

SEASIDE GROUNDWATER BASIN

2018

SEAWATER INTRUSION ANALYSIS REPORT



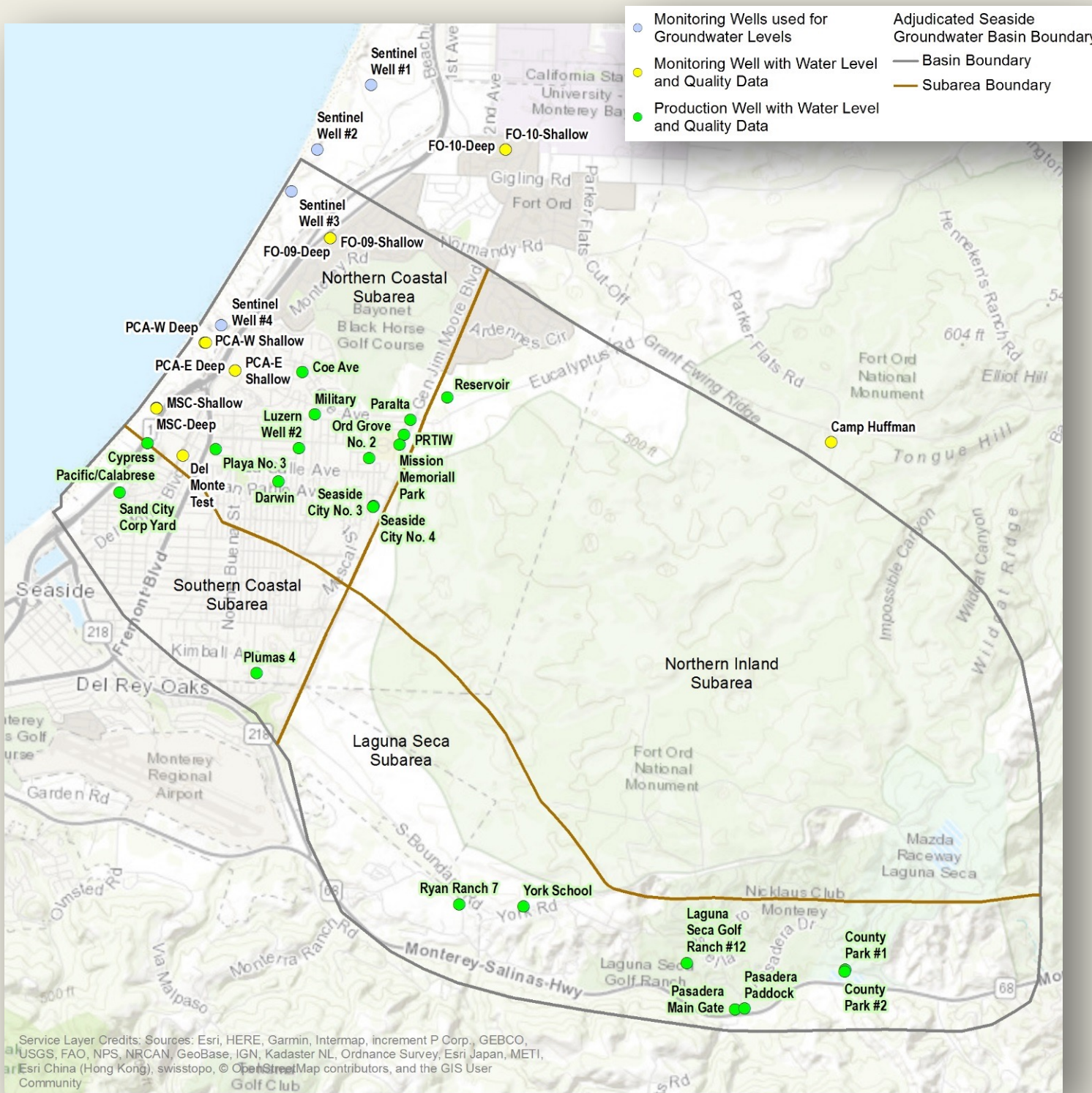
MONTGOMERY
& ASSOCIATES

Presented to the
Seaside Basin
Technical
Advisory
Committee
November 21,
2018

SIAR ANALYSIS

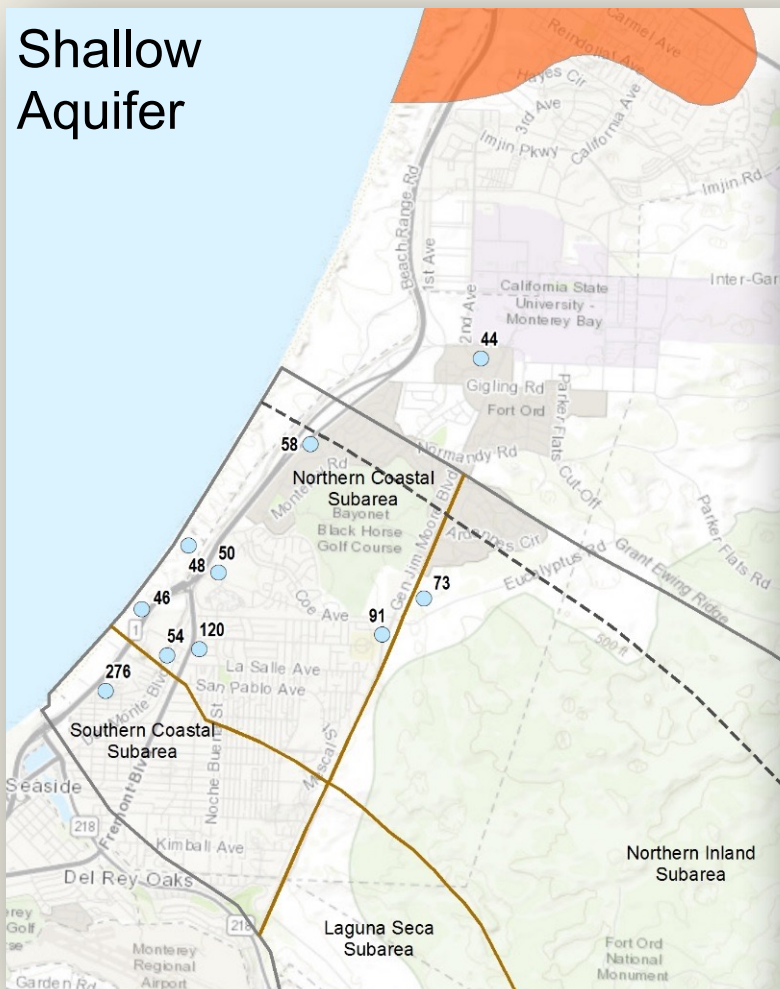
- Chloride Distribution and Na/Cl Molar Ratio
- Cation/Anions – Piper and Stiff Diagrams
- Electric Induction Logs
- Groundwater Elevations
- Protective Groundwater Elevations
- Groundwater Production

WELL DATA INCLUDED IN SIAR

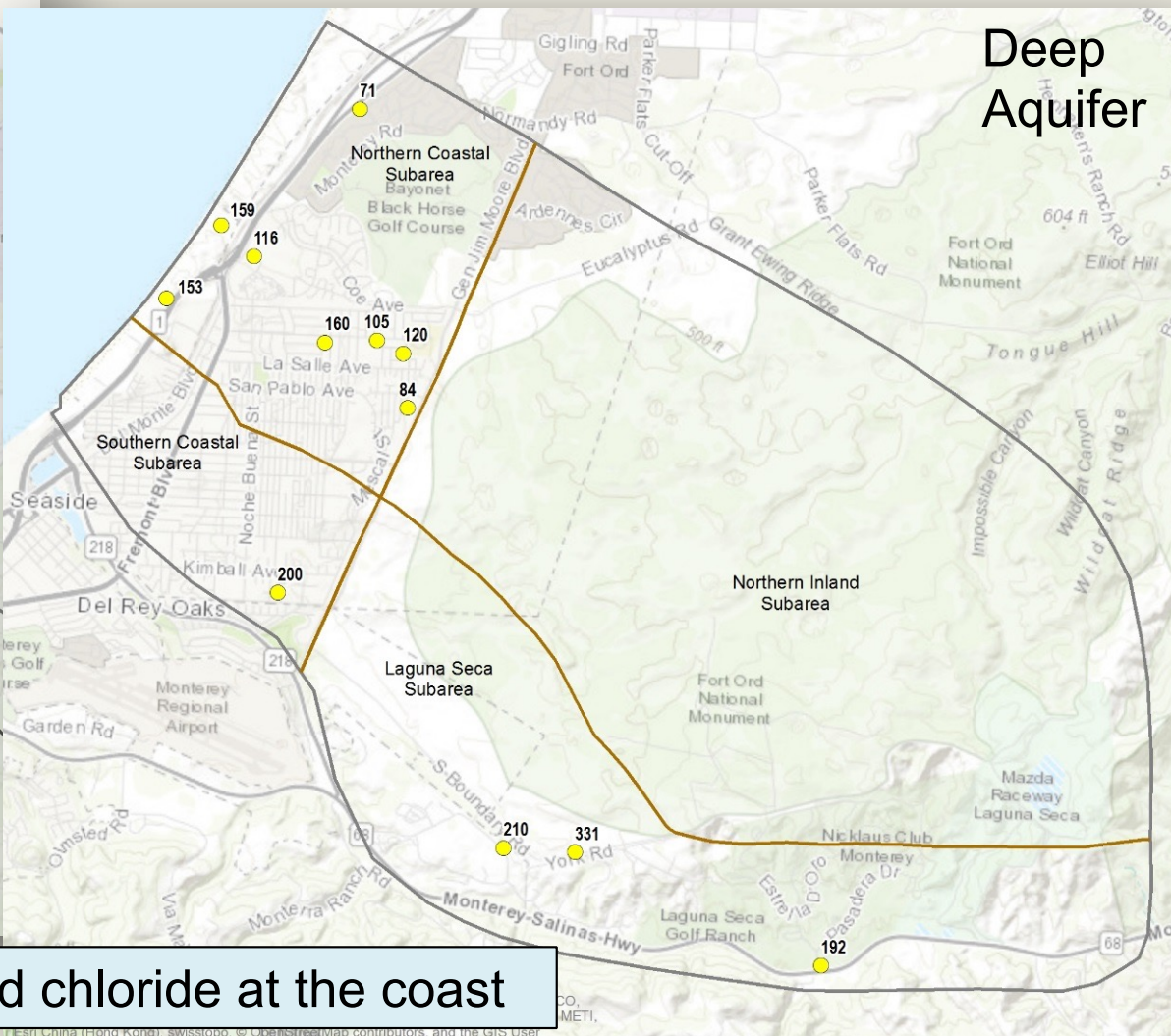


CHLORIDE DISTRIBUTION

Shallow
Aquifer

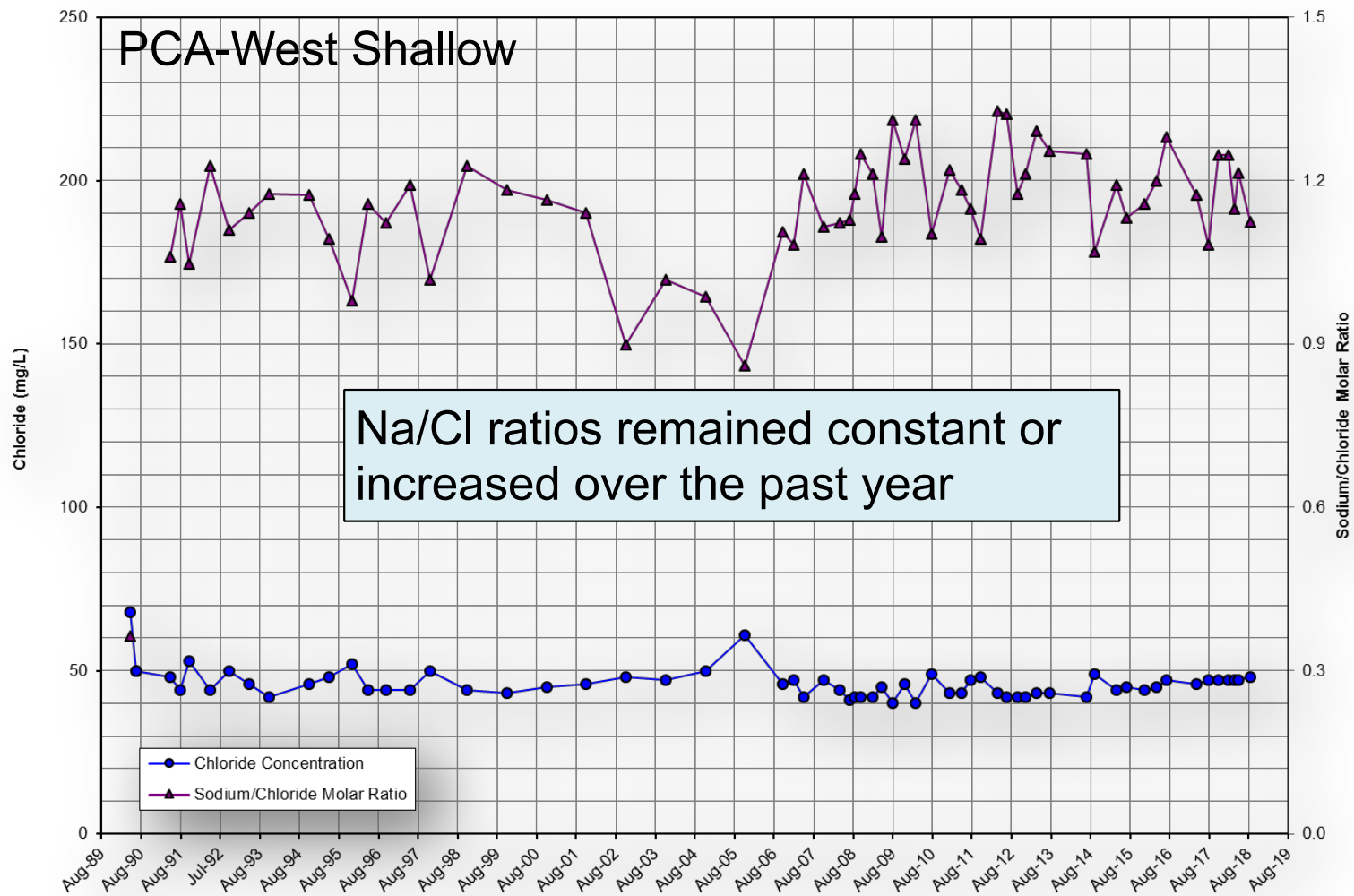


Deep
Aquifer



No increased chloride at the coast

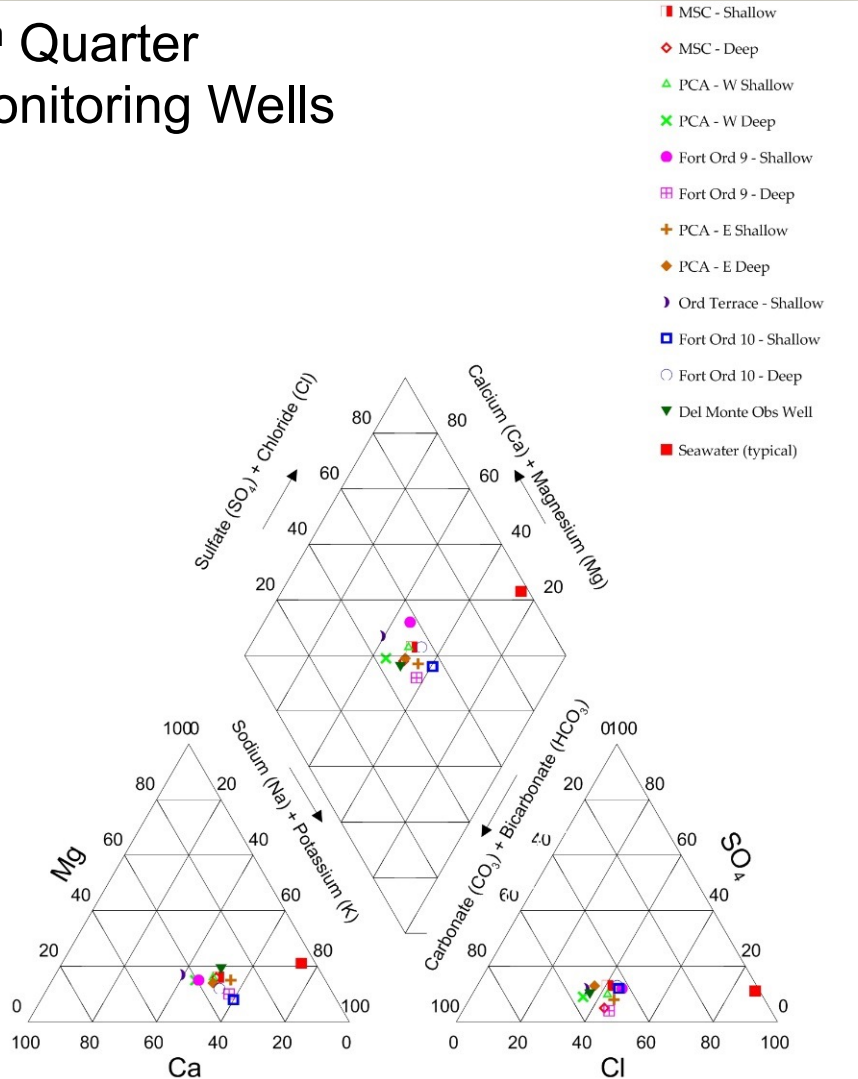
SODIUM/CHLORIDE MOLAR RATIO



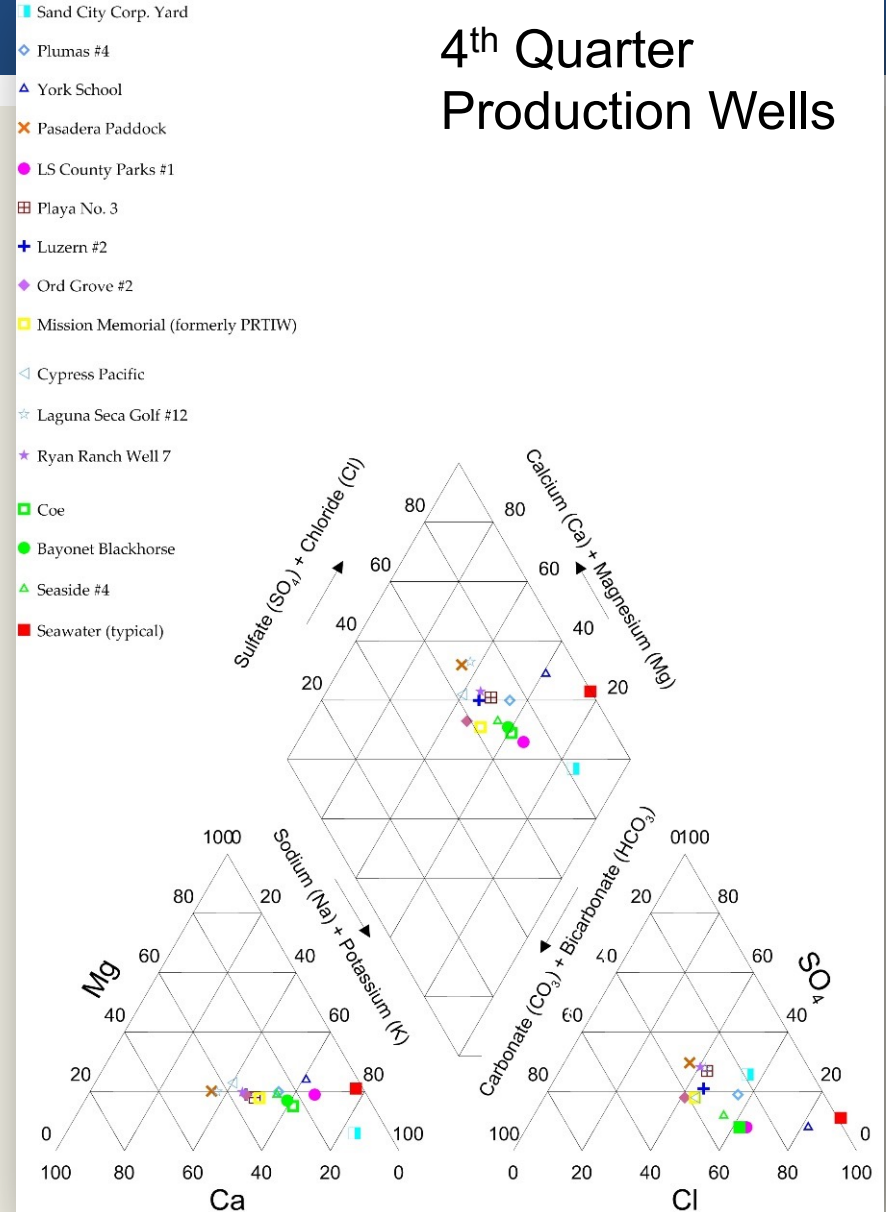
PIPER DIAGRAMS

No trends towards seawater

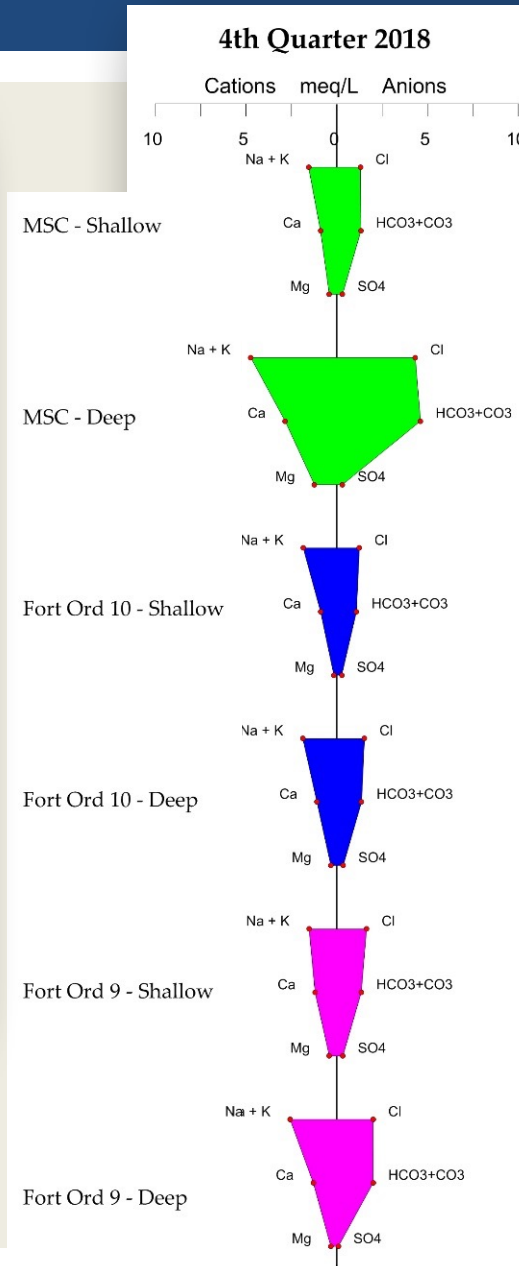
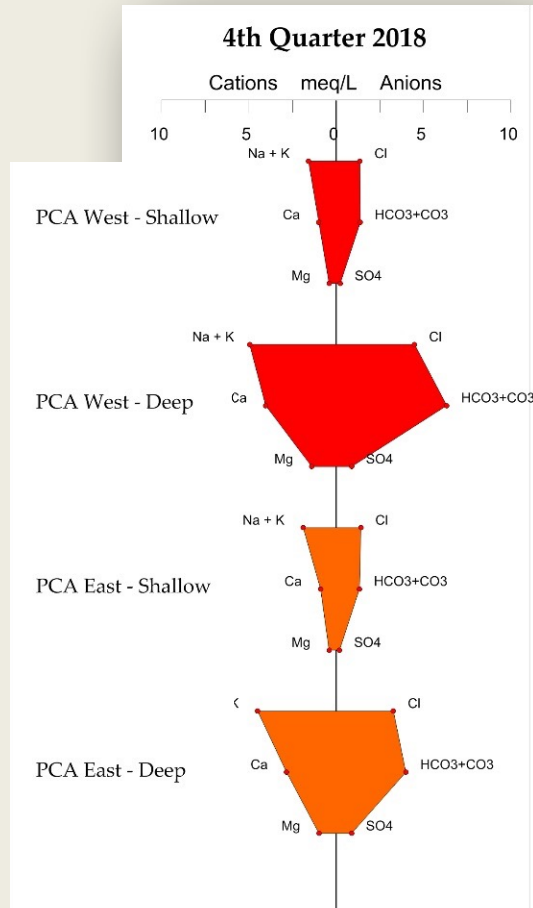
4th Quarter Monitoring Wells



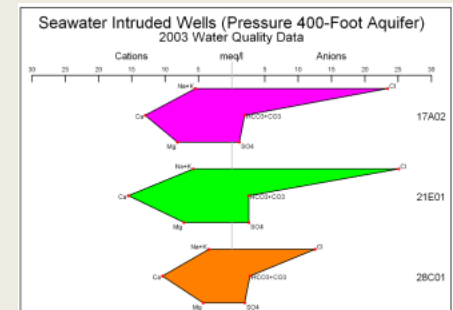
4th Quarter Production Wells



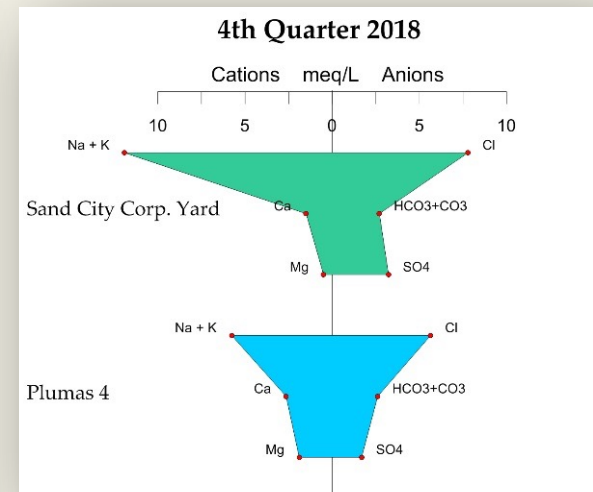
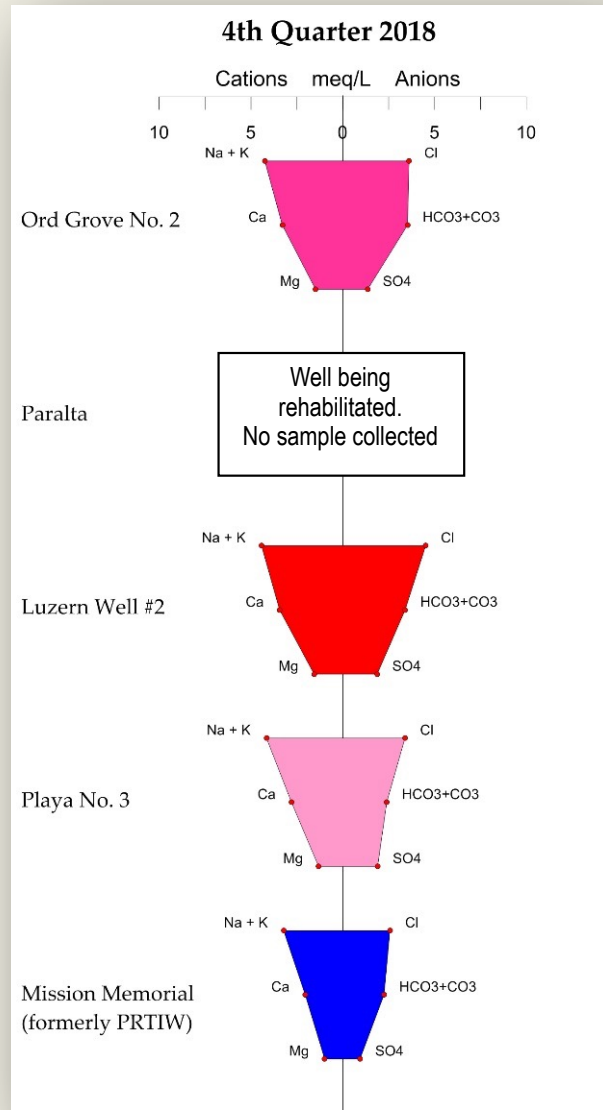
MONITORING WELL STIFF DIAGRAMS



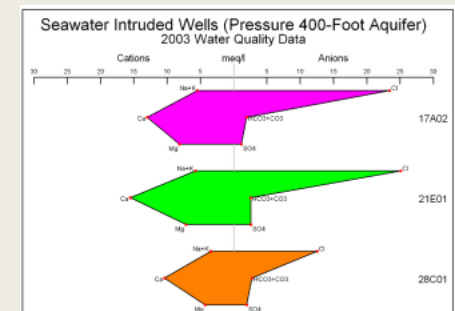
No shapes typical of seawater intruded anions & cations



PRODUCTION WELL STIFF DIAGRAMS

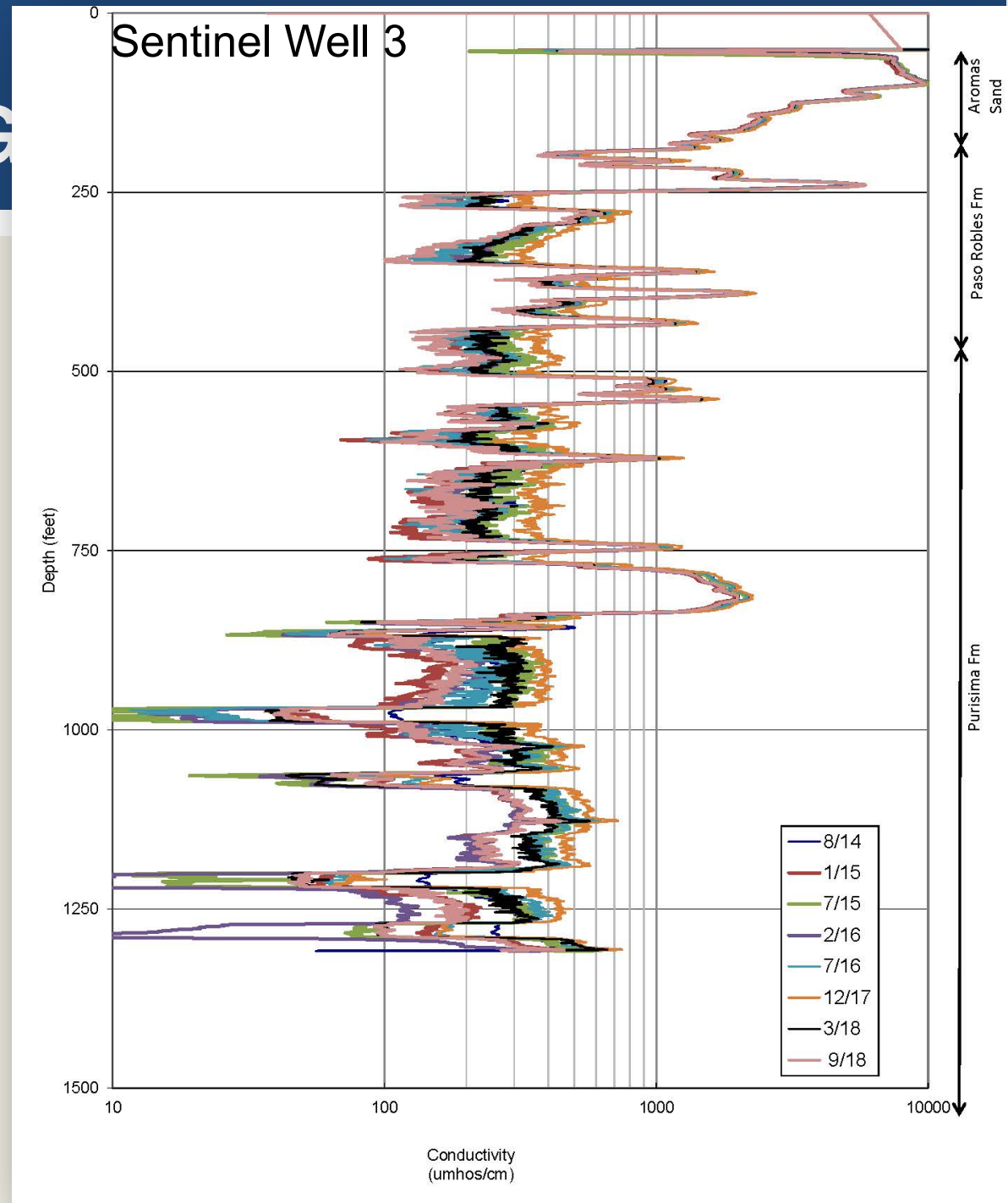


No shapes typical of seawater intruded anions & cations

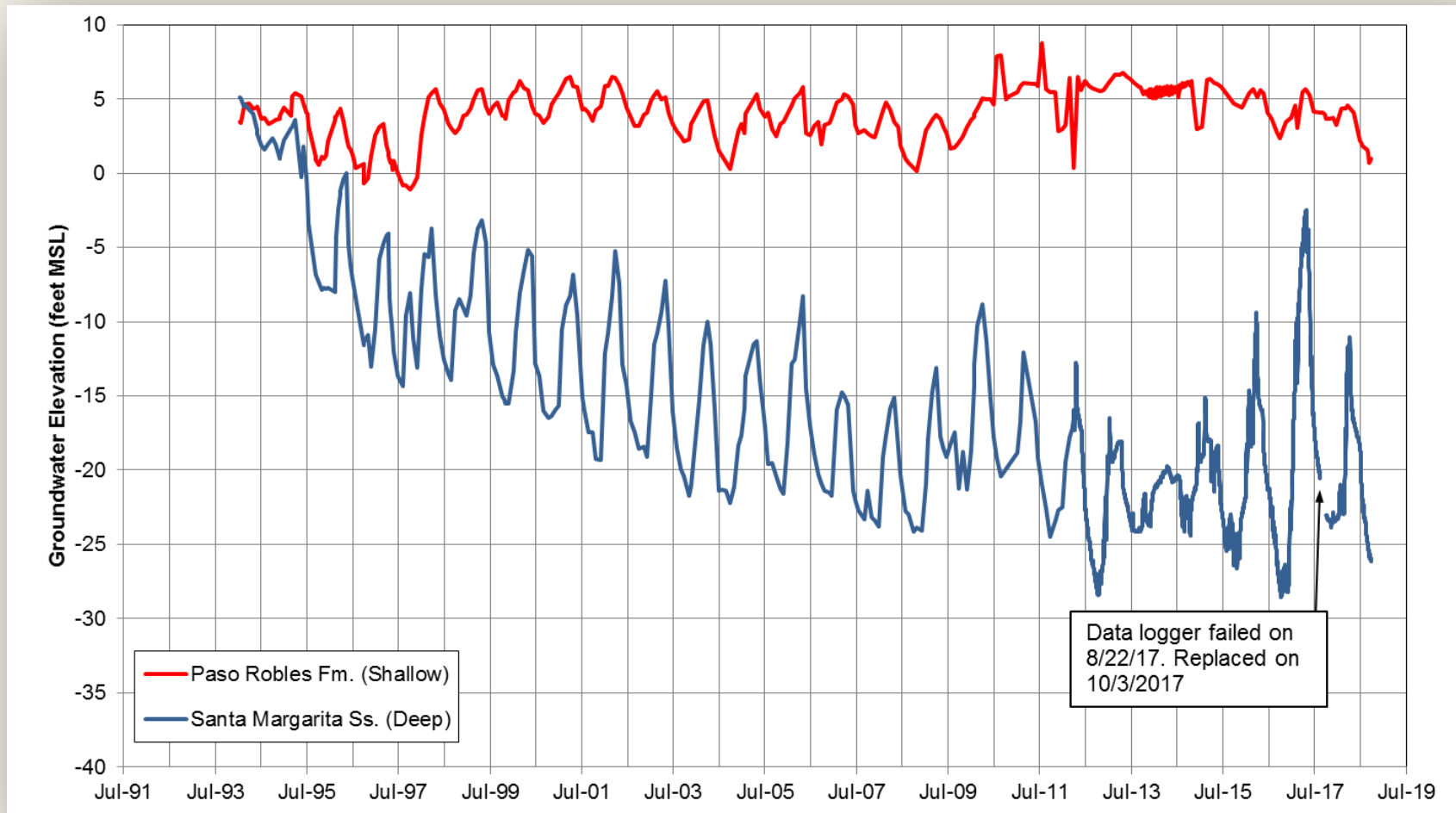


ELECTRIC INDUCTION LOG

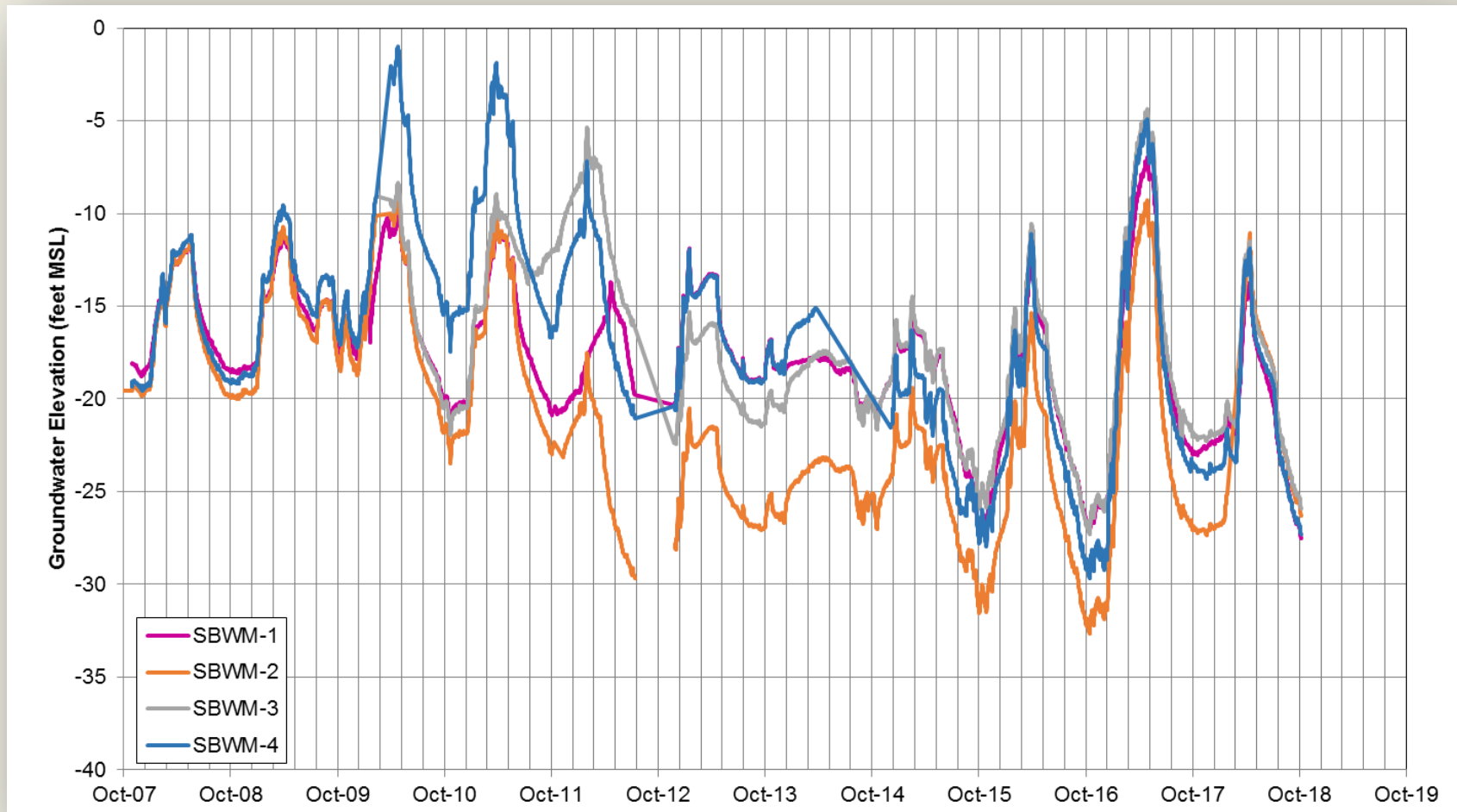
None of the Sentinel wells show detectable changes in conductivity in the deeper aquifers where production wells extract groundwater



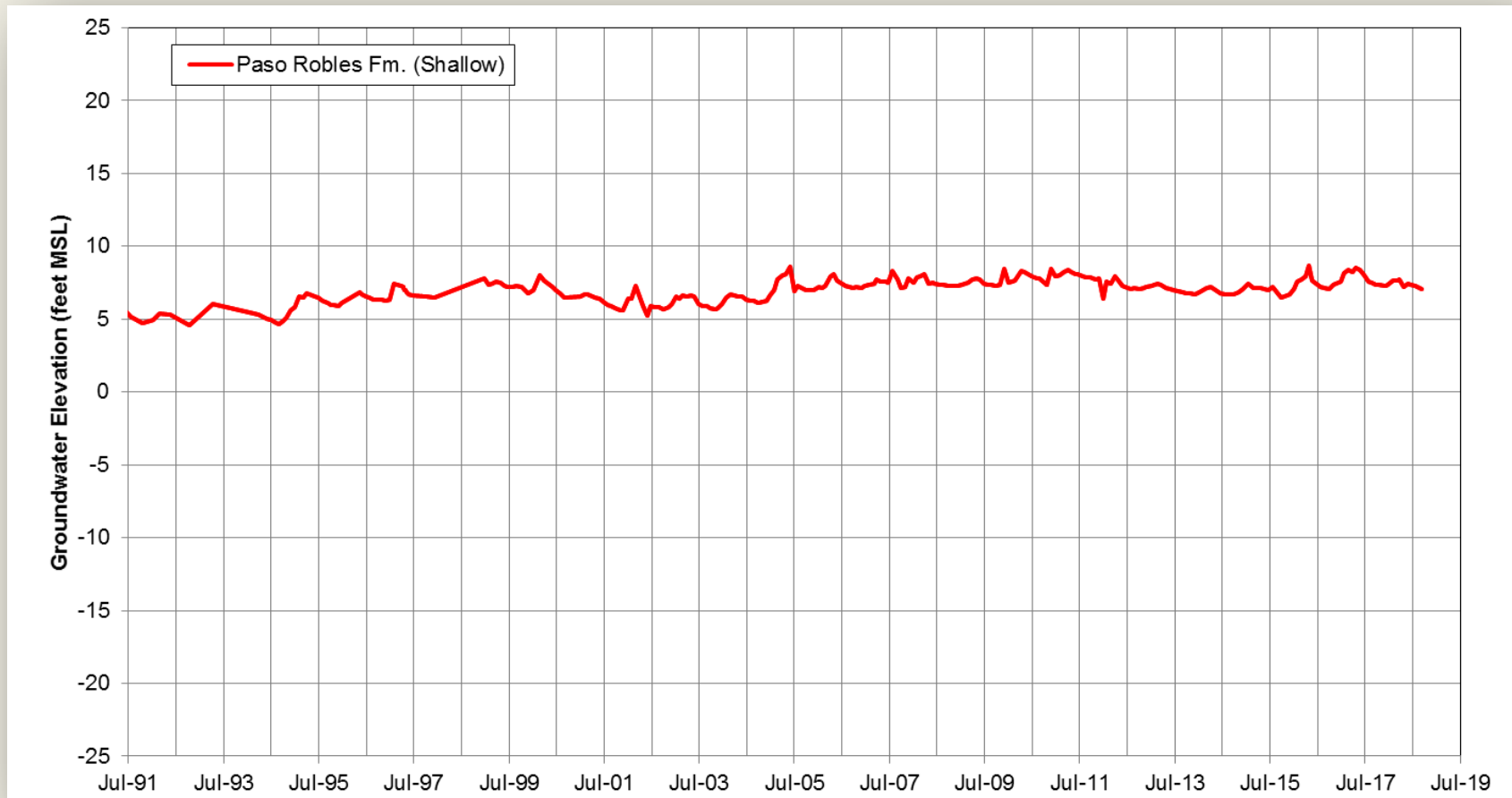
NORTHERN COASTAL GROUNDWATER ELEVATIONS



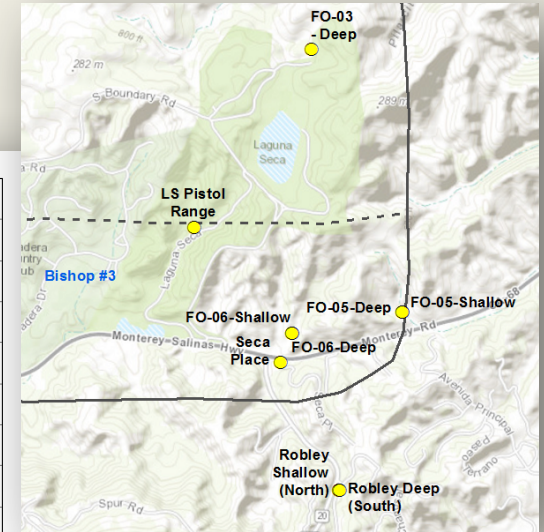
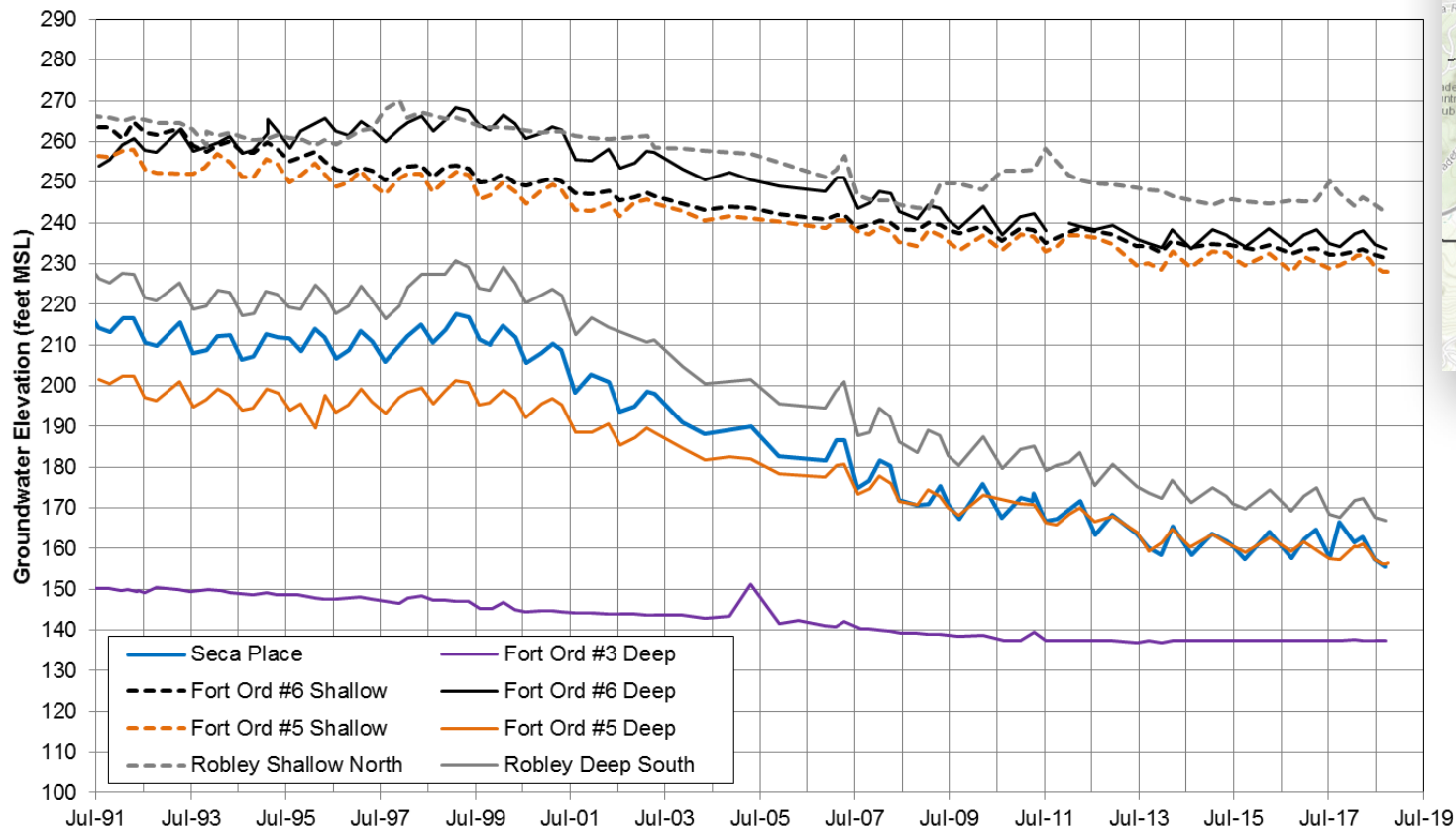
NORTHERN COASTAL GROUNDWATER ELEVATIONS



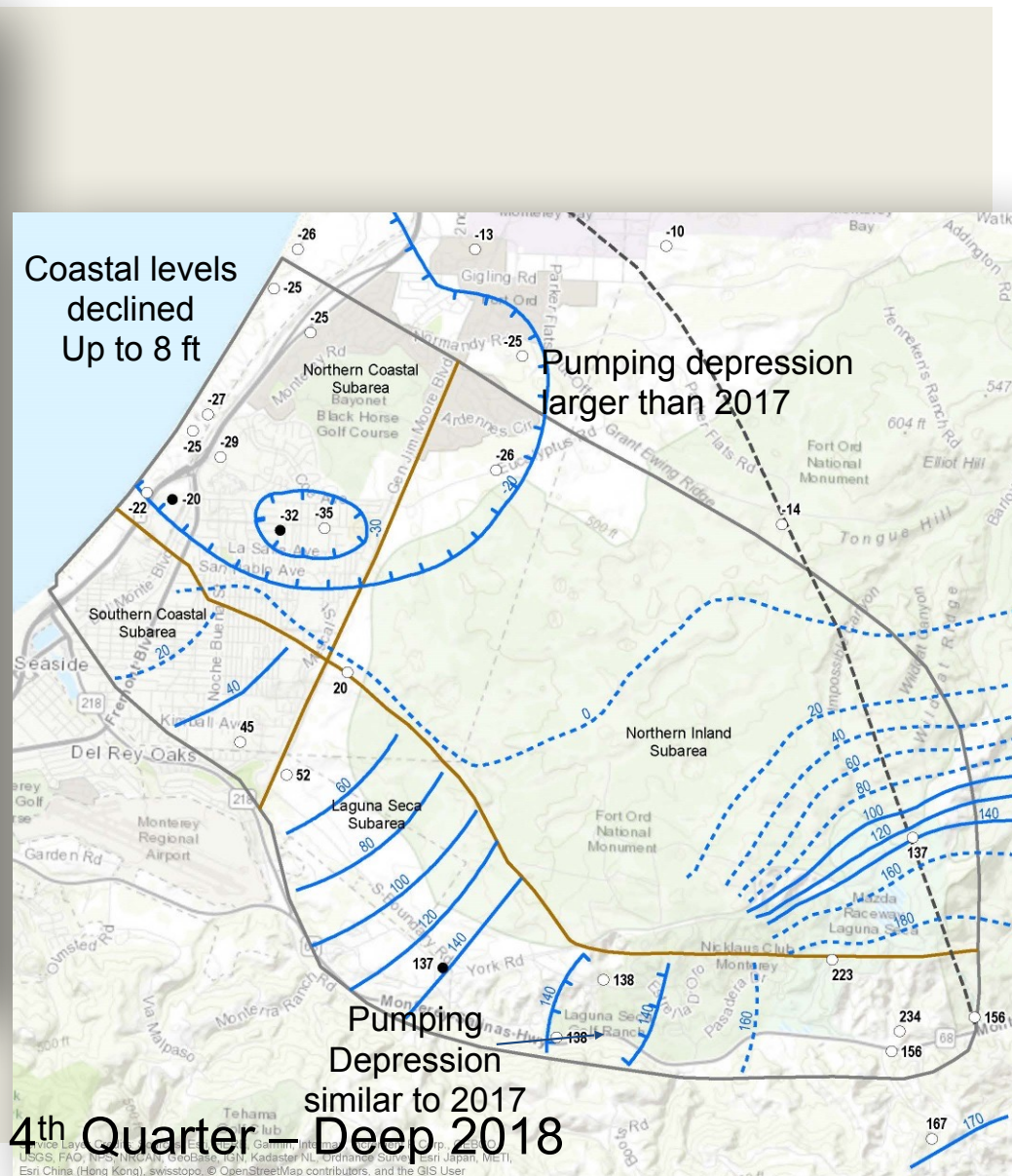
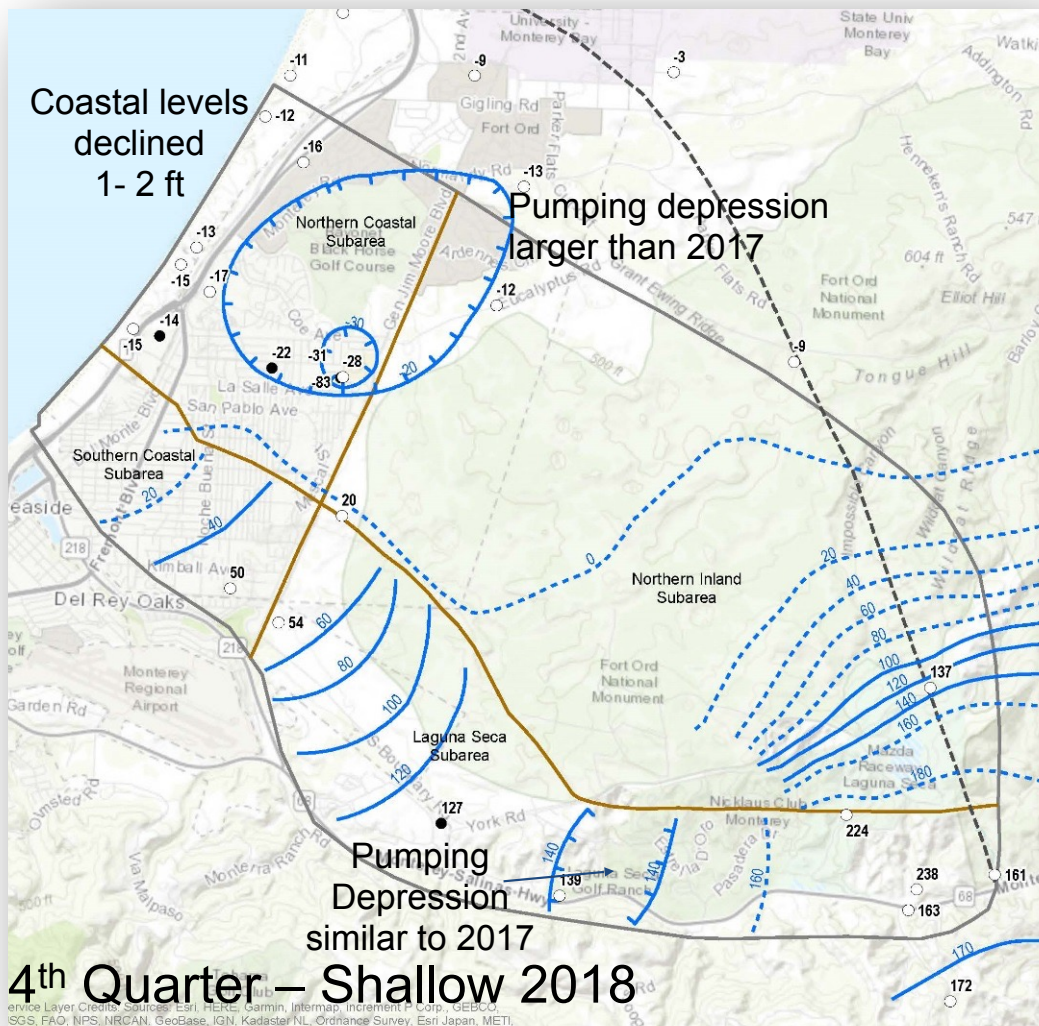
SOUTHERN COASTAL GROUNDWATER ELEVATIONS



EASTERN LAGUNA SECA GROUNDWATER ELEVATIONS



GROUNDWATER ELEVATION CONTOURS

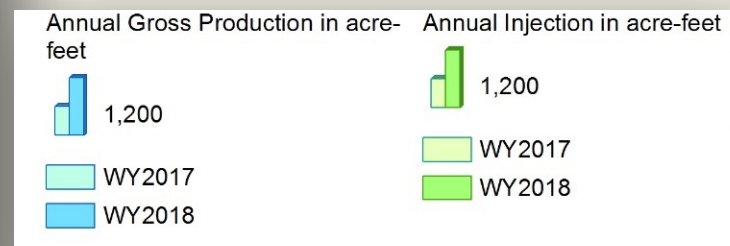
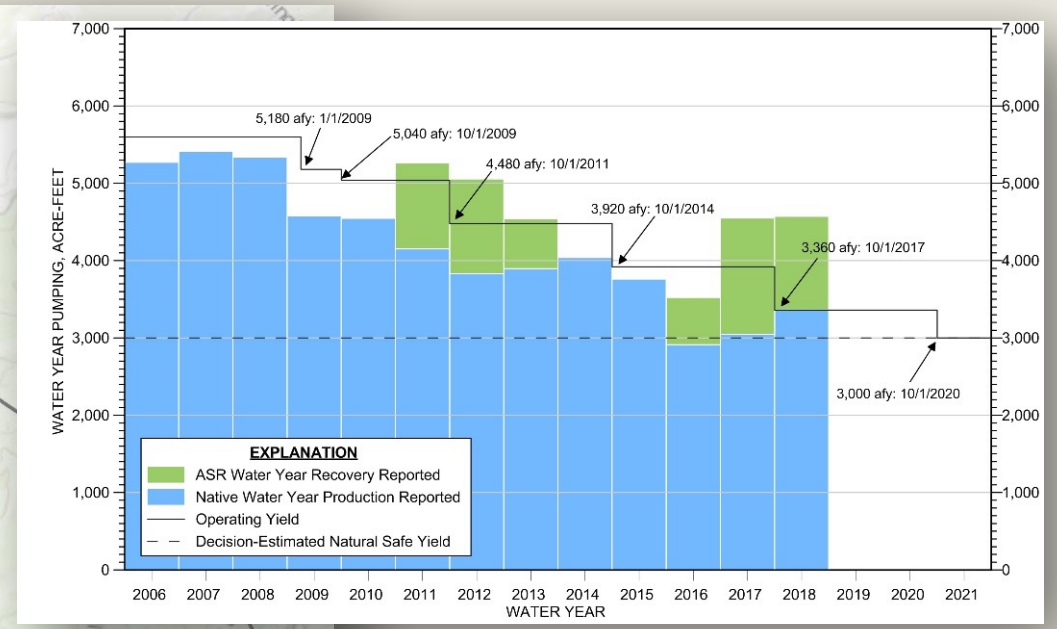
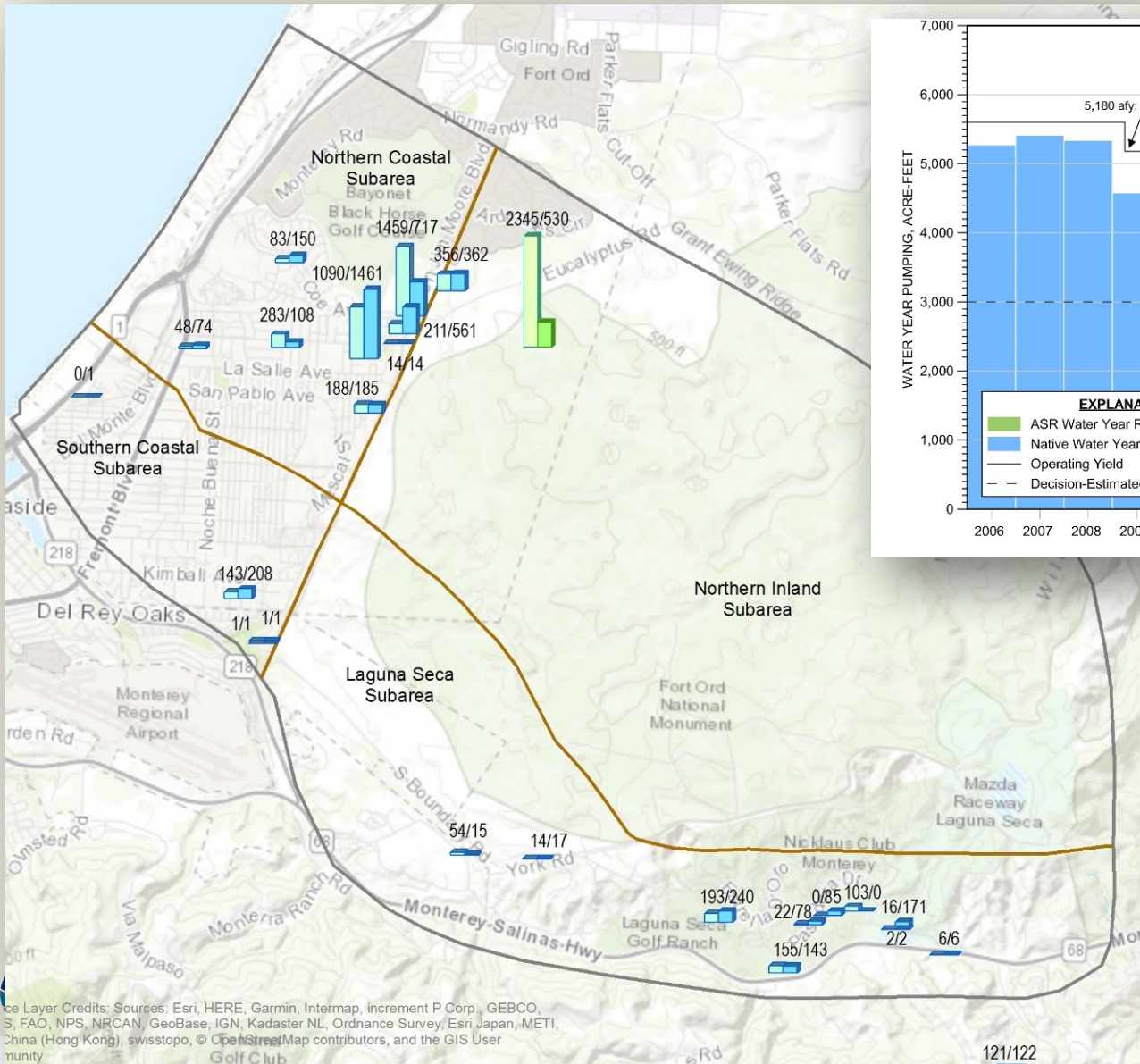


PROTECTIVE GROUNDWATER ELEVATIONS

<i>Subarea</i>	<i>Well</i>	<i>Depth</i>	<i>Protective Elevation.</i>	<i>Above or Below</i>
<i>Northern Coastal</i>	<i>MSC</i>	<i>Deep</i>	<i>17</i>	<i>Below</i>
		<i>Shallow</i>	<i>11</i>	<i>Below</i>
	<i>PCA-W</i>	<i>Deep</i>	<i>17</i>	<i>Below</i>
		<i>Shallow</i>	<i>2</i>	<i>Below</i>
	<i>Sentinel 3</i>	<i>Deep</i>	<i>4</i>	<i>Below</i>
<i>Southern</i>	<i>CDM-MW4</i>	<i>Shallow</i>	<i>2</i>	<i>Above</i>



GROUNDWATER PRODUCTION WY 2017 VS 2018



Source Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, S. FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User community

CONCLUSIONS

Analyses indicating seawater intrusion is NOT occurring:

- **No groundwater chemistry changes towards seawater in either shallow or deep groundwater**
- **Overall, chloride concentration trends were stable for most monitoring wells, with no increases greater than 10 mg/L**
- **Sodium/chloride molar ratios in the monitoring wells remained constant or increased over the past year**
- **Induction logging data at the coastal Sentinel Wells do not show large changes over time that are indicative of seawater intrusion**

CONCLUSIONS

Conditions in the basin that continue to provide a potential for seawater intrusion:

- **All deep groundwater in the Northern Coastal subarea is below sea level**
 - **2nd quarter (winter/spring) > 12 feet below sea level**
 - **4th quarter (summer/fall) > 25 feet below sea level**
- **Groundwater levels remain below protective elevations in all deep target monitoring wells**
- **Currently, only one of the three shallow wells' groundwater levels are above protective elevations**

CONCLUSIONS

- **After 16 years of ongoing declines in the Laguna Seca Subarea, the rate of decline is now less and appears close to stabilizing**
- **Native groundwater production in the Seaside Groundwater Basin for Water Year 2018 was 3,363.4 acre-feet:**
 - **314 acre-feet more than Water Year 2017**
 - **3.4 acre-feet more than the Decision-ordered Operating Yield of 3,360 acre-feet per year that is required between October 1, 2017 and September 30, 2020**

RECOMMENDATIONS

- 1. Continue to Analyze and Report on Water Quality Annually**
- 2. Include Data from New Monitoring Wells Installed as Part of Recharge Projects**

QUESTIONS?