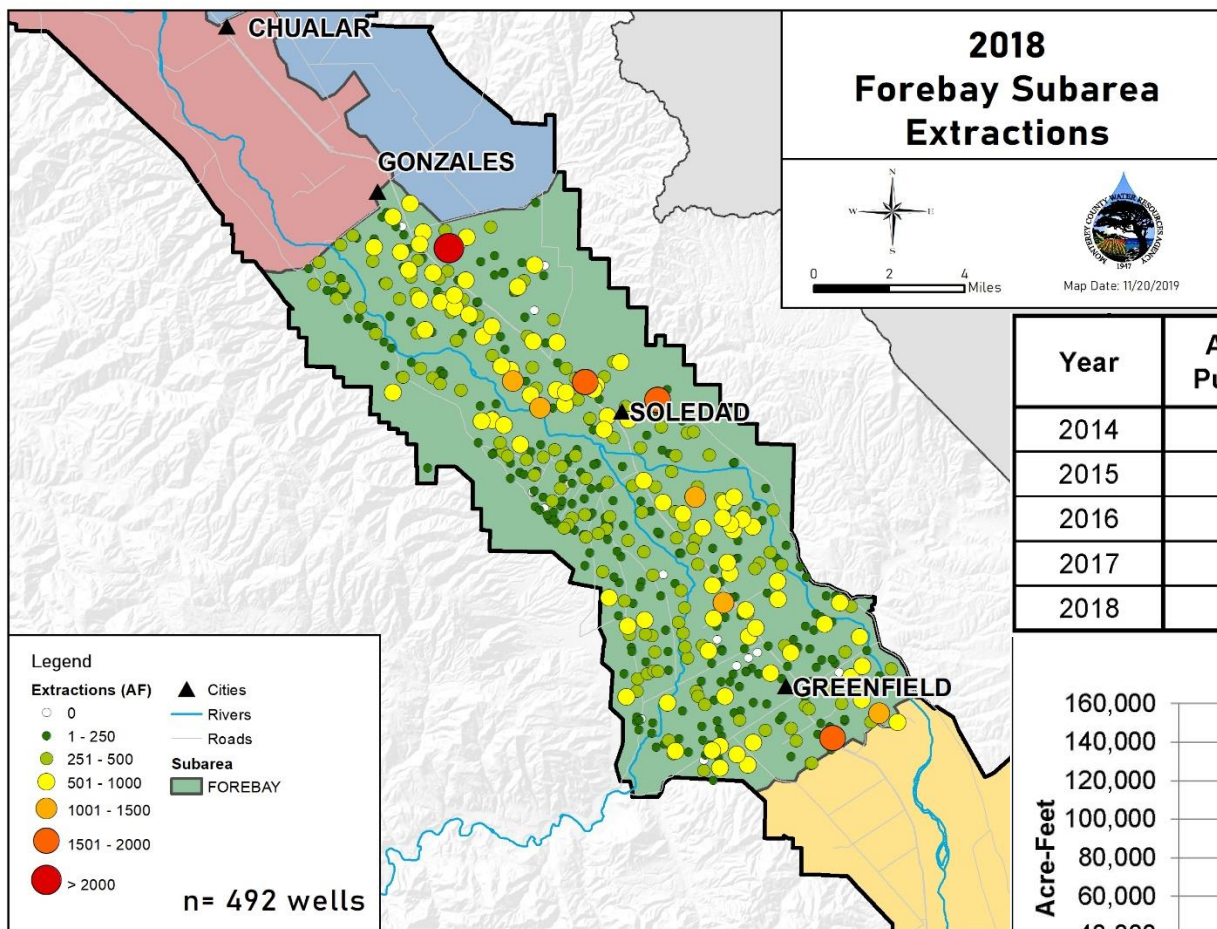
Year	Agricultural Pumping (AF)	Urban Pumping (AF)	Total Pumping (AF)
2014	101,465	19,425	120,890
2015	109,214	14,443	123,657
2016	98,890	14,605	113,495
2017	91,901	15,523	107,424
2018	92,010	17,246	109,256



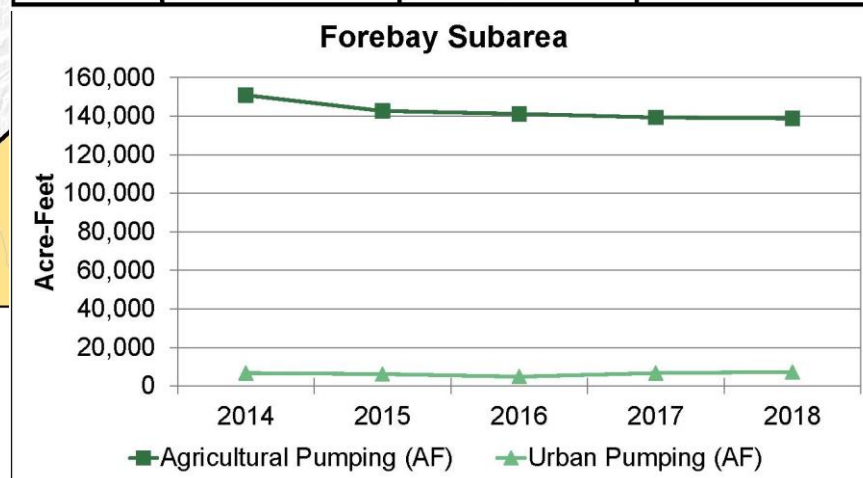
Total Extractions – East Side



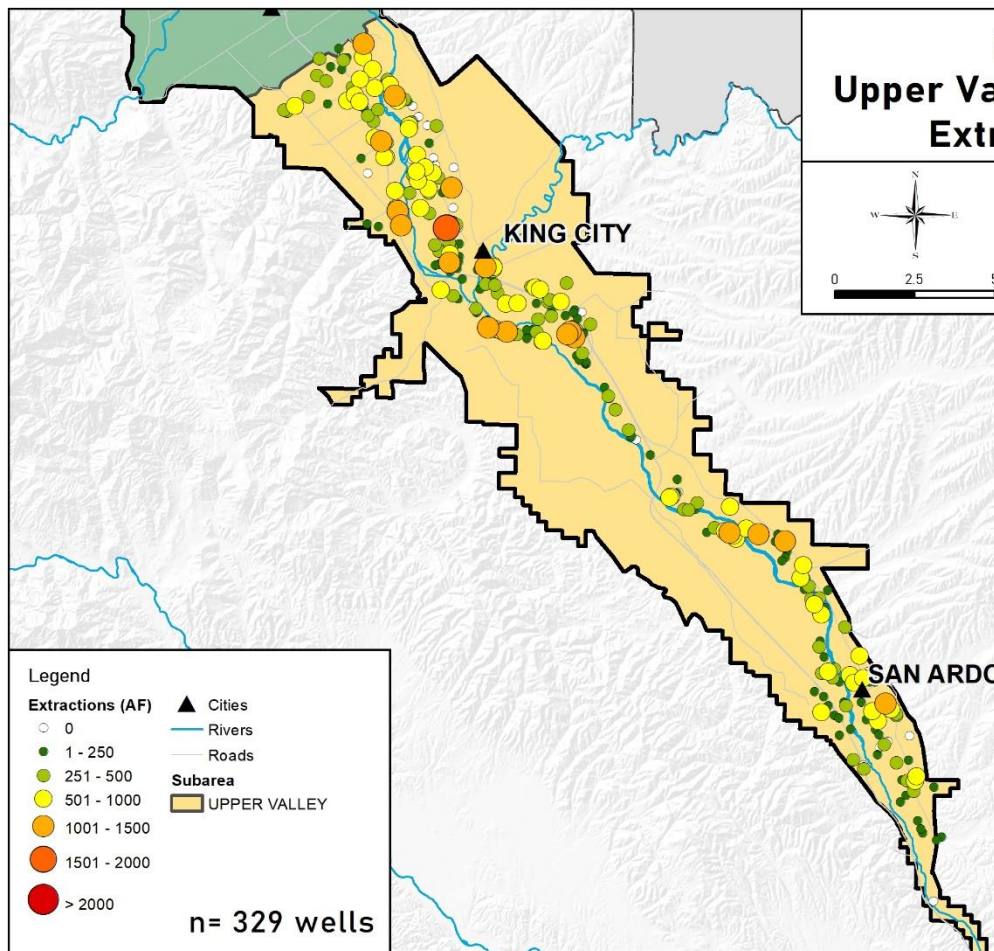
Total Extractions - Forebay



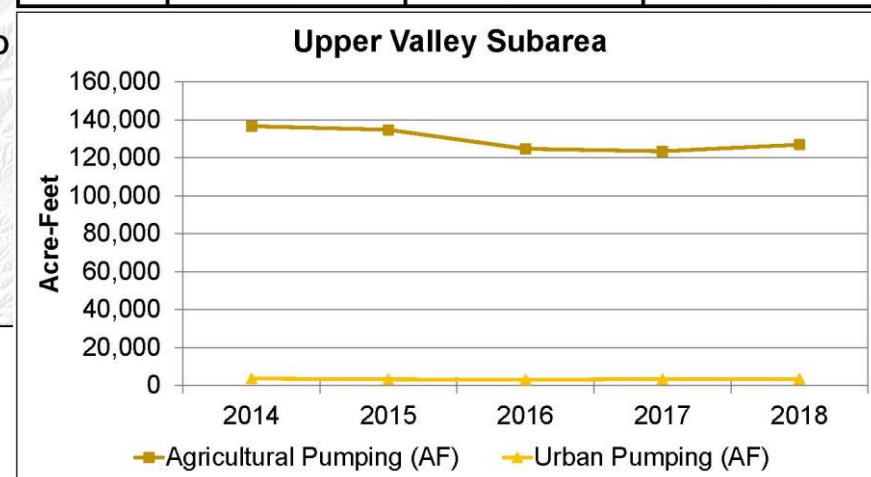
Year	Agricultural Pumping (AF)	Urban Pumping (AF)	Total Pumping (AF)
2014	150,890	6,745	157,635
2015	142,668	6,221	148,889
2016	141,163	4,866	146,029
2017	139,359	6,764	146,123
2018	138,838	7,303	146,141



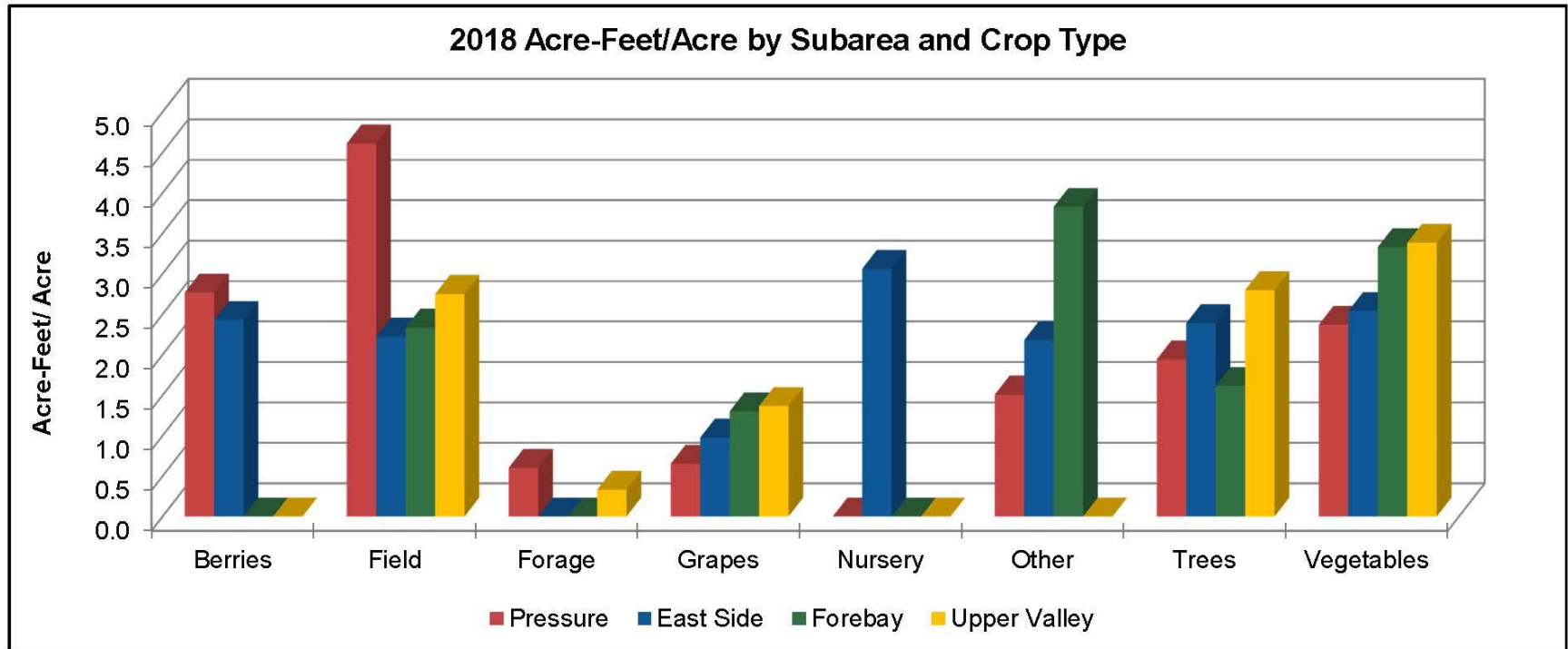
Total Extractions – Upper Valley



Year	Agricultural Pumping (AF)	Urban Pumping (AF)	Total Pumping (AF)
2014	136,645	3,673	140,318
2015	134,740	3,306	138,046
2016	124,678	2,991	127,669
2017	123,446	3,407	126,853
2018	126,919	3,418	130,337



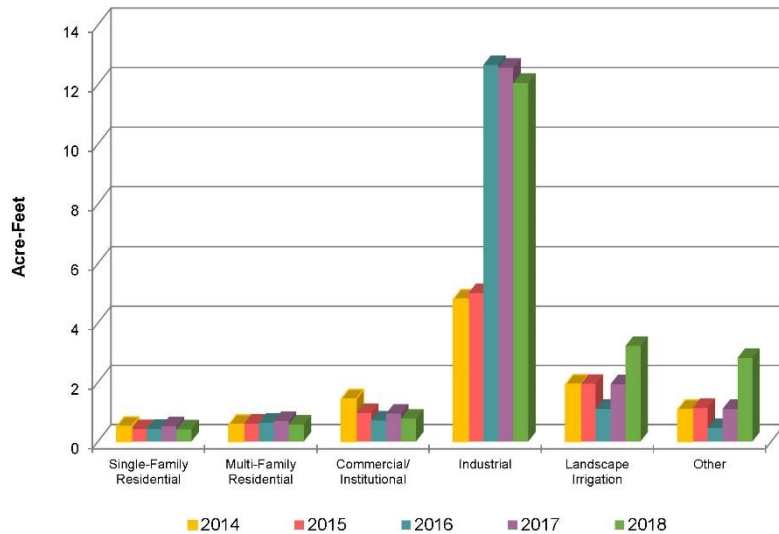
Acre-Feet/Acre Use by Subarea



2018	Berries (AF/Acre)	Field (AF/Acre)	Forage (AF/Acre)	Grapes (AF/Acre)	Nursery (AF/Acre)	Other (AF/Acre)	Trees (AF/Acre)	Vegetables (AF/Acre)
Pressure	2.8	4.6	0.6	0.7	-	1.5	1.9	2.4
East Side	2.4	2.2	-	1.0	3.1	2.2	2.4	2.5
Forebay	-	2.3	-	1.3	-	3.8	1.6	3.3
Upper Valley	-	2.7	0.3	1.4	-	-	2.8	3.4

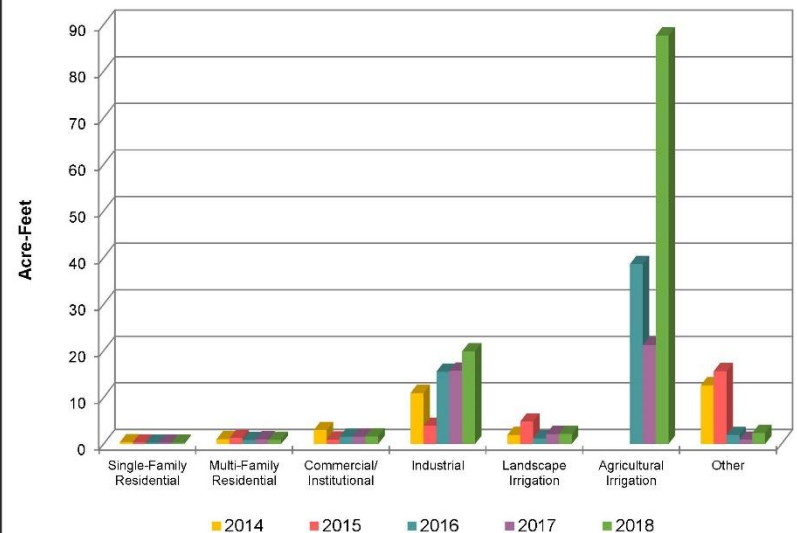
Urban Water Use

Small Water Systems- Water Use per Connection (AF)



Small Water Systems: Water Use (AF) Per Connection Class	2014	2015	2016	2017	2018
Single-Family Residential	0.504	0.416	0.426	0.516	0.411
Multi-Family Residential	0.573	0.603	0.640	0.689	0.567
Commercial/ Institutional	1.429	0.963	0.709	0.940	0.769
Industrial	4.795	5.001	12.652	12.562	12.055
Landscape Irrigation	1.927	1.945	1.100	1.934	3.220
Other	1.077	1.130	0.454	1.098	2.819

Large Water Systems- Water Use per Connection (AF)



Large Water Systems: Water Use (AF) Per Connection Class	2014	2015	2016	2017	2018
Single-Family Residential	0.372	0.314	0.274	0.292	0.282
Multi-Family Residential	1.025	1.296	0.858	1.026	0.892
Commercial/ Institutional	2.997	0.965	1.579	1.583	1.635
Industrial	10.928	3.910	15.491	15.718	19.879
Landscape Irrigation	1.956	4.828	1.195	2.138	2.157
Agricultural Irrigation	-	-	38.649	21.223	87.650
Other	12.574	15.591	1.918	0.934	2.382



TODAY'S ACTION

Receive the
2016, 2017, and 2018
Groundwater Extraction Summary Reports





TODAY'S ACTION

Consider Receiving 2019
Groundwater Level Contours and
500 mg/L Chloride Contour Maps

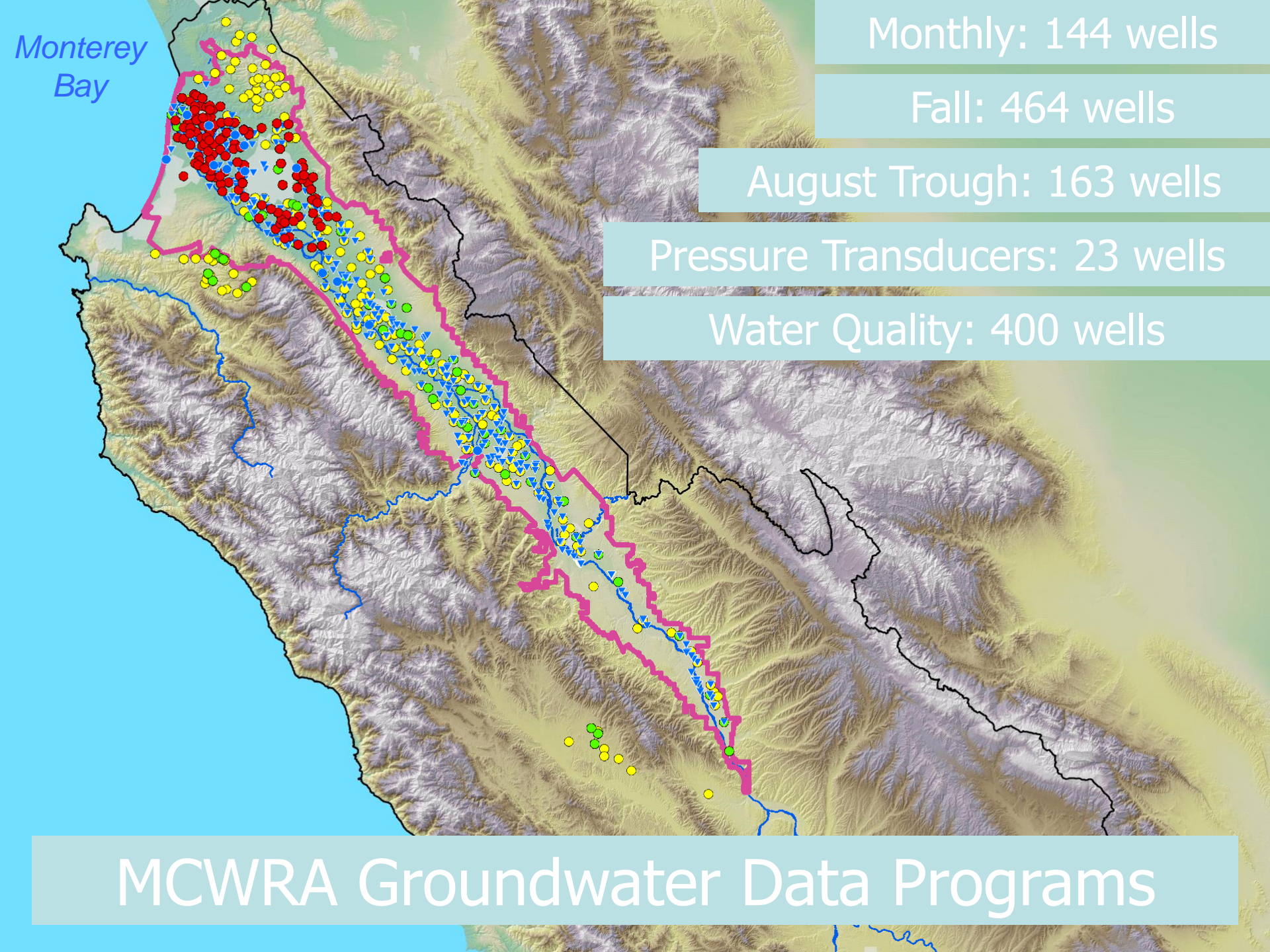




Agency Groundwater Monitoring Programs

- GWL & WQ data collected & analyzed since 1947
- Purposes:
 - Monitor health of basin
 - Evaluate Agency projects
 - Develop basin management strategies





Monthly: 144 wells

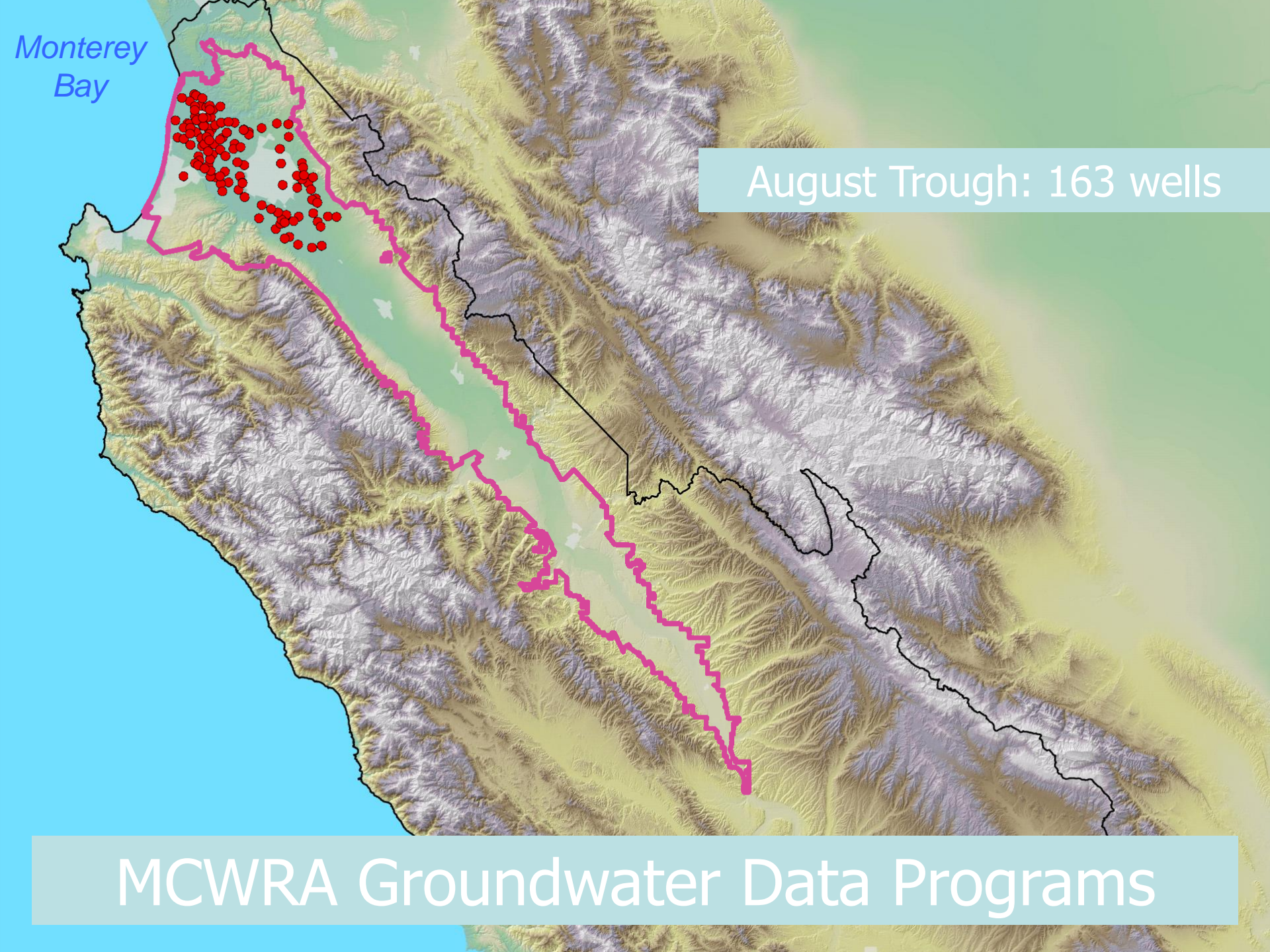
Fall: 464 wells

August Trough: 163 wells

Pressure Transducers: 23 wells

Water Quality: 400 wells

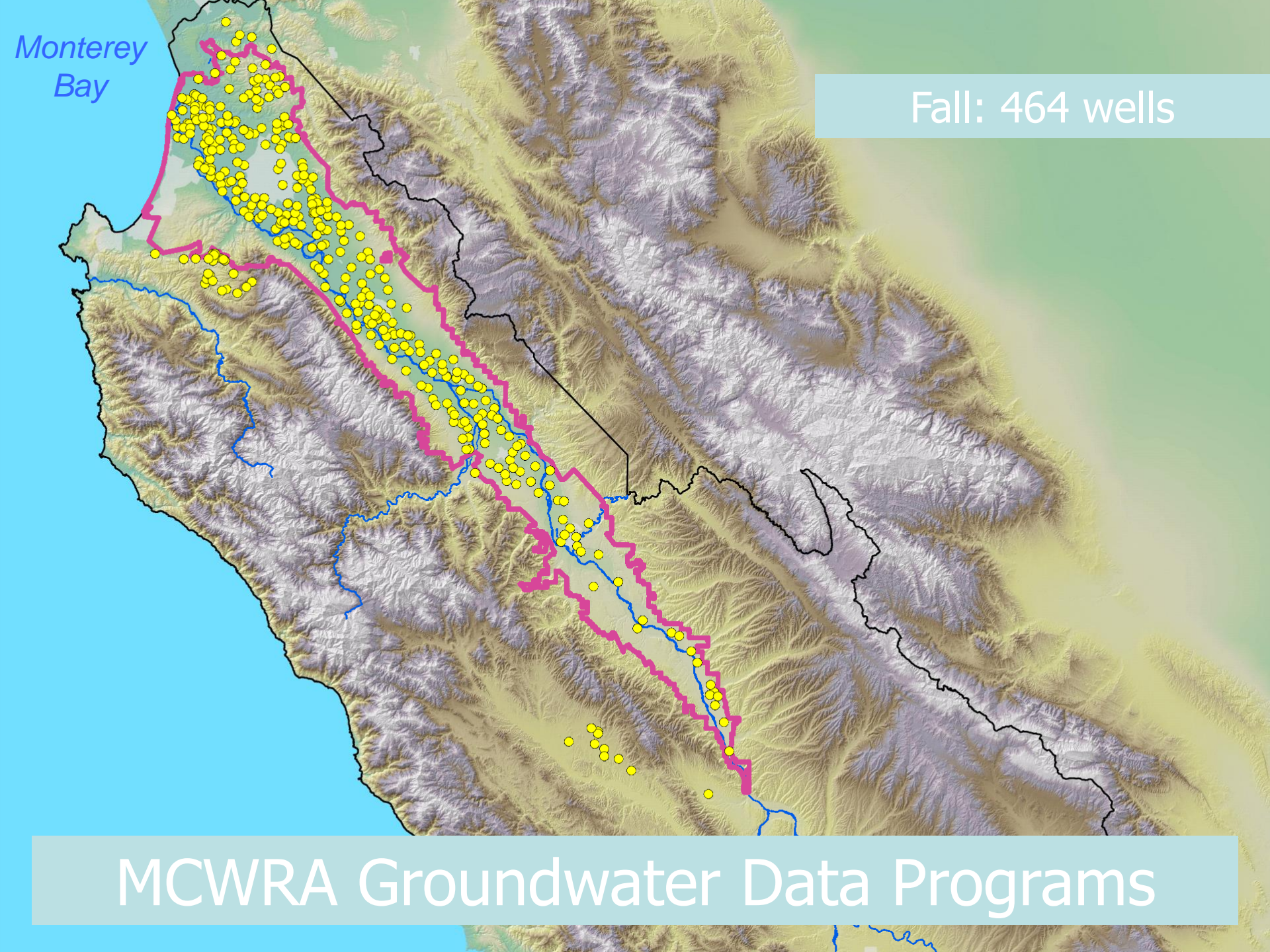
MCWRA Groundwater Data Programs



Monterey
Bay

August Trough: 163 wells

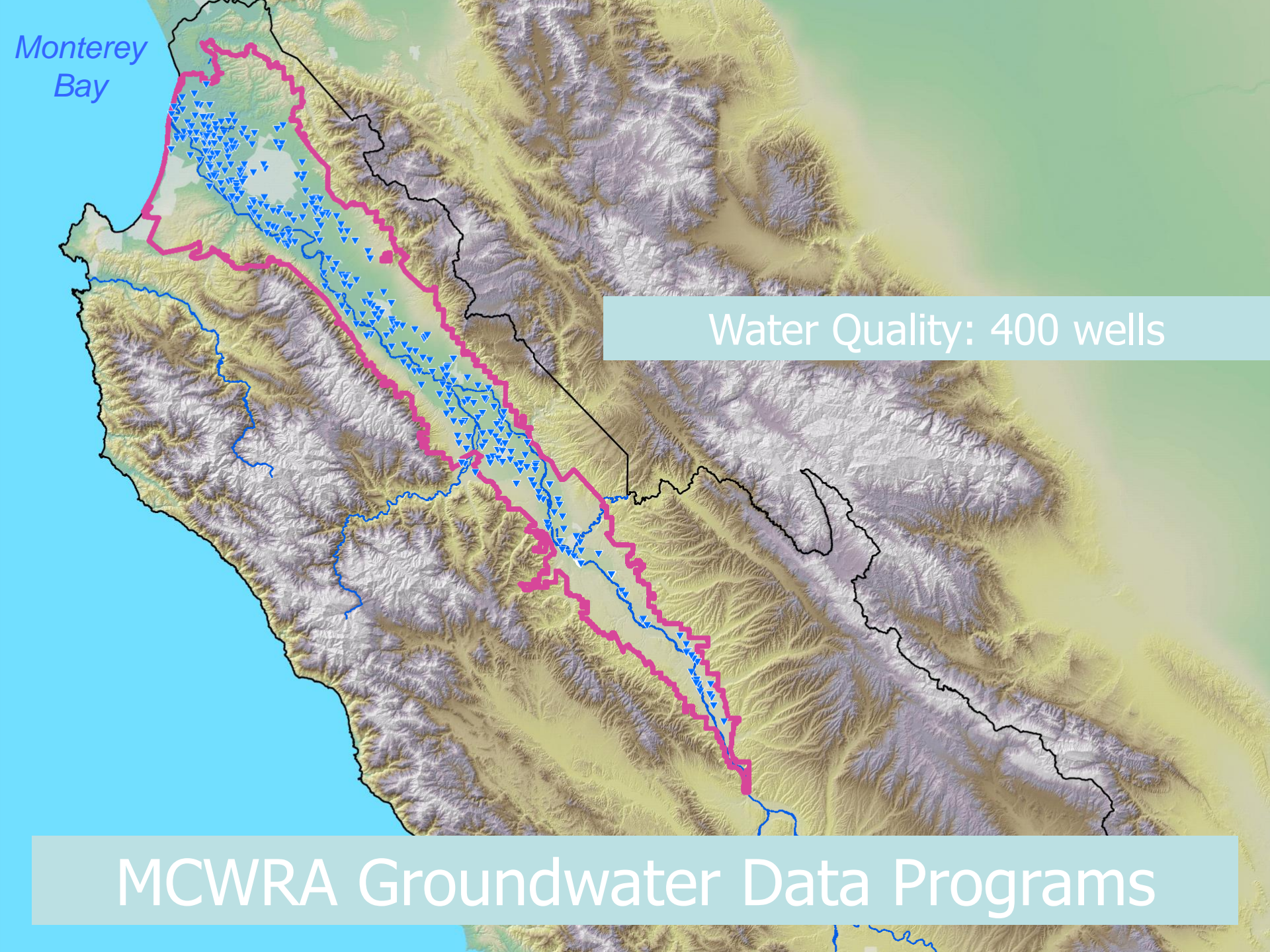
MCWRA Groundwater Data Programs



Monterey
Bay

Fall: 464 wells

MCWRA Groundwater Data Programs



Monterey
Bay

Water Quality: 400 wells

MCWRA Groundwater Data Programs

2019 Groundwater Level Contours



2019 Groundwater Level Contours

Data Acquisition

- Planning
- Logistics
- Collection
- QA/QC
- Loading



2019 Groundwater Level Contours

Data Acquisition

- Planning
- Logistics
- Collection
- QA/QC
- Loading



Data Analysis

- Mapping
- Initial Contouring
- Spatial/Hydrogeologic Analysis
- Smoothing
- Final Contouring





Uses of Data

- Understand Groundwater Flow
- Mechanism of Seawater Intrusion
- Understand Groundwater Pumping
- How Subbasins are Recharged
- Basin response to Wet and Dry periods
- Land Use Impacts Analysis
- Calibrate the SVIHM





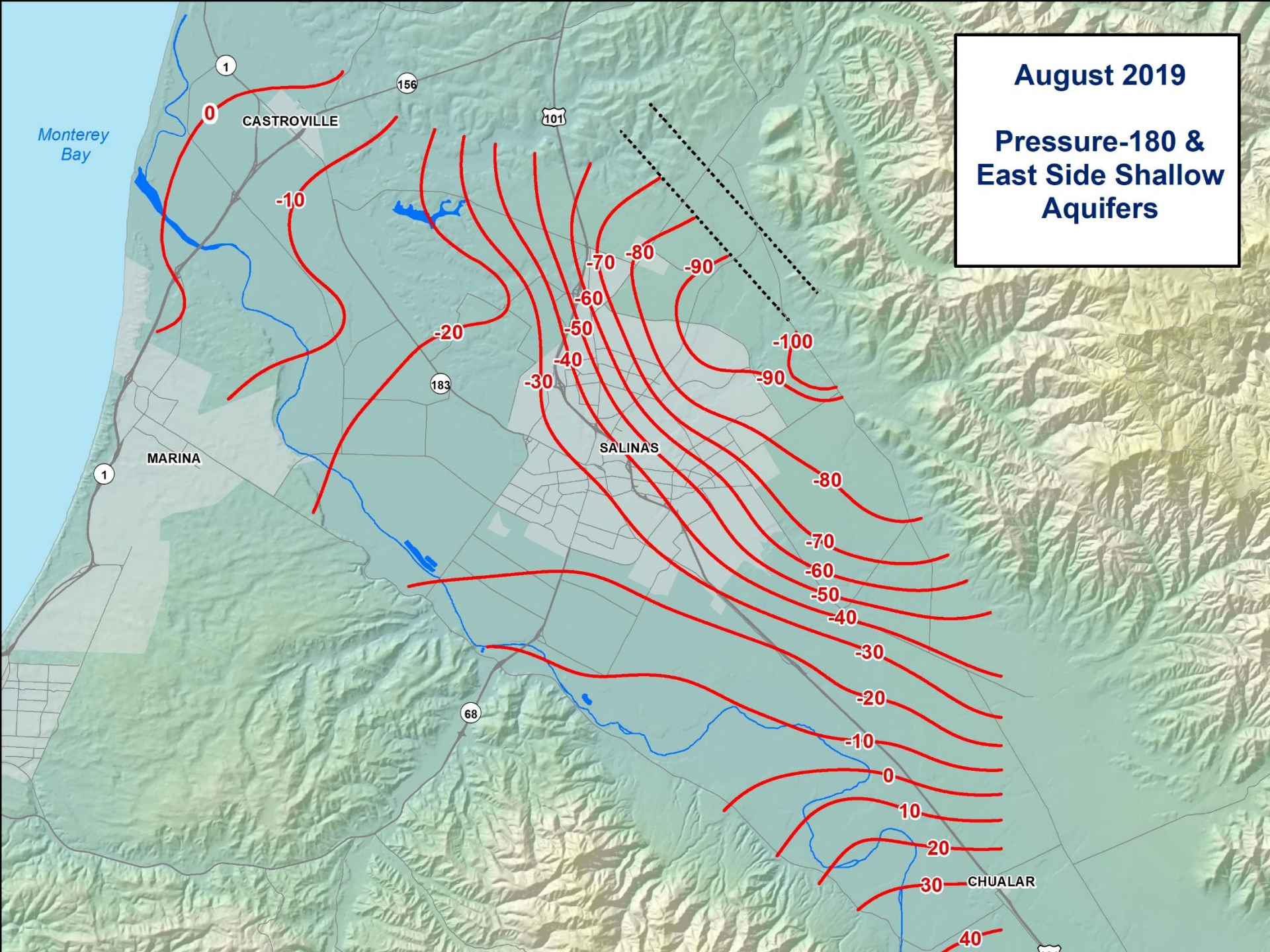
August 2019 Groundwater Level Contours

1. P180 & East Side Shallow
2. P400 & East Side Deep



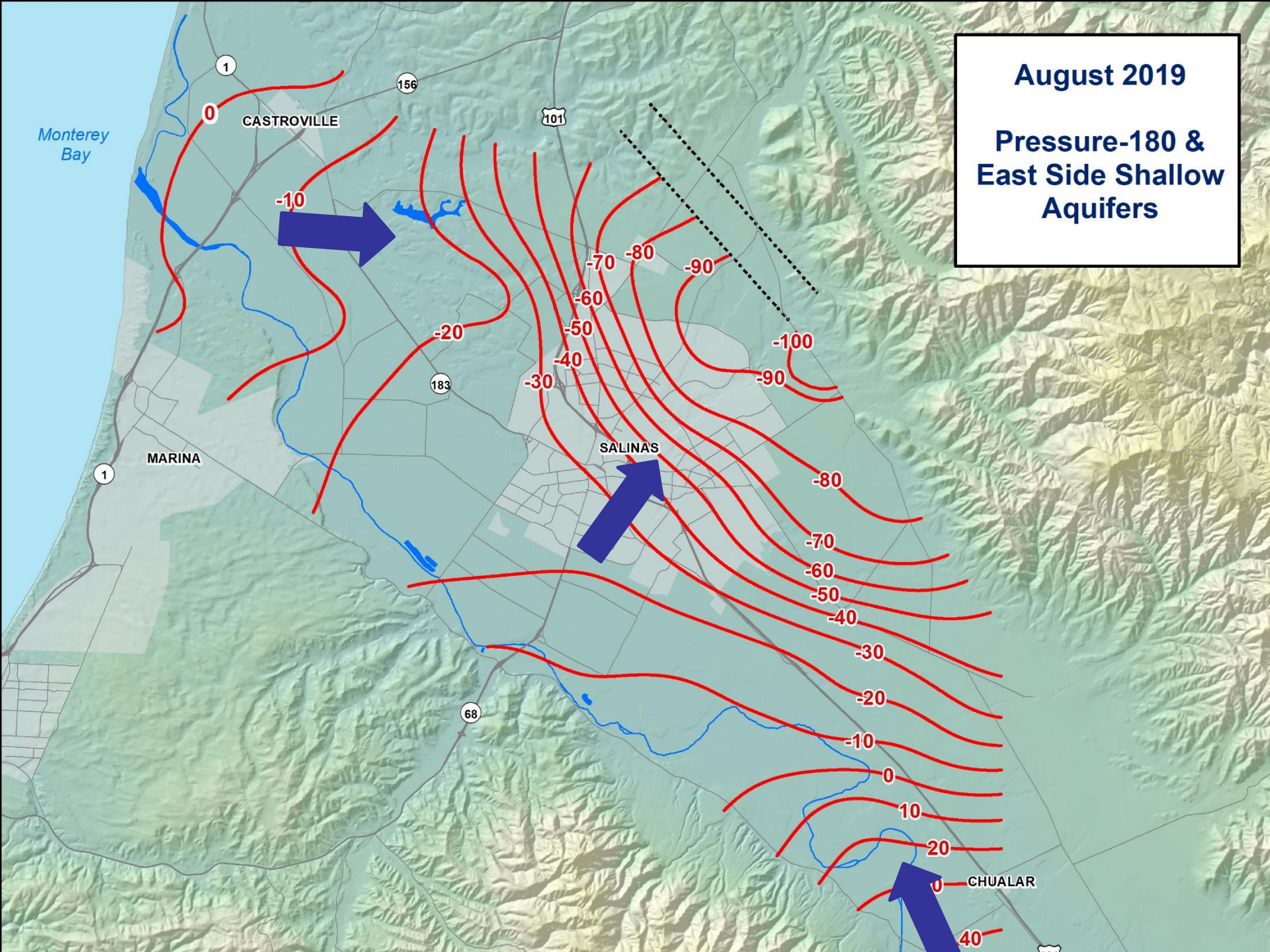
August 2019

**Pressure-180 &
East Side Shallow
Aquifers**



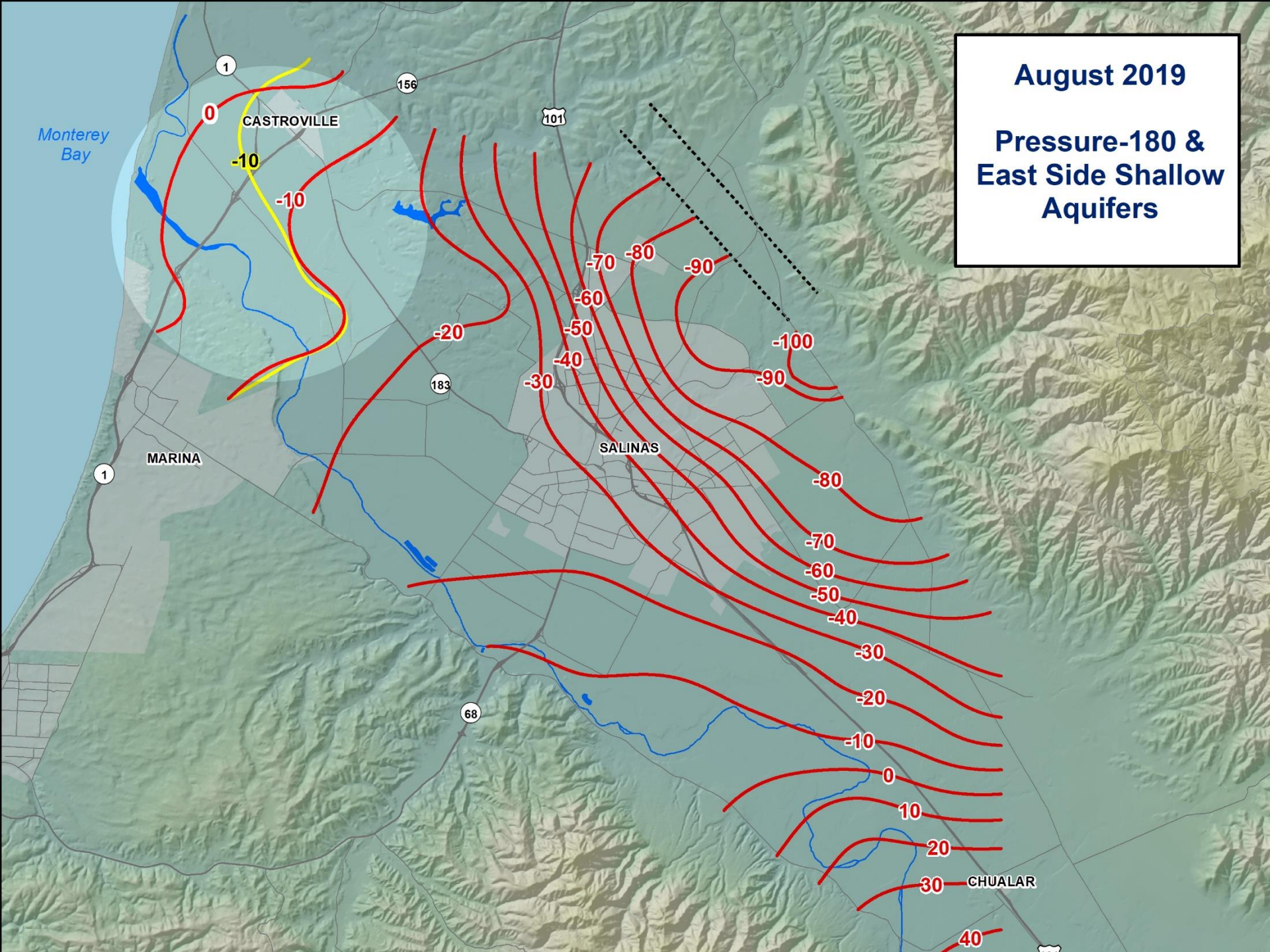
August 2019

**Pressure-180 &
East Side Shallow
Aquifers**



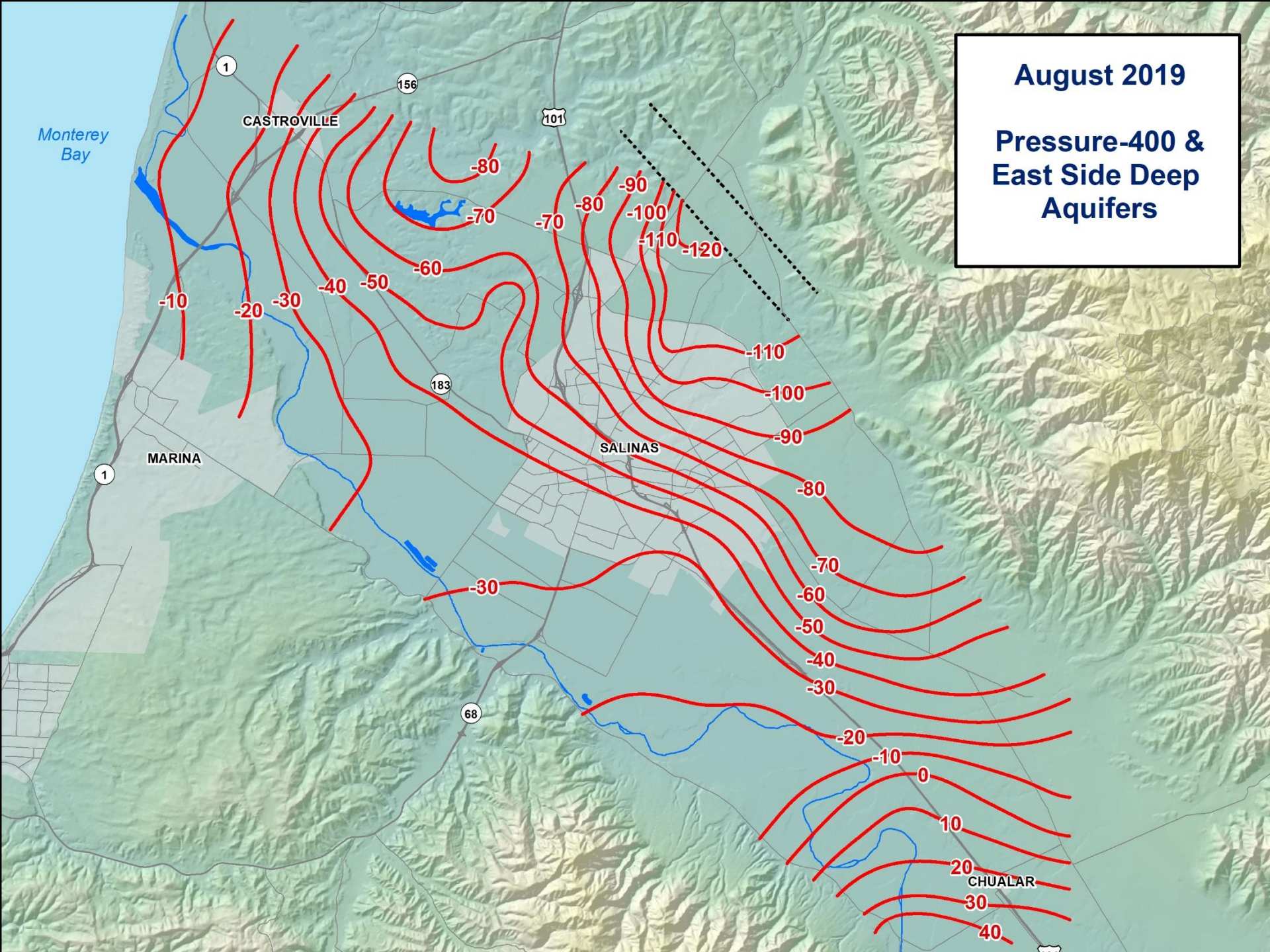
August 2019

**Pressure-180 &
East Side Shallow
Aquifers**



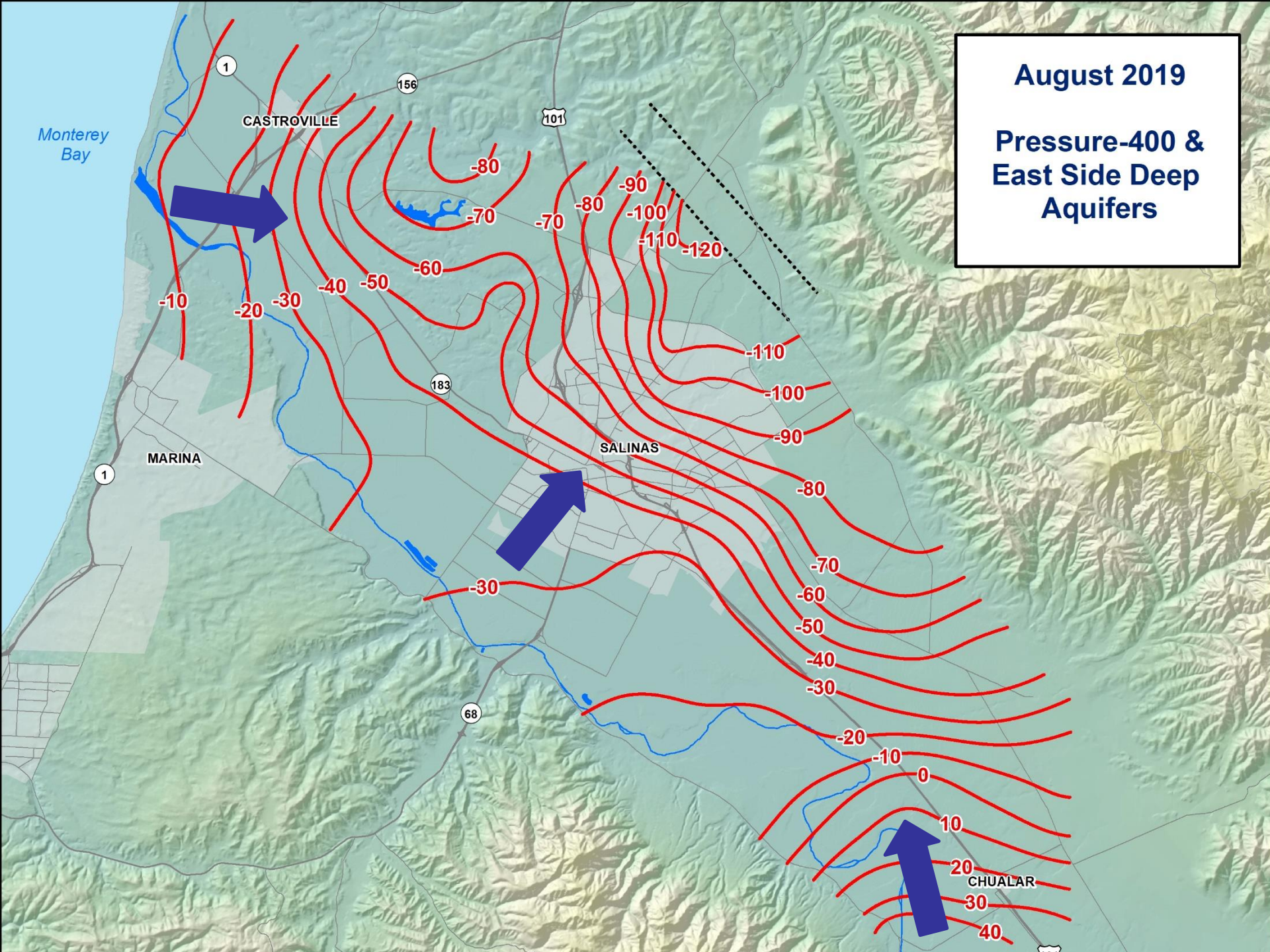
August 2019

**Pressure-400 &
East Side Deep
Aquifers**



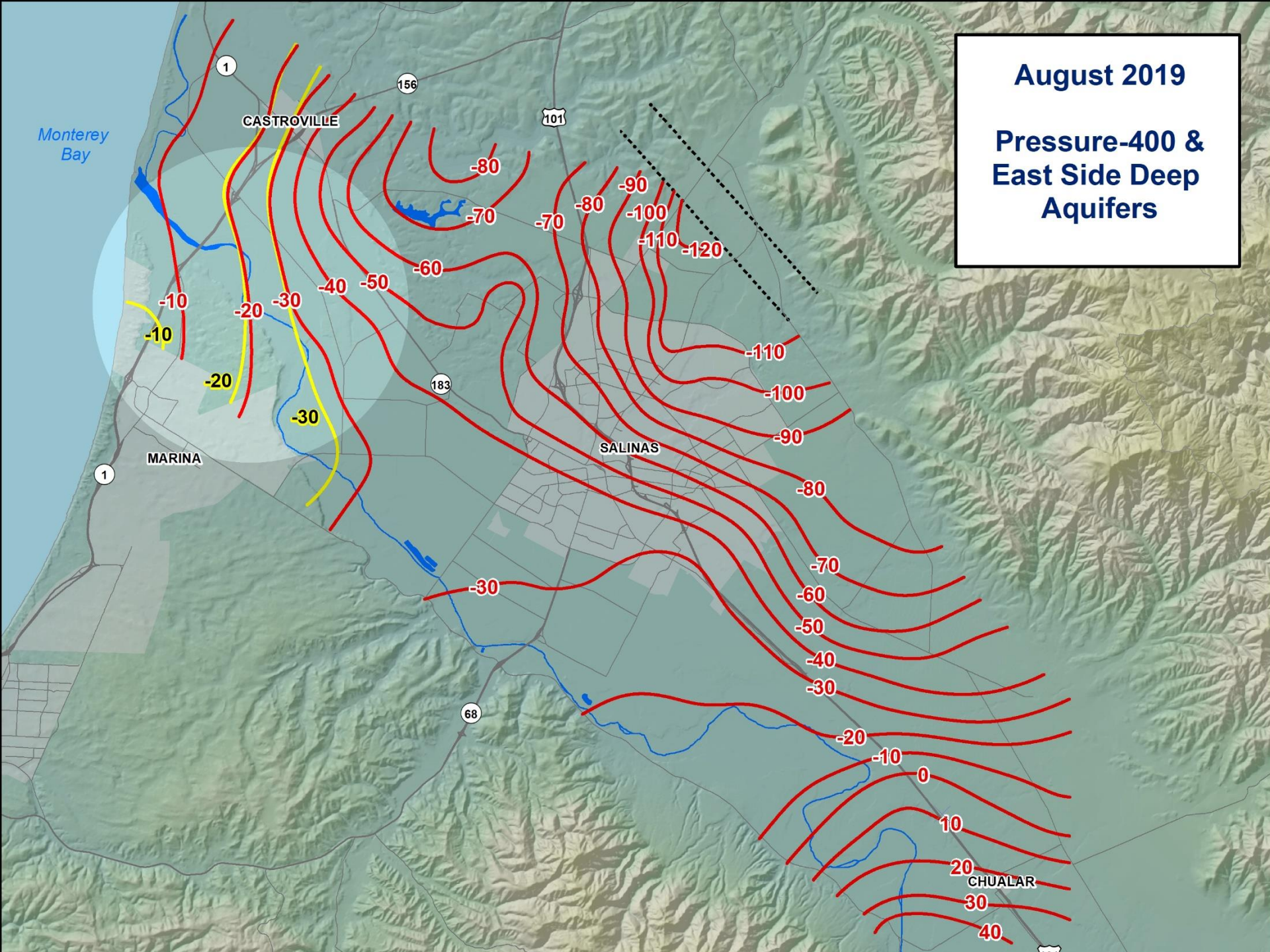
August 2019

**Pressure-400 &
East Side Deep
Aquifers**



August 2019

**Pressure-400 &
East Side Deep
Aquifers**





Summary: 2019 August GWL Changes Since 2017

- P180
 - Coastal GWLs above sea level
 - 5-10ft rise in GWLs near Chualar
 - East Side: No change

- P400
 - Coastal GWLs remain below sea level
 - 10-20 ft recovery near Chualar
 - East Side GWLs down 10 ft





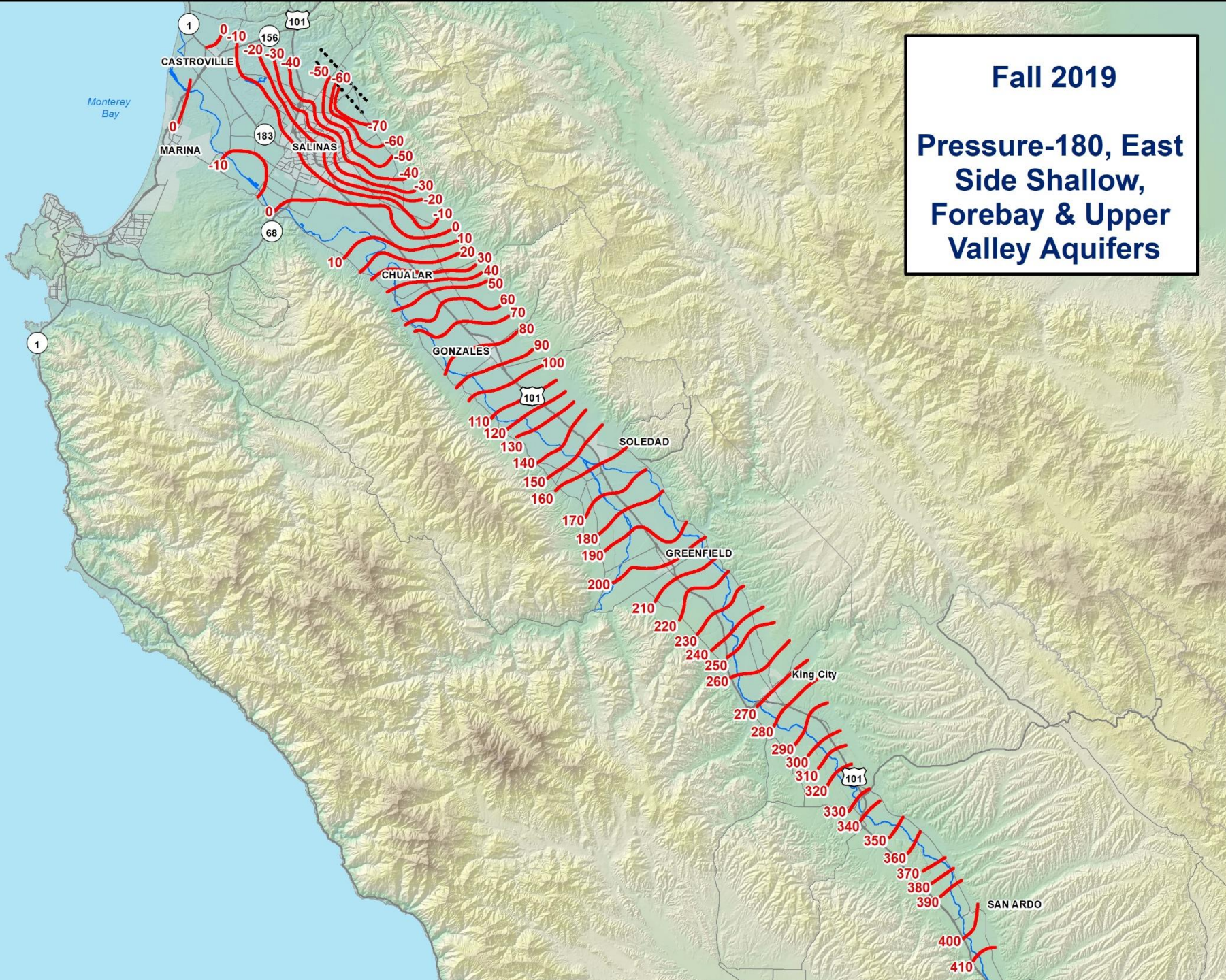
Fall 2019 Groundwater Level Contours

1. P180, East Side Shallow, Forebay & Upper Valley
2. P400 & East Side Deep



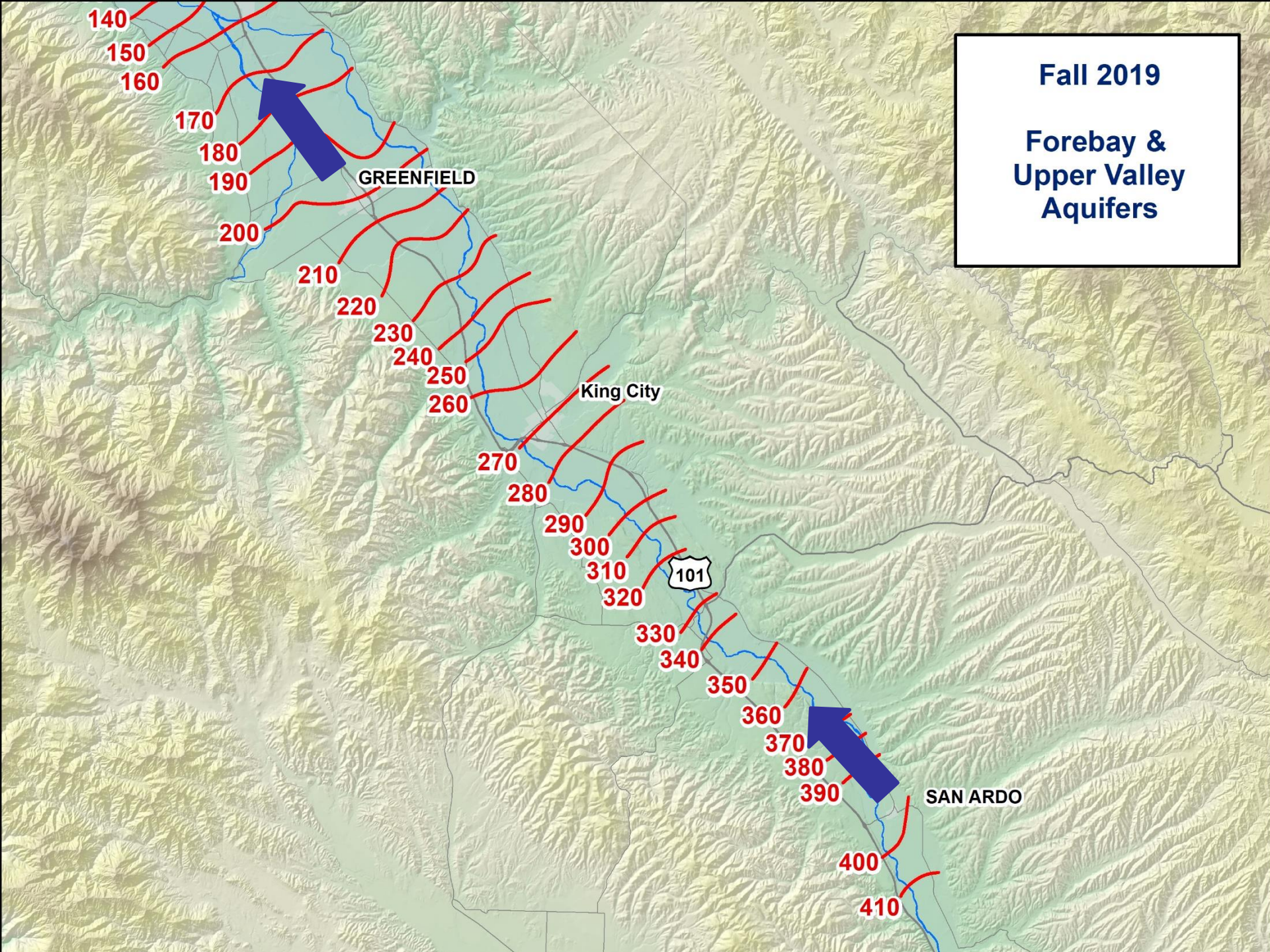
Fall 2019

**Pressure-180, East
Side Shallow,
Forebay & Upper
Valley Aquifers**



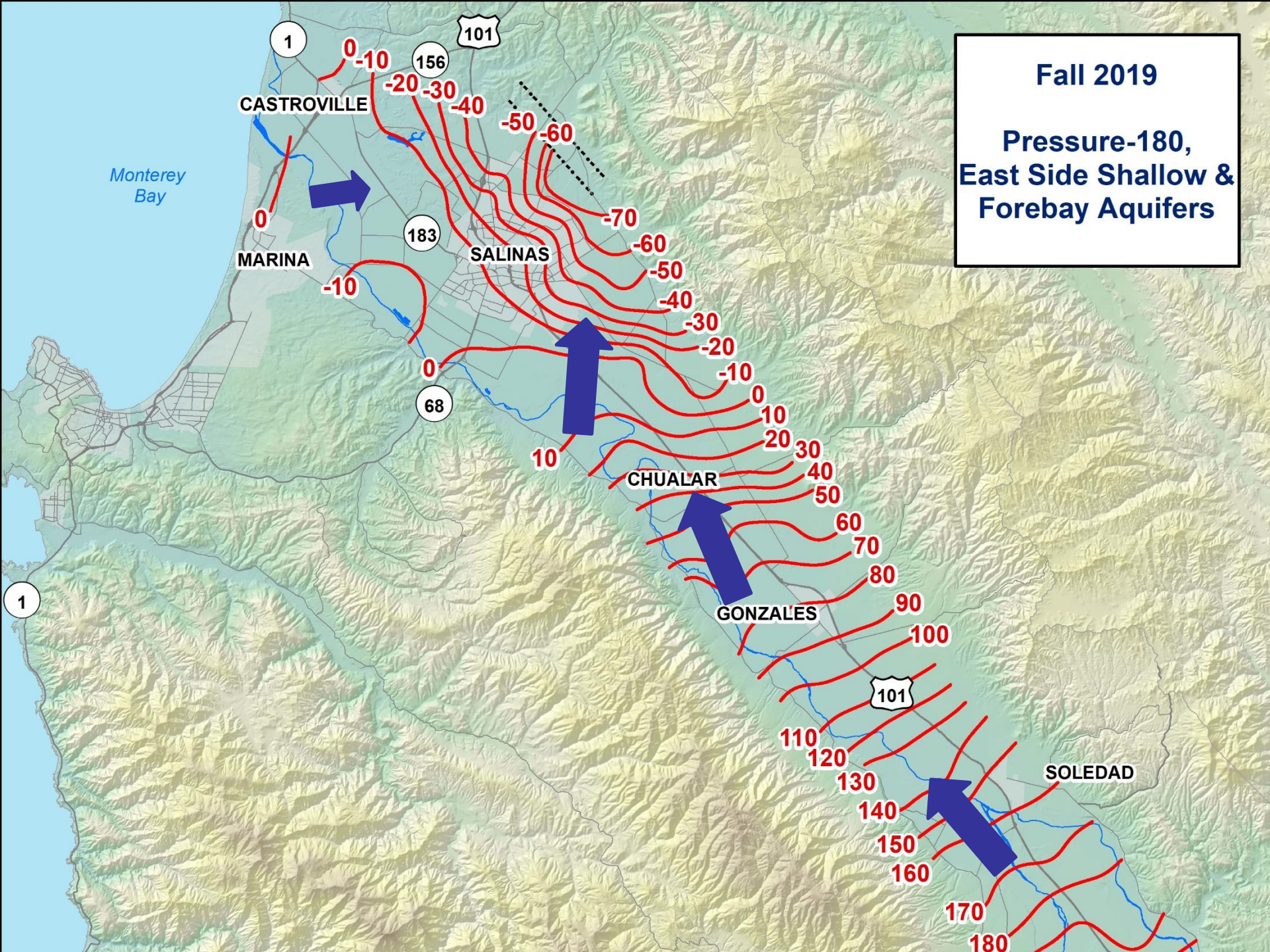
Fall 2019

**Forebay &
Upper Valley
Aquifers**



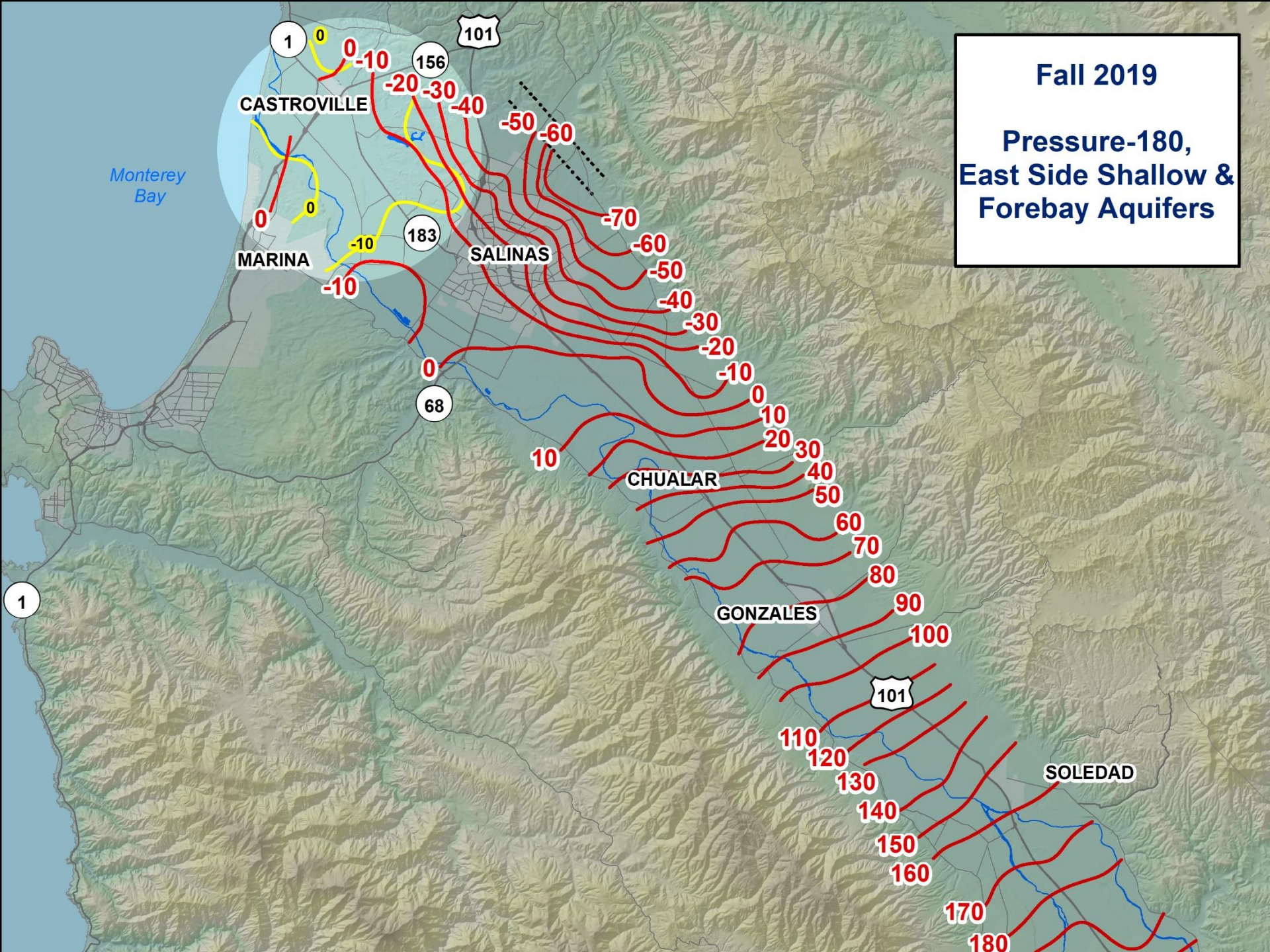
Fall 2019

Pressure-180,
East Side Shallow &
Forebay Aquifers



Fall 2019

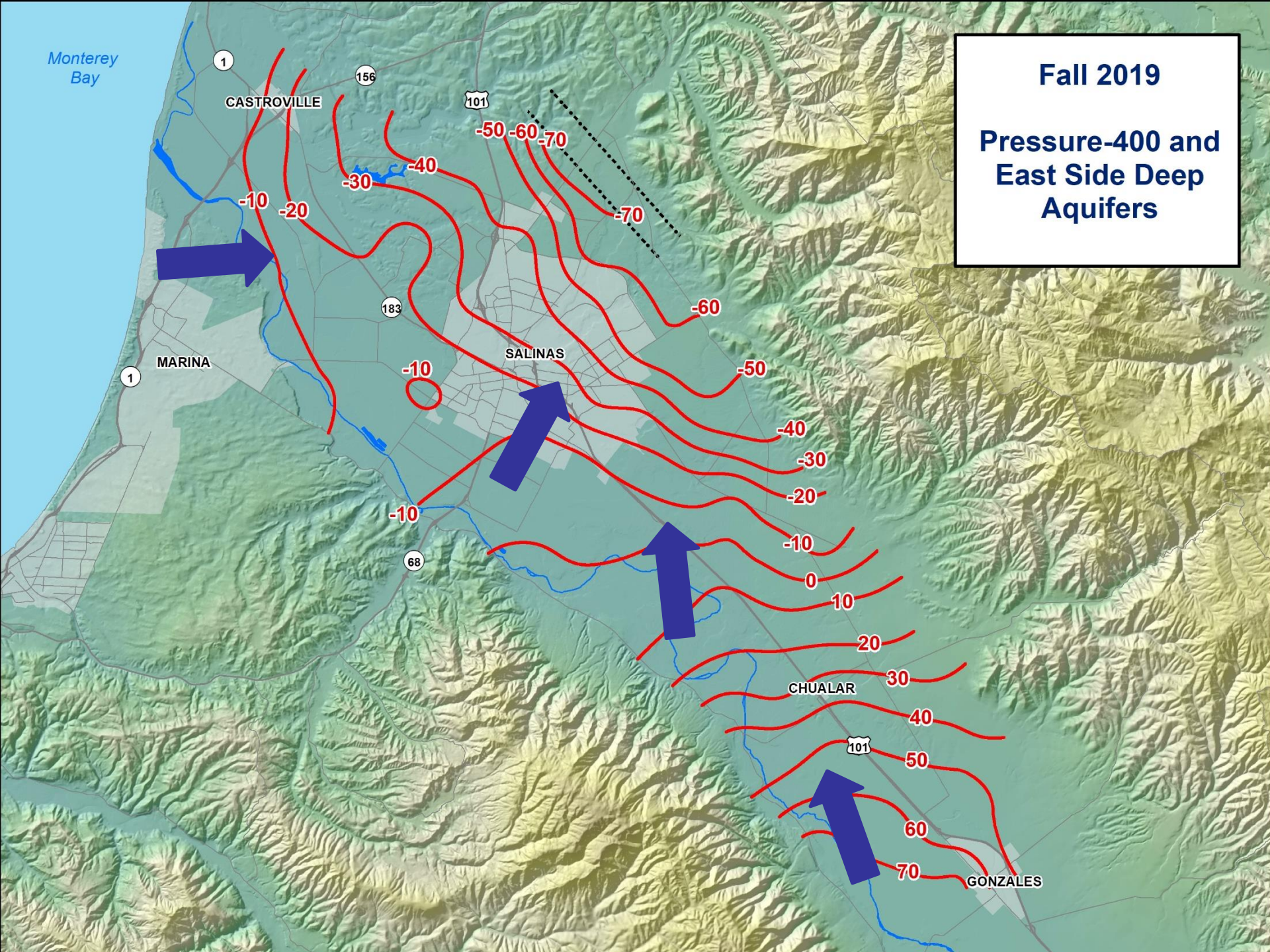
Pressure-180,
East Side Shallow &
Forebay Aquifers



Monterey Bay

Fall 2019

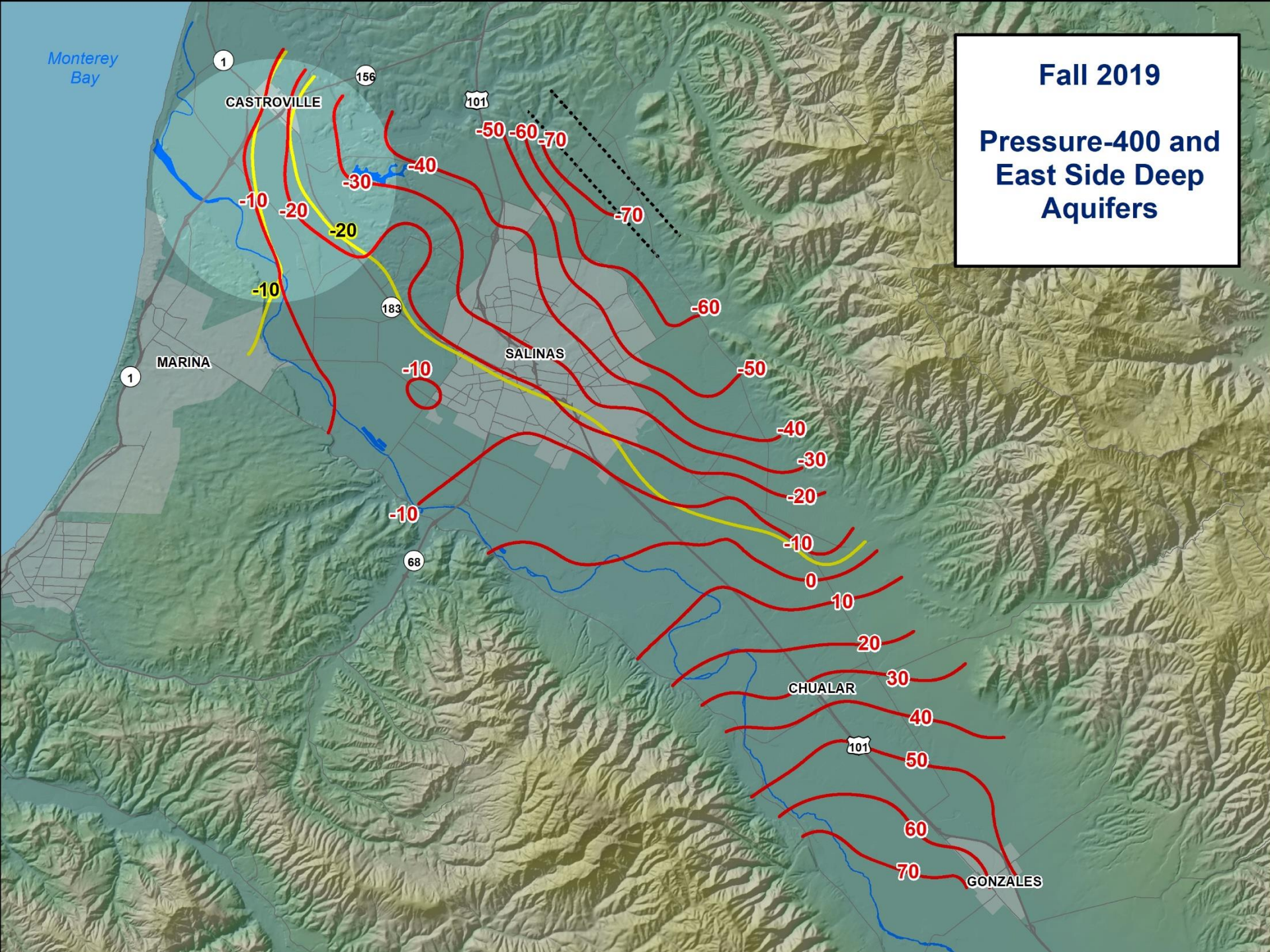
Pressure-400 and
East Side Deep
Aquifers



Monterey Bay

Fall 2019

Pressure-400 and
East Side Deep
Aquifers





Summary: 2019 Fall GWL Changes Since 2017

- P180, East Side Shallow, Forebay, Upper Valley
 - Overall: GWLs show a modest recovery
 - Coastal GWLs: remain above sea level
- P400, East Side Deep
 - Coastal GWLs remain below sea level
 - Modest recovery south of Salinas





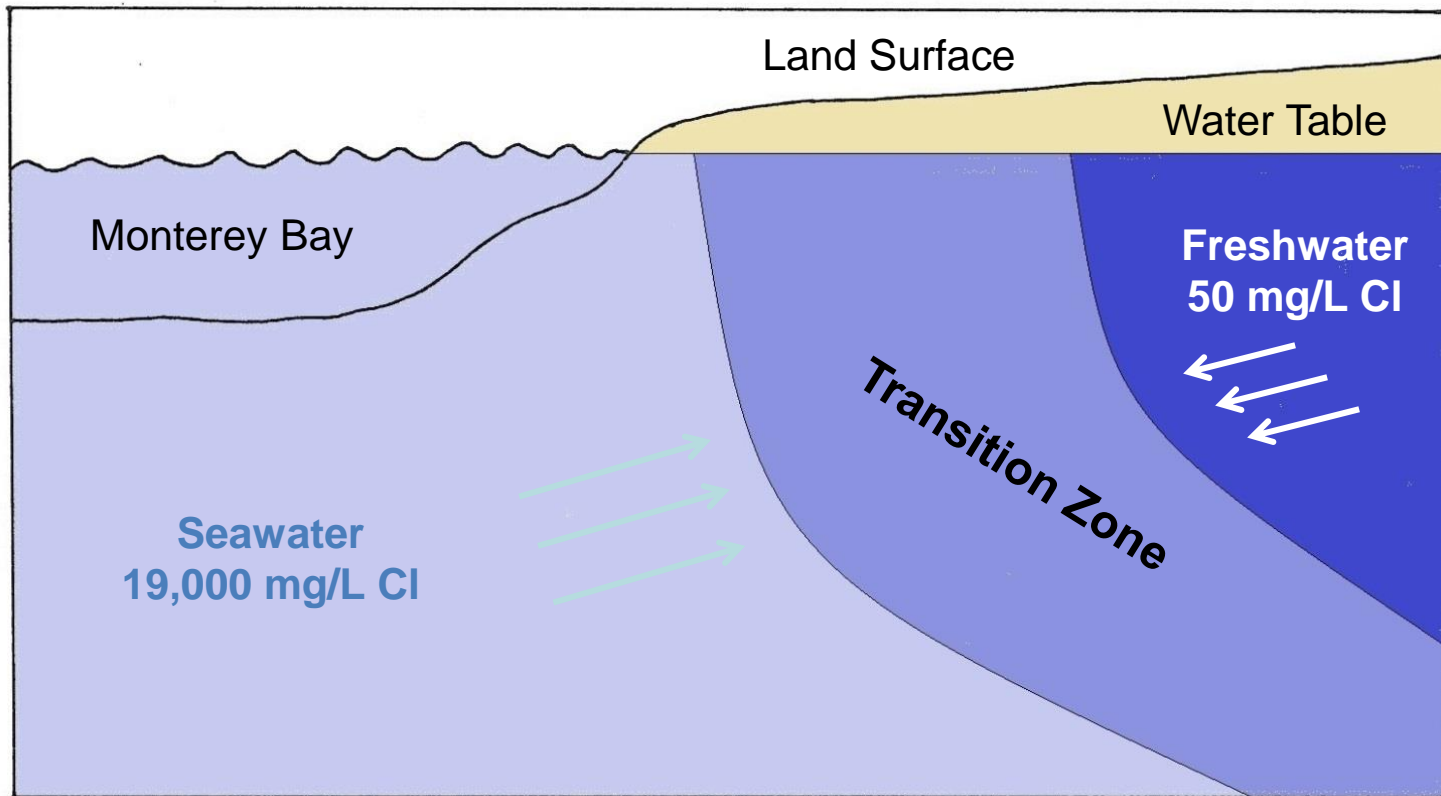
Take Home Message

1. Continued Recovery from the Drought
2. The Mechanism of Seawater Intrusion Persists

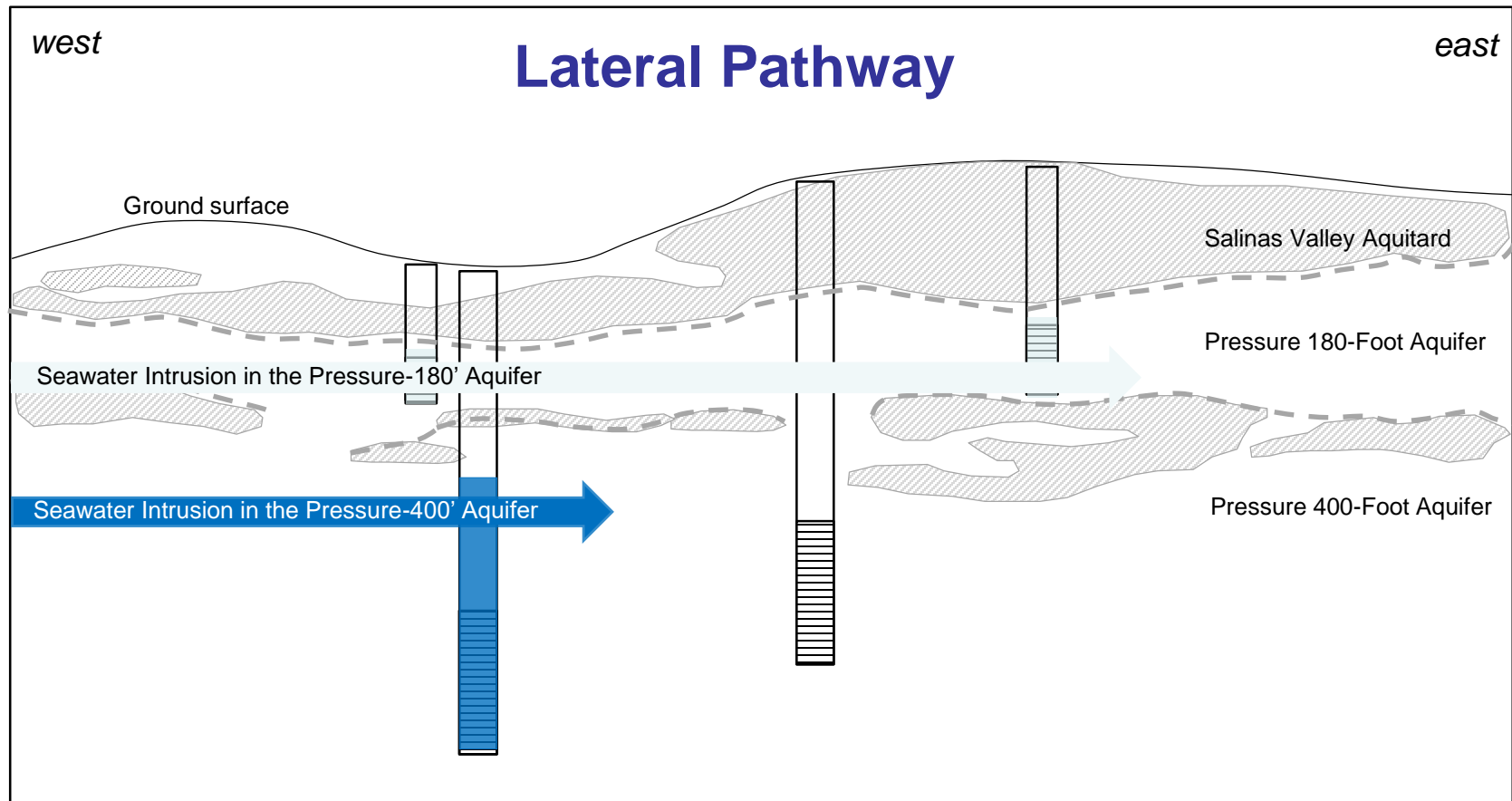







Seawater Intrusion – Transition Zone



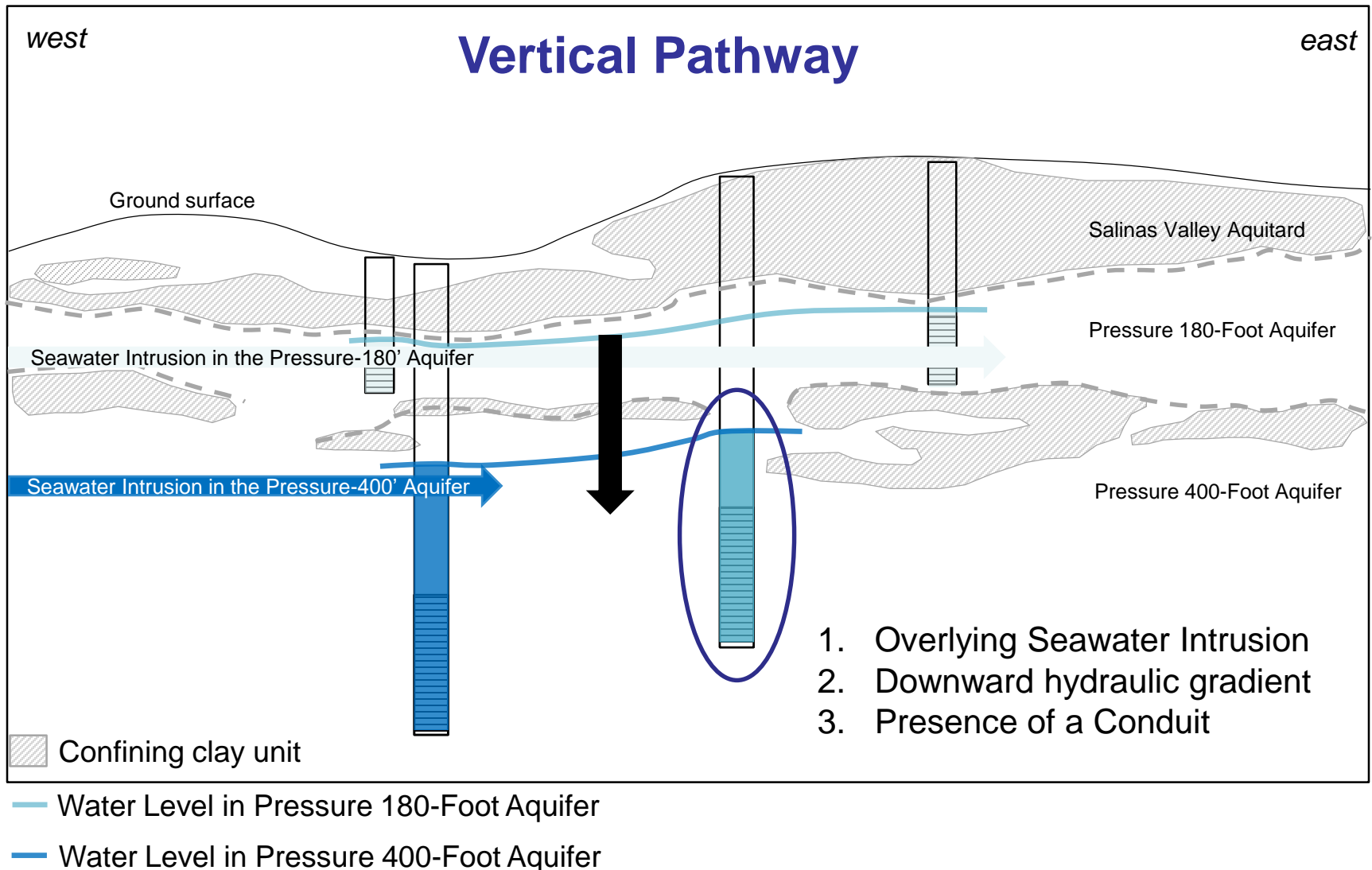
Seawater Intrusion – Pathways



-  Confining clay unit
-  Water Level in Pressure 180-Foot Aquifer
-  Water Level in Pressure 400-Foot Aquifer



Seawater Intrusion – Pathways





Seawater Intrusion – Monitoring Program

- Groundwater Wells
 - Sampled annually during peak pumping
 - ~90 Ag & Urban wells sampled twice (Jun & Aug)
 - 25 Dedicated monitoring wells sampled
 - ❖ Agency's wells and MPWSP wells
 - Analyzed for General Minerals
 - ❖ Monterey County Lab (ELAP #1395)





Seawater Intrusion – Analysis

- Data Evaluation
 - Historical Chloride & Conductivity Trends
 - Stiff and Piper Diagrams
 - Chloride Concentration vs. Na/Cl Molar Ratio Trends
- Data Development Process
 - Water Quality
 - Well Construction
 - Well Pumping Data
 - Ground Water Level Contours



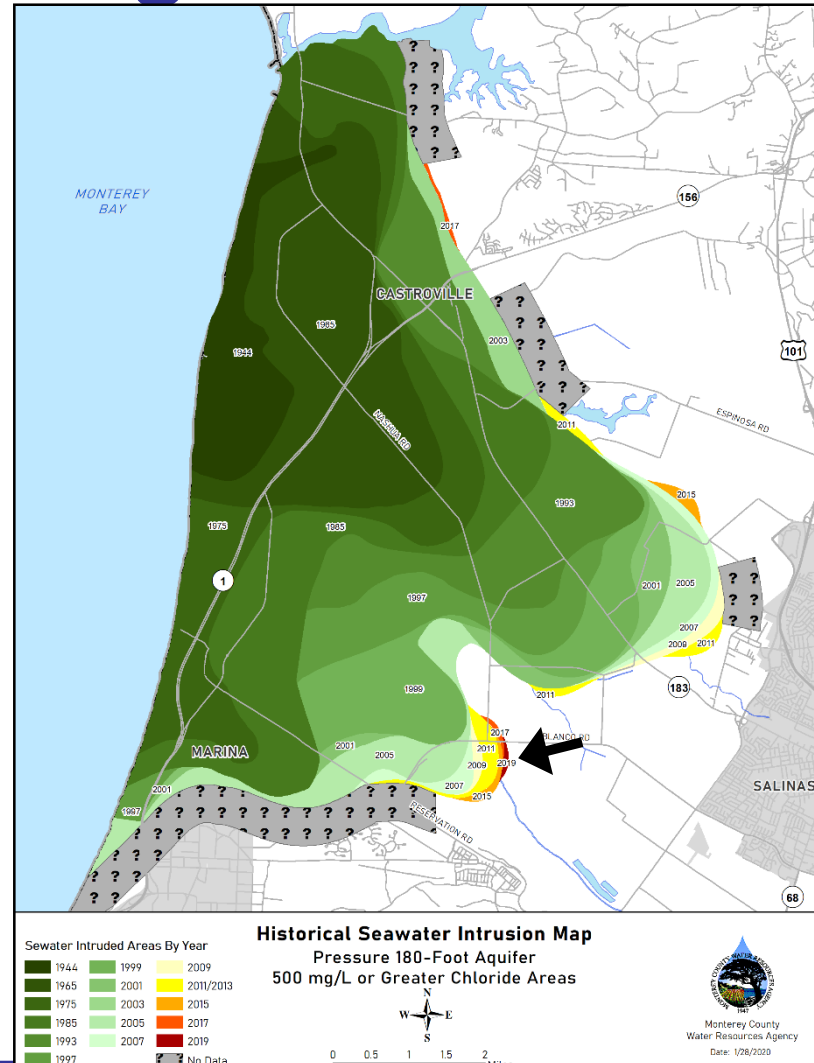


Seawater Intrusion – Data Processing

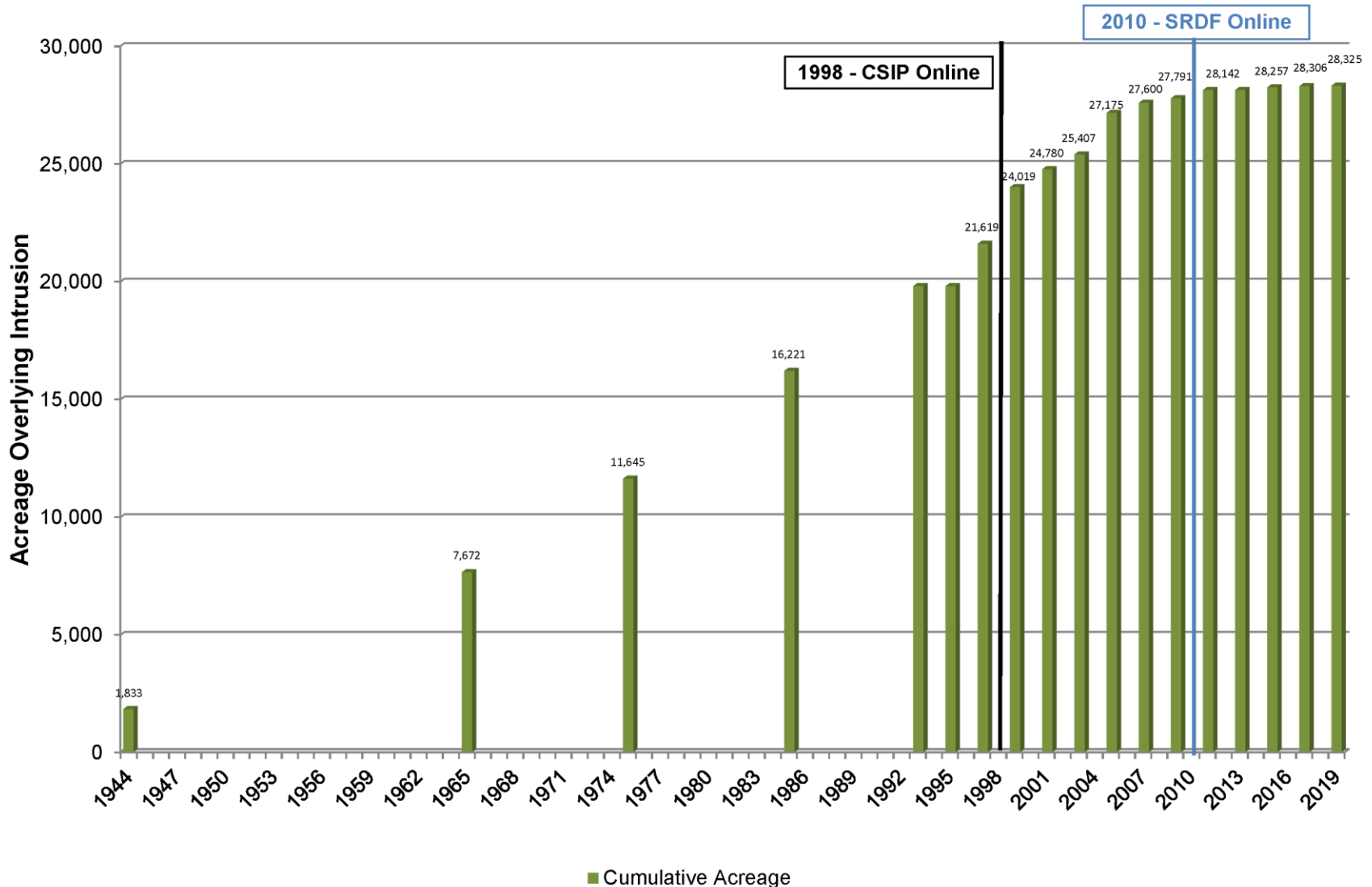
- Lab Results are Evaluated & Uploaded into WRAIMS Database Annually
- 500 mg/L Contours are Developed from the Odd Year Data & Added to the Historical SWI Maps



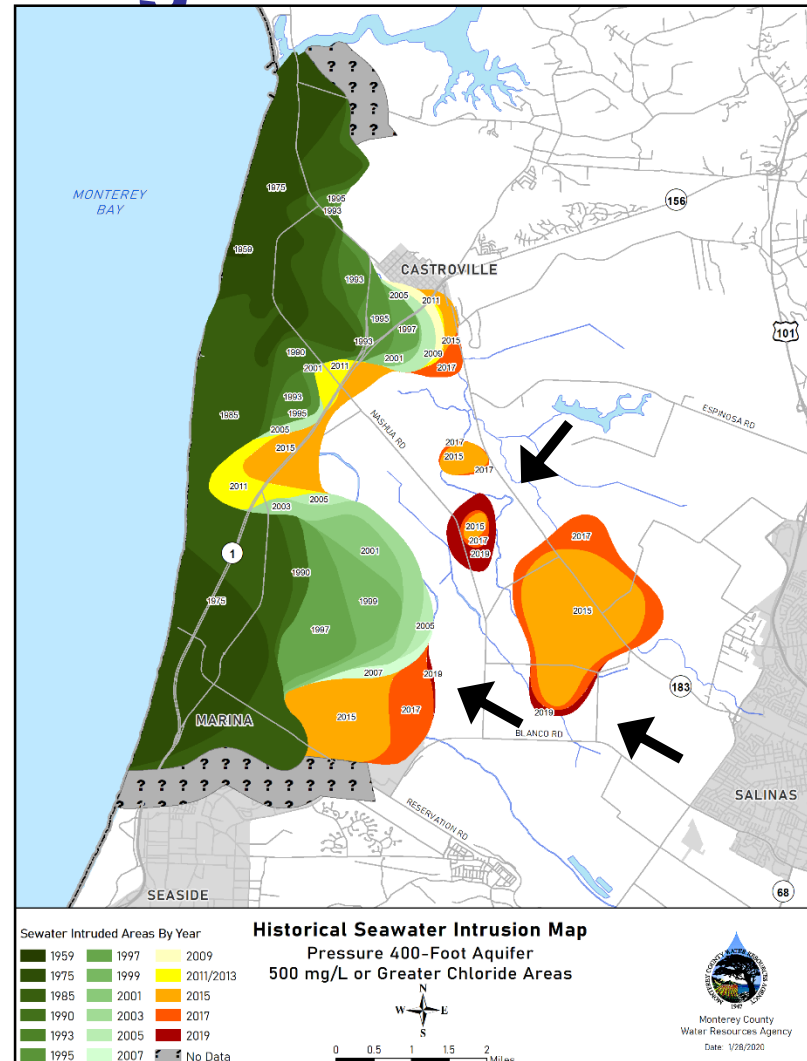
2019 Pressure 180-Foot Aquifer 500 mg/L Chloride Areas



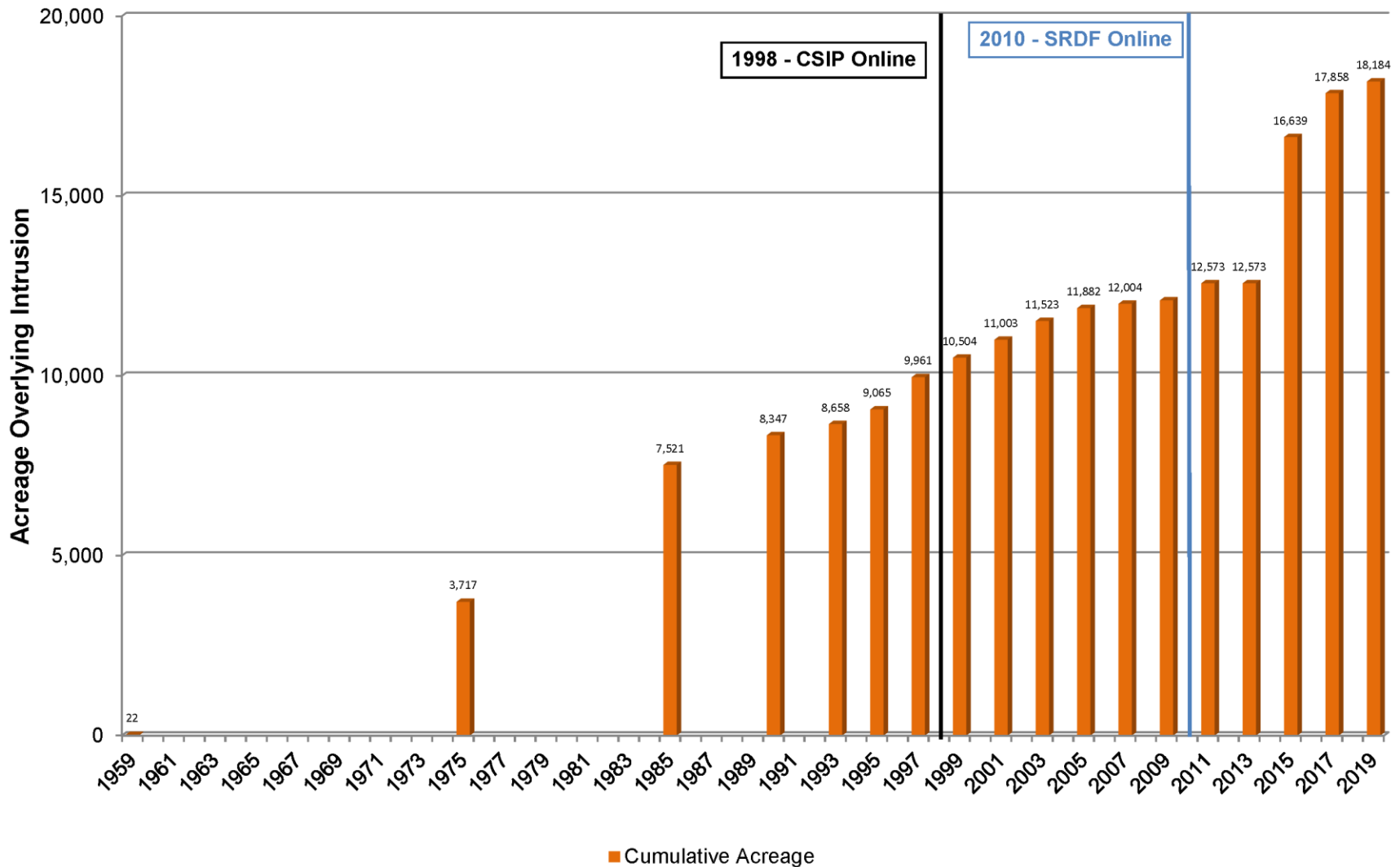
Acreage Overlying the 500 mg/L Chloride Contour Pressure 180-Foot Aquifer



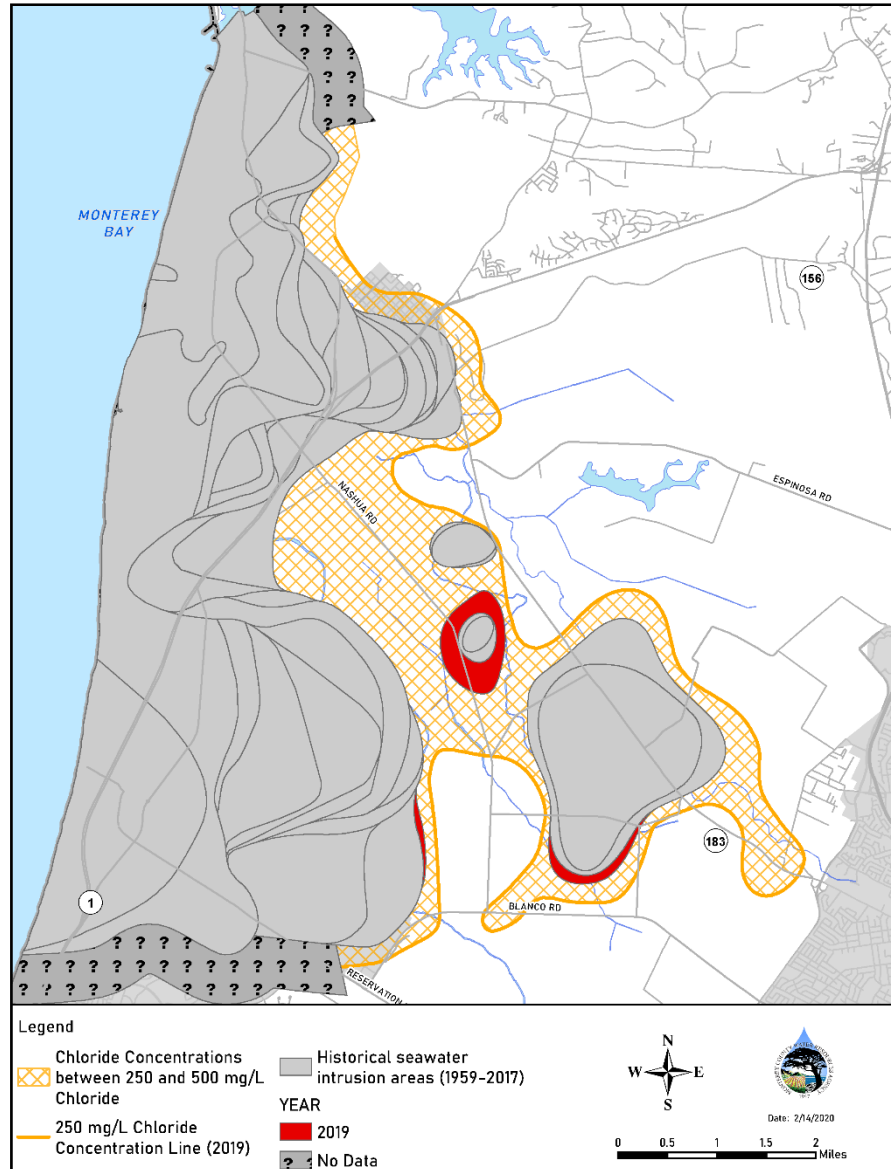
2019 Pressure 400-Foot Aquifer 500 mg/L Chloride Areas



Acreage Overlying the 500 mg/L Chloride Contour Pressure 400-Foot Aquifer



2019 Pressure 400-Foot Aquifer





Conclusion

Pressure 180-Ft Contours

- Rate of SWI Continues to Decrease
- Minimal Advancement
- Minimal Lobe Broadening

Pressure 400-Ft Contours

- Expansion of the 500 mg/L Cl “Islands”
- Minimal Advancement



TODAY'S ACTION

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Groundwater Level Contours and
500 mg/L Chloride Contour Maps**



