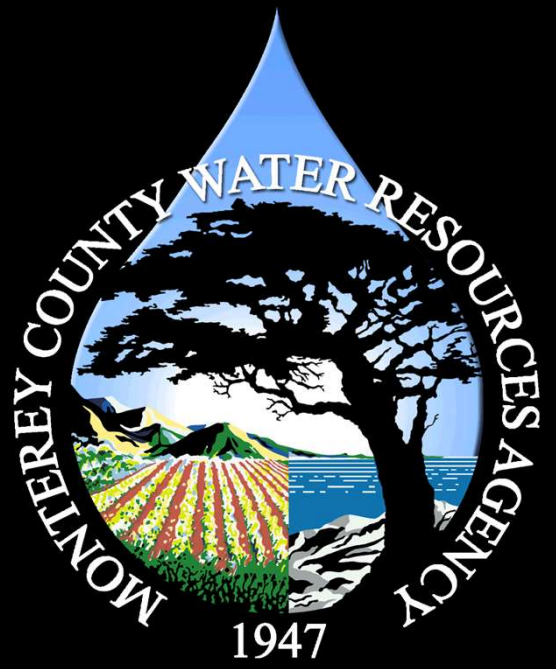
MONTEREY COUNTY WATER RESOURCES AGENCY
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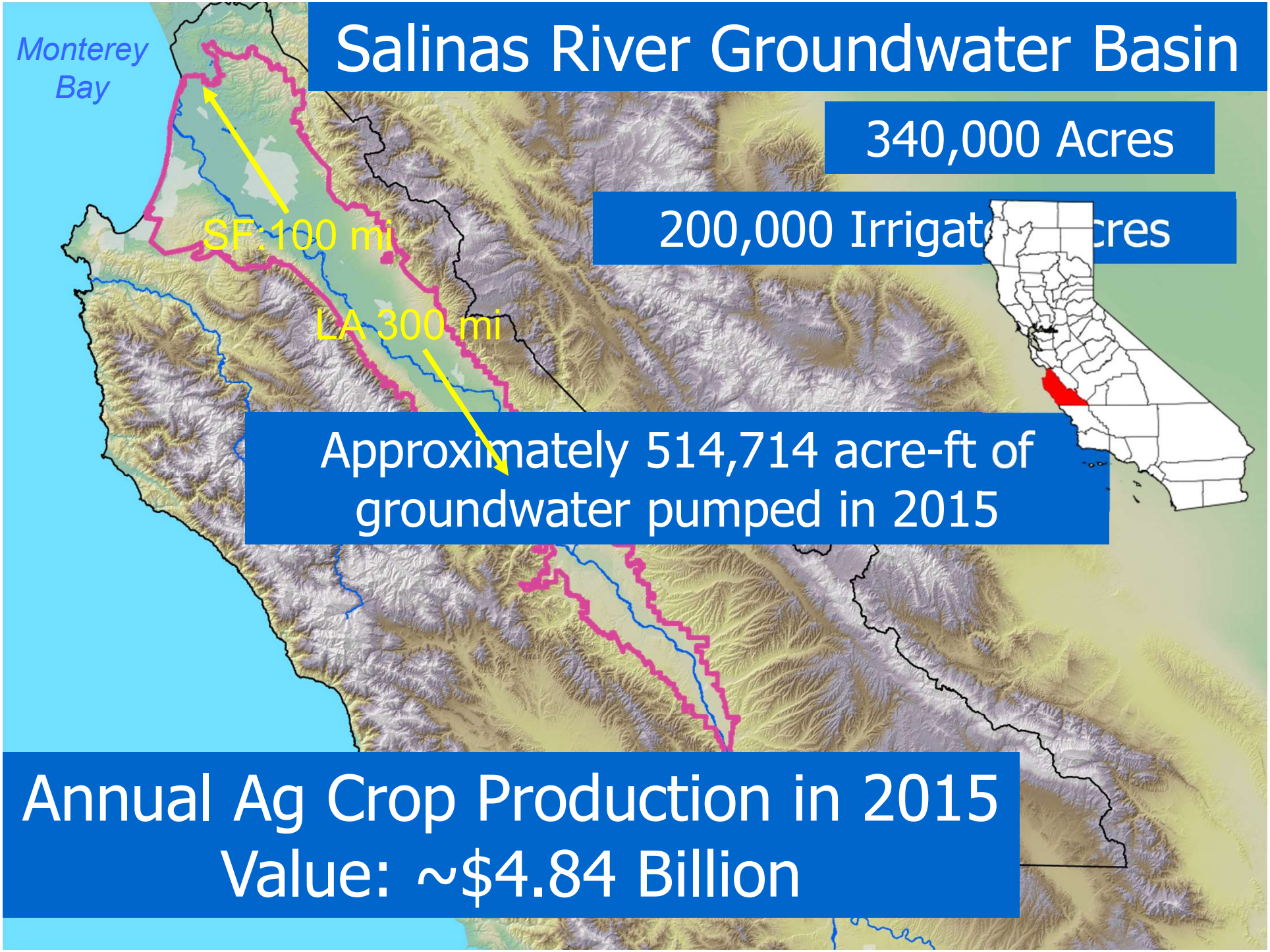
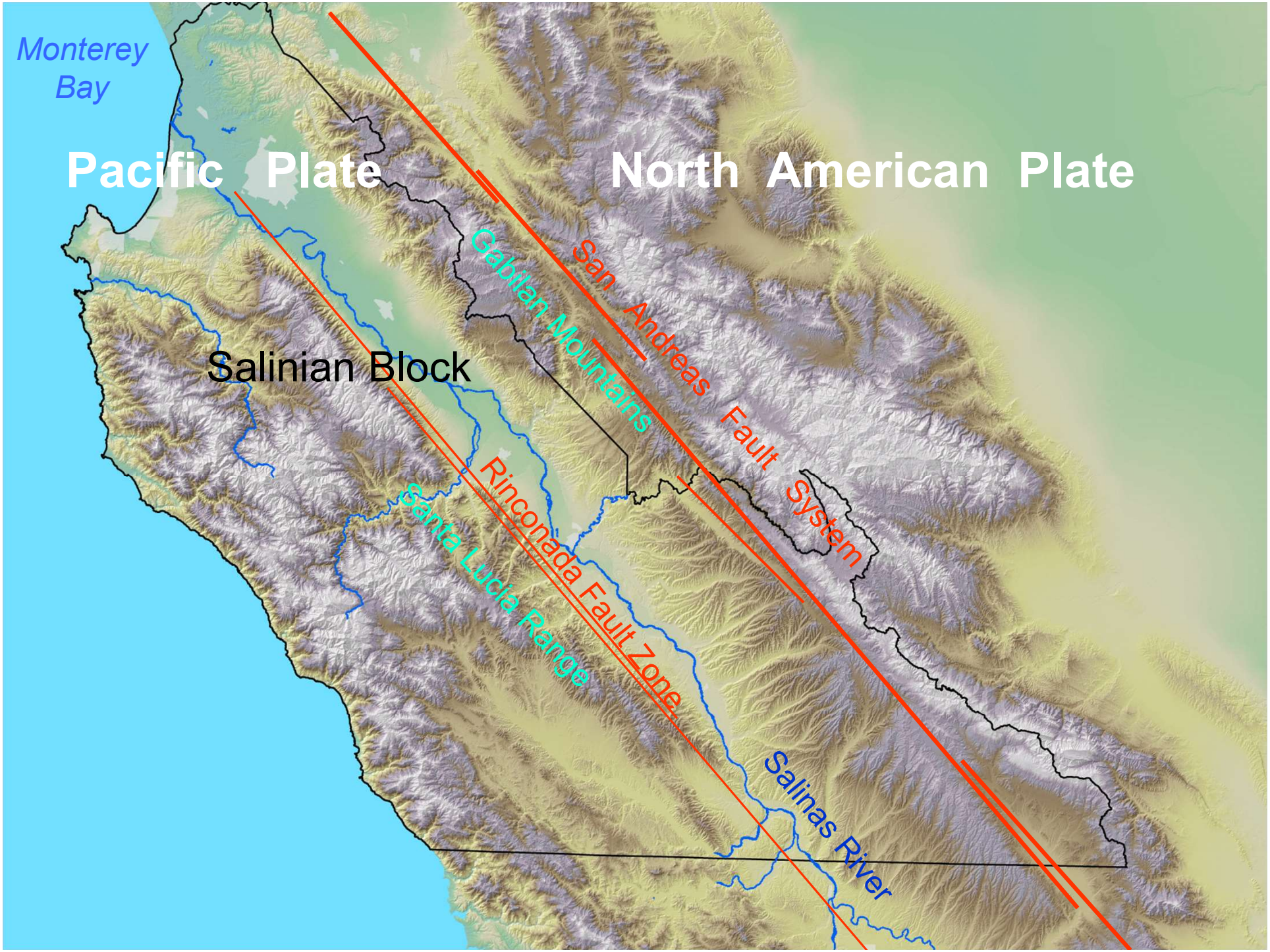
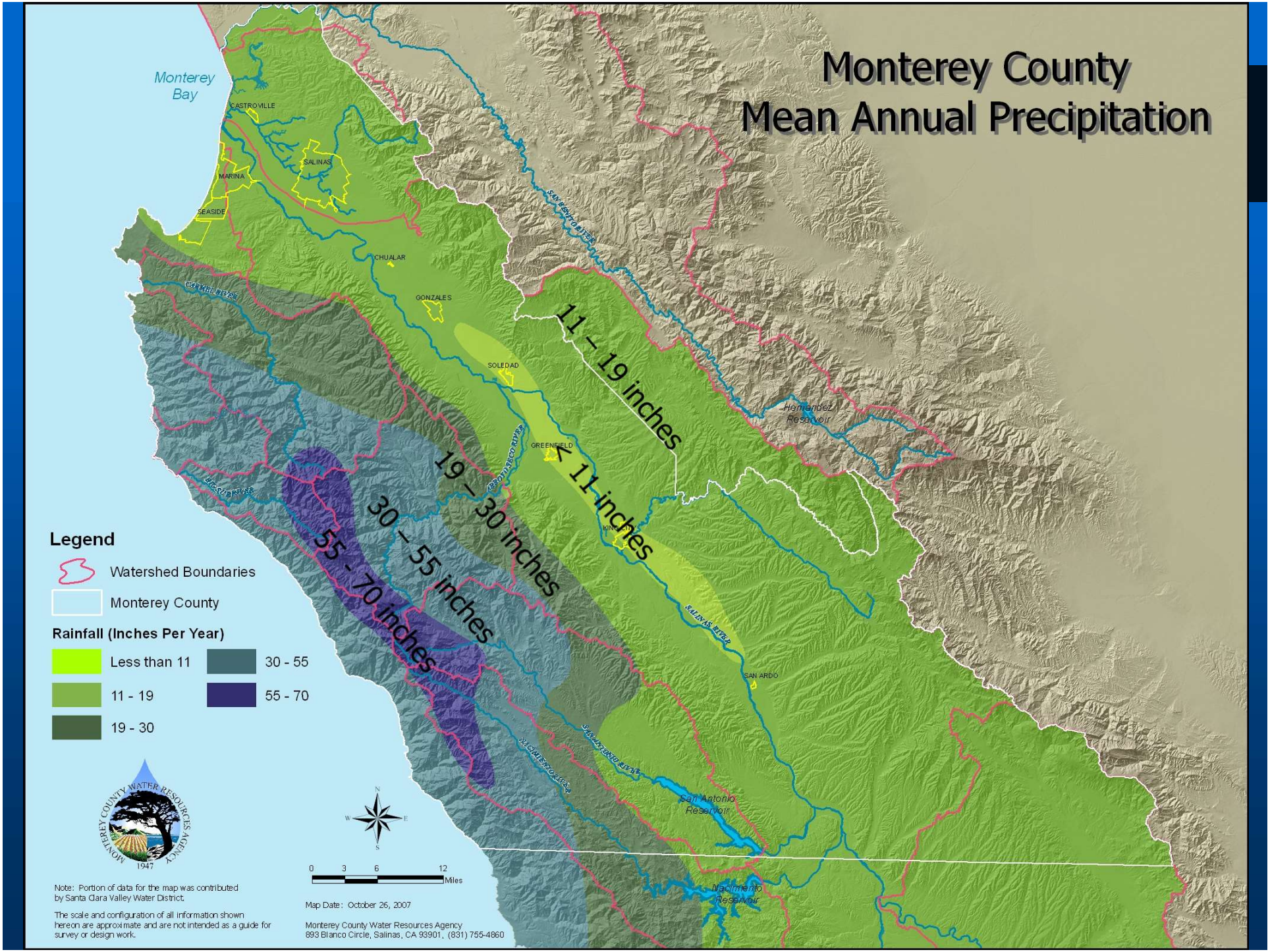
State of the Basin and Update on Seawater Intrusion in the Coastal Aquifers of the Salinas Valley Groundwater Basin

- Geographic and Geologic Setting
- State of the Salinas River Groundwater Basin
- Groundwater Extraction
- Groundwater Monitoring and Long Term Groundwater Level Trends
- Seawater Intrusion in the Salinas Valley


Monterey Bay
Salinas River Groundwater Basin
340,000 Acres
200,000 Irrigat cres
SF 100 mi
LA 300 mi
Approximately 514,714 acre-ft of groundwater pumped in 2015
Annual Ag Crop Production in 2015
Value: ~$4.84 Billion


Monterey Bay
Pacific Plate
North American Plate
Salinian Block
Gabilan Mountains
San Andreas Fault System
Rinconada Fault Zone
Santa Lucia Range
Salinas River


Monterey County
Mean Annual Precipitation
Monterey Bay
CASTROVILLE
SALINAS
MARINA
SEASIDE
CHUALAR
GONZALES
SOLEDAD
GREENFIELD
KING CITY
SAN ARDO
Hernandez Reservoir
San Antonio Reservoir
Nacimiento Reservoir
SALINAS RIVER
SAN ANTONIO RIVER
NACIMIENTO RIVER
ARROYO SECO RIVER
CARMEL RIVER
PESCADERO
11 – 19 inches
< 11 inches
19 – 30 inches
30 – 55 inches
55 - 70 inches
Legend
Watershed Boundaries
Monterey County
Rainfall (Inches Per Year)
Less than 11
11 - 19
19 - 30
30 - 55
55 - 70
MONTEREY COUNTY WATER RESOURCES AGENCY
1947
N
W
E
S
0 3 6 12
Miles
Note: Portion of data for the map was contributed by Santa Clara Valley Water District.
The scale and configuration of all information shown hereon are approximate and are not intended as a guide for survey or design work.
Map Date: October 26, 2007
Monterey County Water Resources Agency
893 Blanco Circle, Salinas, CA 93901, (831) 755-4860

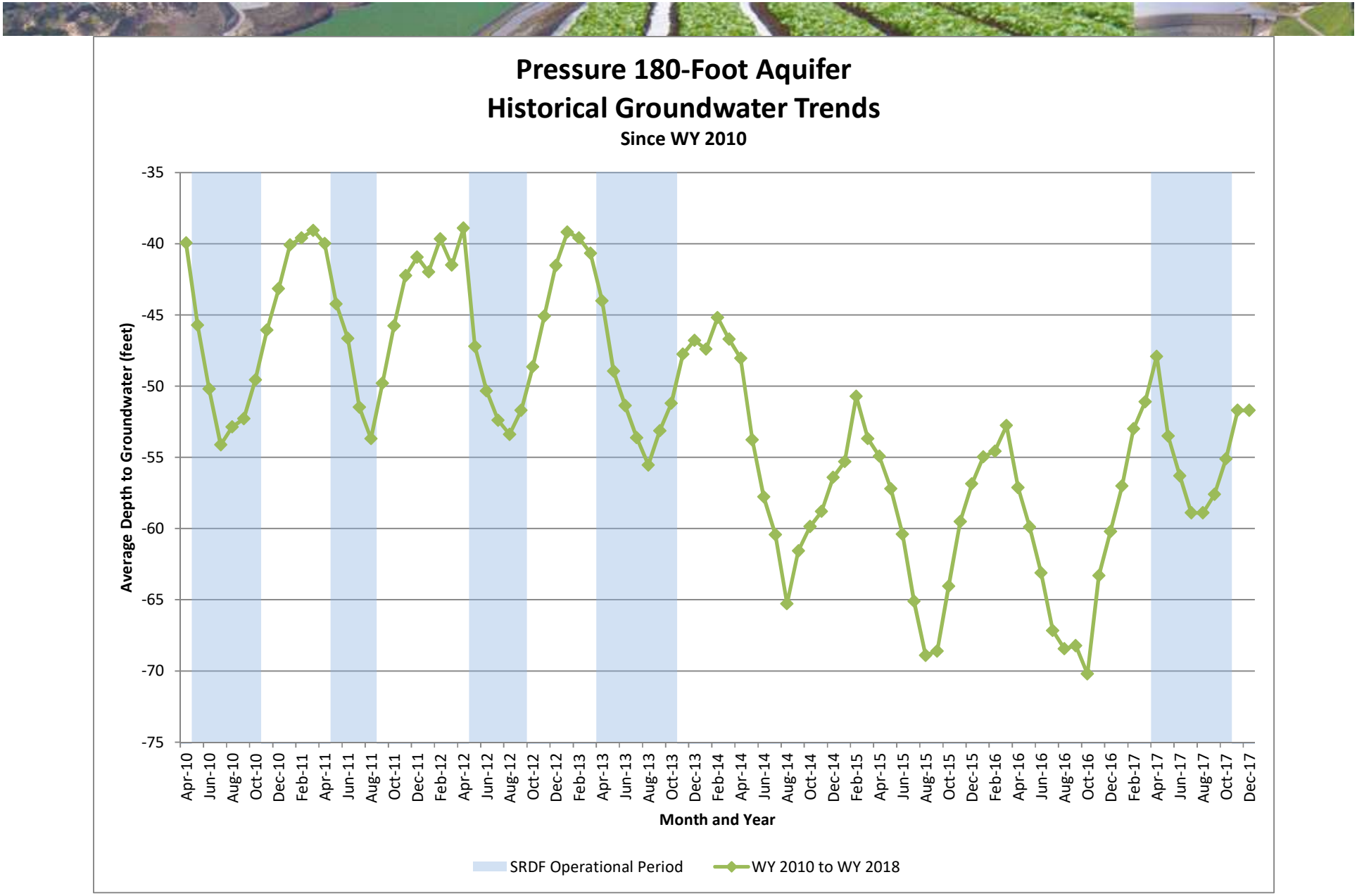
Current Basin Conditions

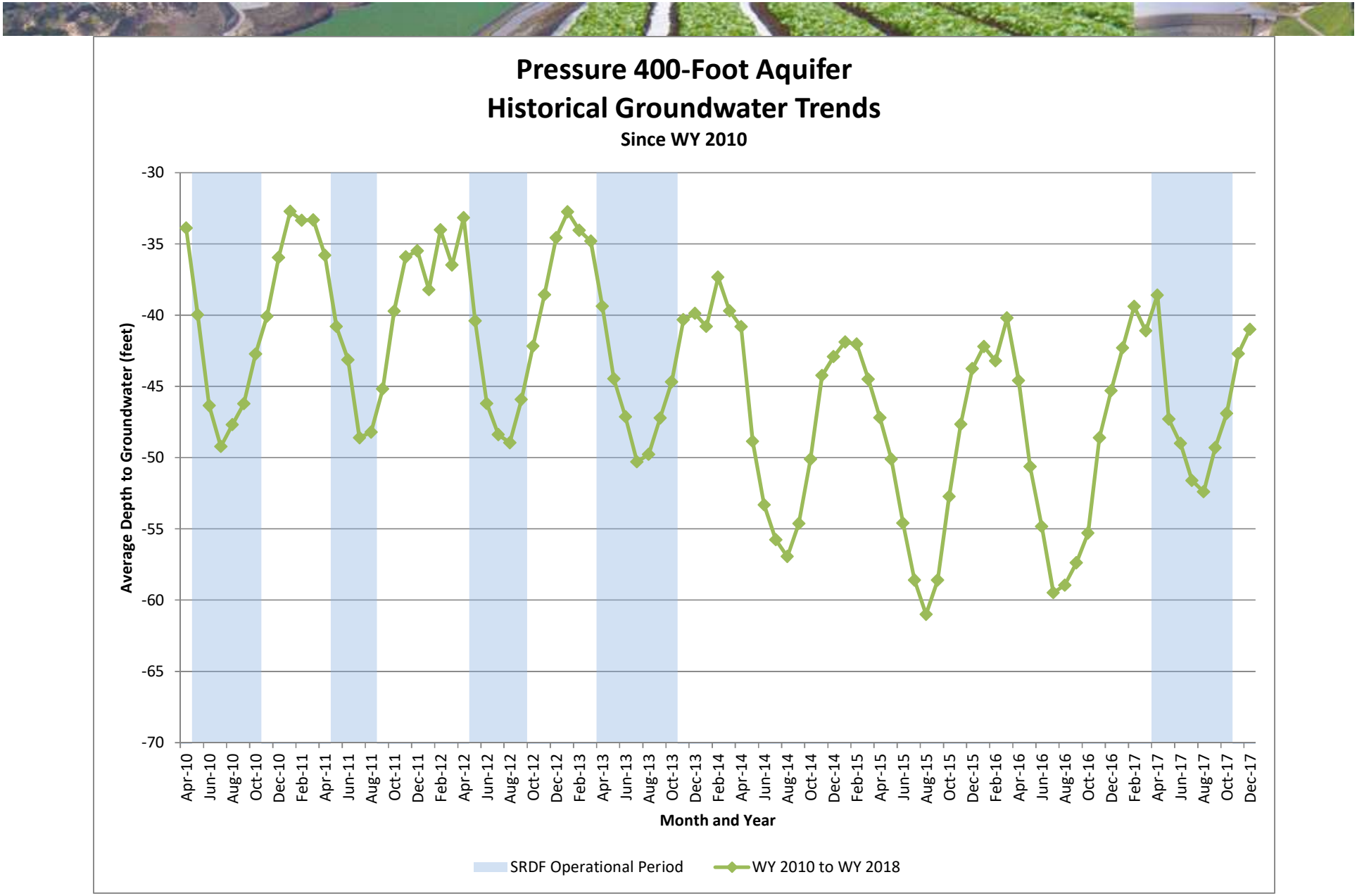
- The Basin is currently out of balance – usage exceeds yield by approximately 17,000 to 24,000 afy.
- However, the estimated volume of groundwater in reserve (i.e. storage) is about 16.4 million acre-feet.
- Significant groundwater reserve – which could be used to offset temporary overdraft conditions.
- Consequences of extended use of this reserve will result in water level and water quality declines; along with continued seawater advancement.

Groundwater Extraction

2015 Reported Groundwater Extraction: 514,714 Acre-Feet

Subarea	Agricultural Pumping (acre-feet)	Urban Pumping (acre-feet)	Total Pumping (acre-feet)
Pressure	109,214	14,443	123,657
East Side	91,491	12,631	104,122
Forebay	142,668	6,221	148,889
Upper Valley	134,740	3,306	138,046
Total	478,113	36,601	514,714
Percent of Total	92.89%	7.11%	100%


Pressure 180-Foot Aquifer
Historical Groundwater Trends
Since WY 2010
Average Depth to Groundwater (feet)
-35
-40
-45
-50
-55
-60
-65
-70
-75
Apr-10
Jun-10
Aug-10
Oct-10
Dec-10
Feb-11
Apr-11
Jun-11
Aug-11
Oct-11
Dec-11
Feb-12
Apr-12
Jun-12
Aug-12
Oct-12
Dec-12
Feb-13
Apr-13
Jun-13
Aug-13
Oct-13
Dec-13
Feb-14
Apr-14
Jun-14
Aug-14
Oct-14
Dec-14
Feb-15
Apr-15
Jun-15
Aug-15
Oct-15
Dec-15
Feb-16
Apr-16
Jun-16
Aug-16
Oct-16
Dec-16
Feb-17
Apr-17
Jun-17
Aug-17
Oct-17
Dec-17
Month and Year
SRDF Operational Period
WY 2010 to WY 2018


Pressure 400-Foot Aquifer
Historical Groundwater Trends
Since WY 2010
Average Depth to Groundwater (feet)
-30
-35
-40
-45
-50
-55
-60
-65
-70
Apr-10
Jun-10
Aug-10
Oct-10
Dec-10
Feb-11
Apr-11
Jun-11
Aug-11
Oct-11
Dec-11
Feb-12
Apr-12
Jun-12
Aug-12
Oct-12
Dec-12
Feb-13
Apr-13
Jun-13
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Feb-14
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Dec-14
Feb-15
Apr-15
Jun-15
Aug-15
Oct-15
Dec-15
Feb-16
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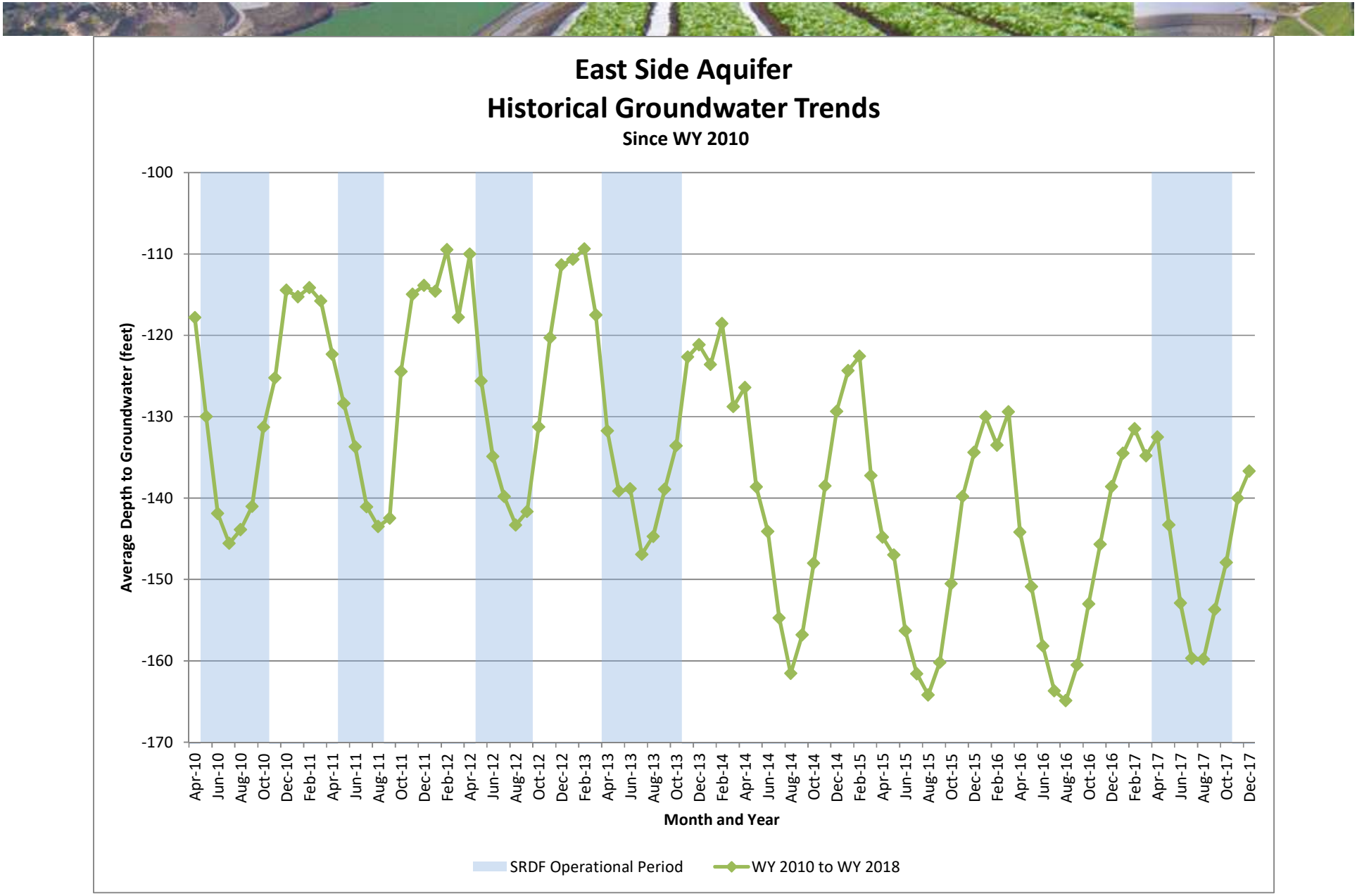
Jun-16
Aug-16
Oct-16
Dec-16
Feb-17
Apr-17
Jun-17
Aug-17
Oct-17
Dec-17
Month and Year
SRDF Operational Period
WY 2010 to WY 2018


East Side Aquifer
Historical Groundwater Trends
Since WY 2010
Average Depth to Groundwater (feet)
-100
-110
-120
-130
-140
-150
-160
-170
Apr-10
Jun-10
Aug-10
Oct-10
Dec-10
Feb-11
Apr-11
Jun-11
Aug-11
Oct-11
Dec-11
Feb-12
Apr-12
Jun-12
Aug-12
Oct-12
Dec-12
Feb-13
Apr-13
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Oct-14
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Feb-15
Apr-15
Jun-15
Aug-15
Oct-15
Dec-15
Feb-16
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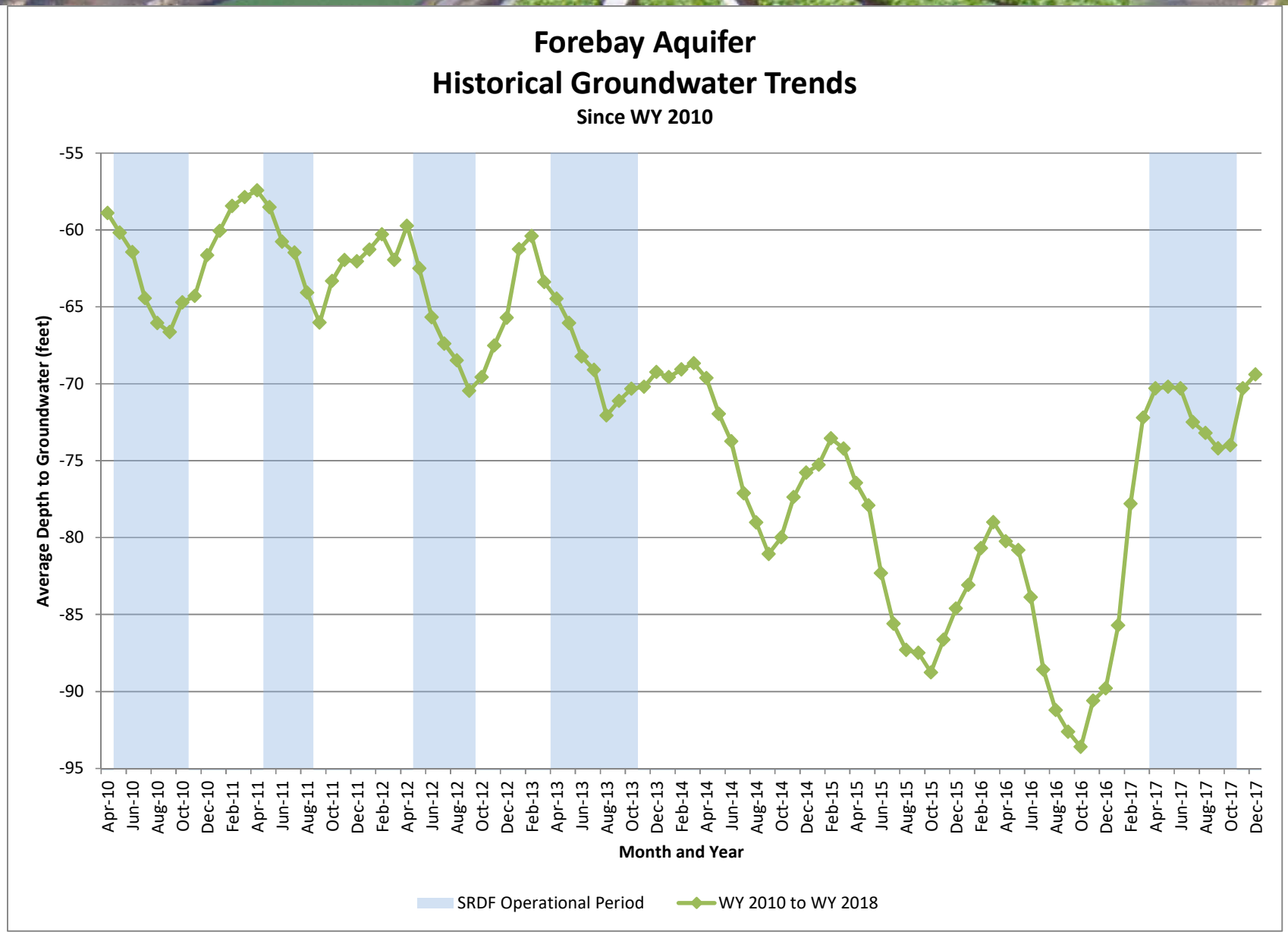
Oct-17
Dec-17
Month and Year
SRDF Operational Period
WY 2010 to WY 2018


Forebay Aquifer
Historical Groundwater Trends
Since WY 2010
Average Depth to Groundwater (feet)
-55
-60
-65
-70
-75
-80
-85
-90
-95
Apr-10
Jun-10
Aug-10
Oct-10
Dec-10
Feb-11
Apr-11
Jun-11
Aug-11
Oct-11
Dec-11
Feb-12
Apr-12
Jun-12
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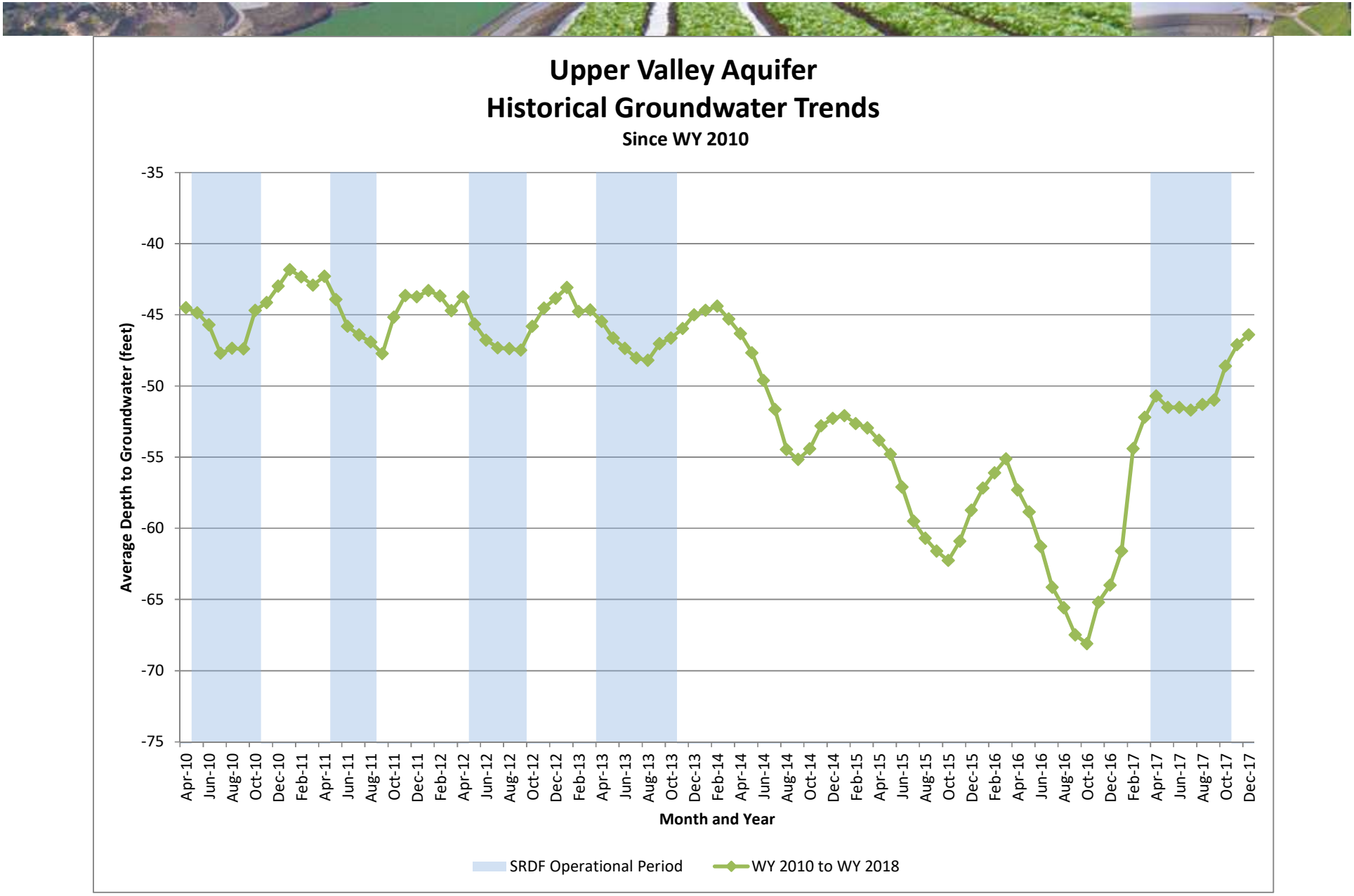
Jun-17
Aug-17
Oct-17
Dec-17
Month and Year
SRDF Operational Period
WY 2010 to WY 2018


Upper Valley Aquifer
Historical Groundwater Trends
Since WY 2010
Average Depth to Groundwater (feet)
-35
-40
-45
-50
-55
-60
-65
-70
-75
Apr-10
Jun-10
Aug-10
Oct-10
Dec-10
Feb-11
Apr-11
Jun-11
Aug-11
Oct-11
Dec-11
Feb-12
Apr-12
Jun-12
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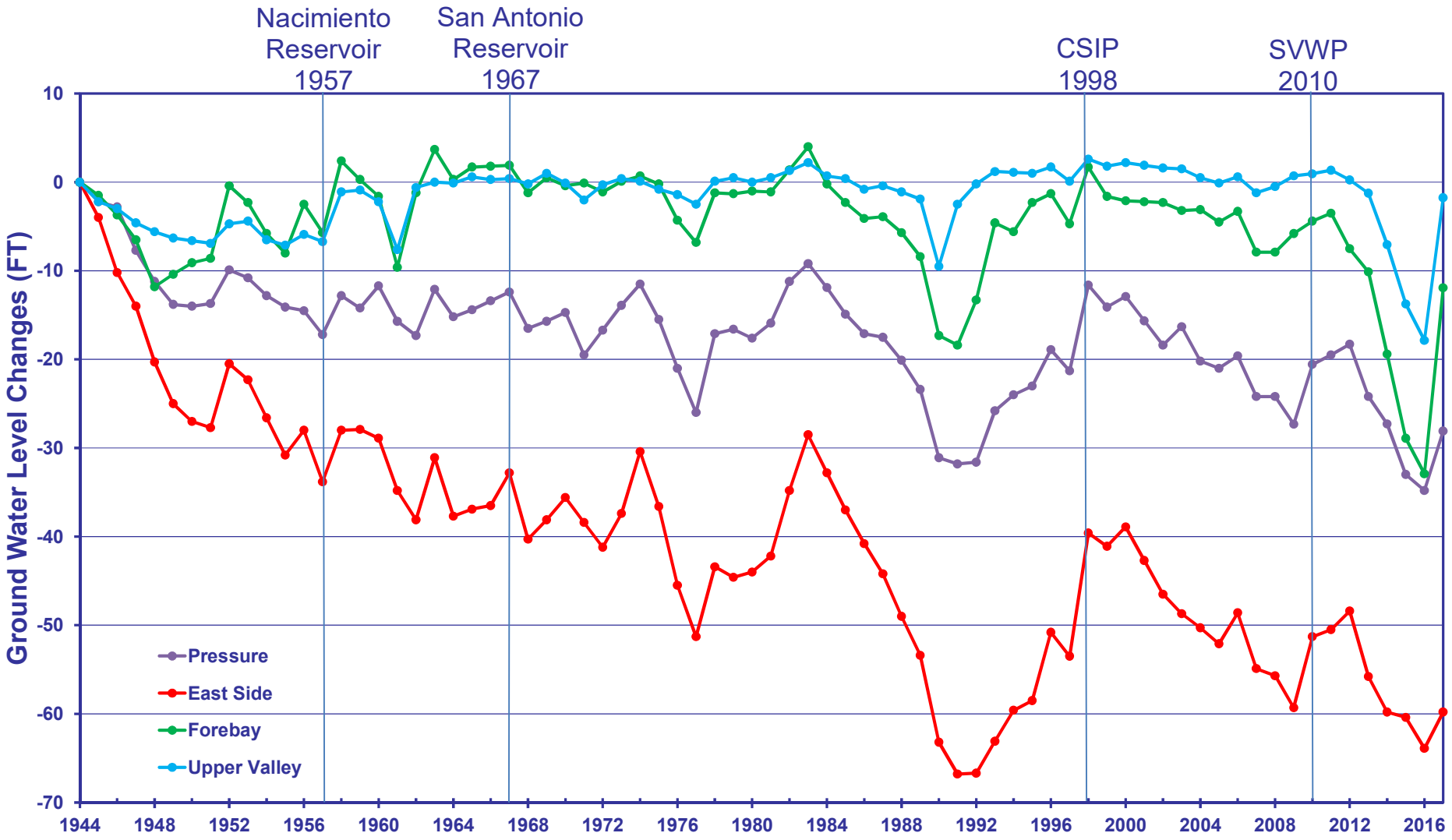
Apr-17
Jun-17
Aug-17
Oct-17
Dec-17
Month and Year
SRDF Operational Period
WY 2010 to WY 2018

Groundwater Level Changes Since 1944

Fall data (1944-2016)

- Indicator of storage change
- Approximately 400 GWL measurements
- 200-300 used for comparison
- Each Subarea represented by one number

Fall Groundwater Level Changes by Subarea



Seawater Intrusion in the Salinas Valley

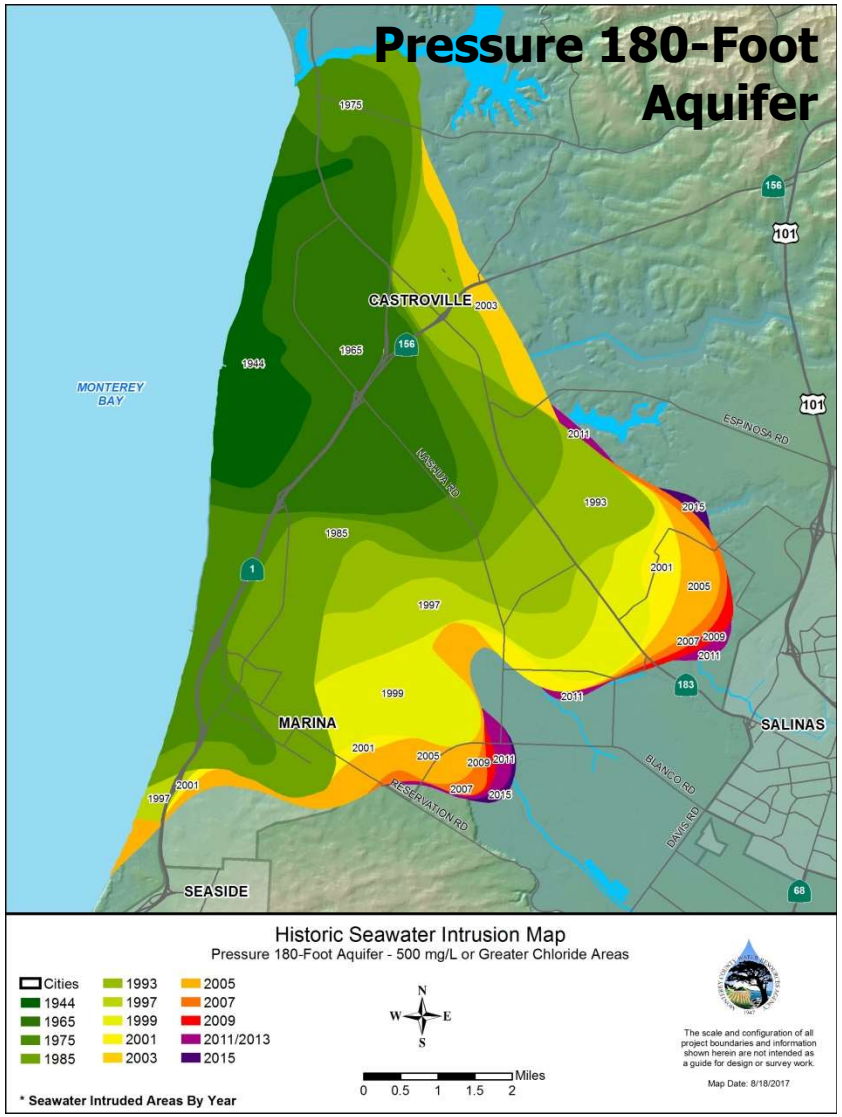
- Approximately 90 Agricultural and 17 Dedicated monitoring wells sampled annually
- Sampling occurs twice during peak pumping season
- Data analyzed and processed every year, with maps created in "odd" years (2009, 2011, 2013, 2015,…)
- 500 mg/L chloride contours delineate seawater intrusion front

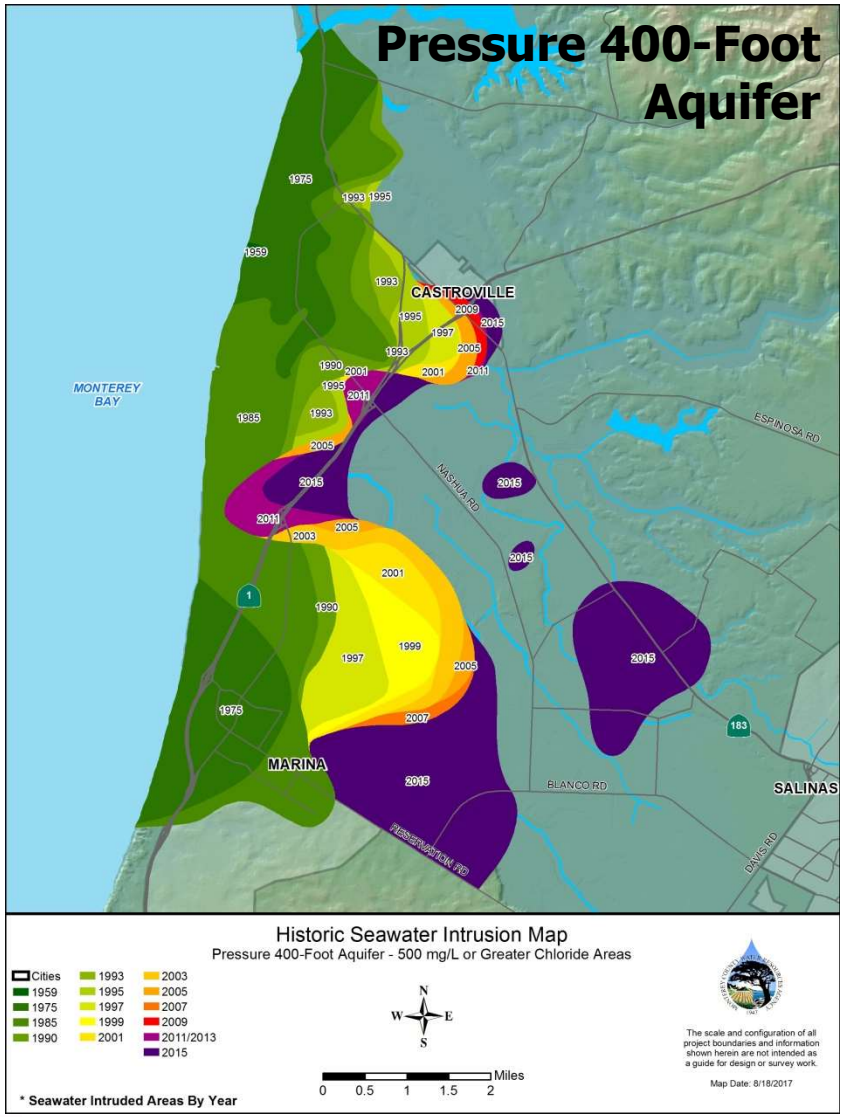
Seawater Intrusion in the Salinas Valley

- 2015 coastal Salinas Valley seawater intrusion contours showed advancement of seawater intrusion front

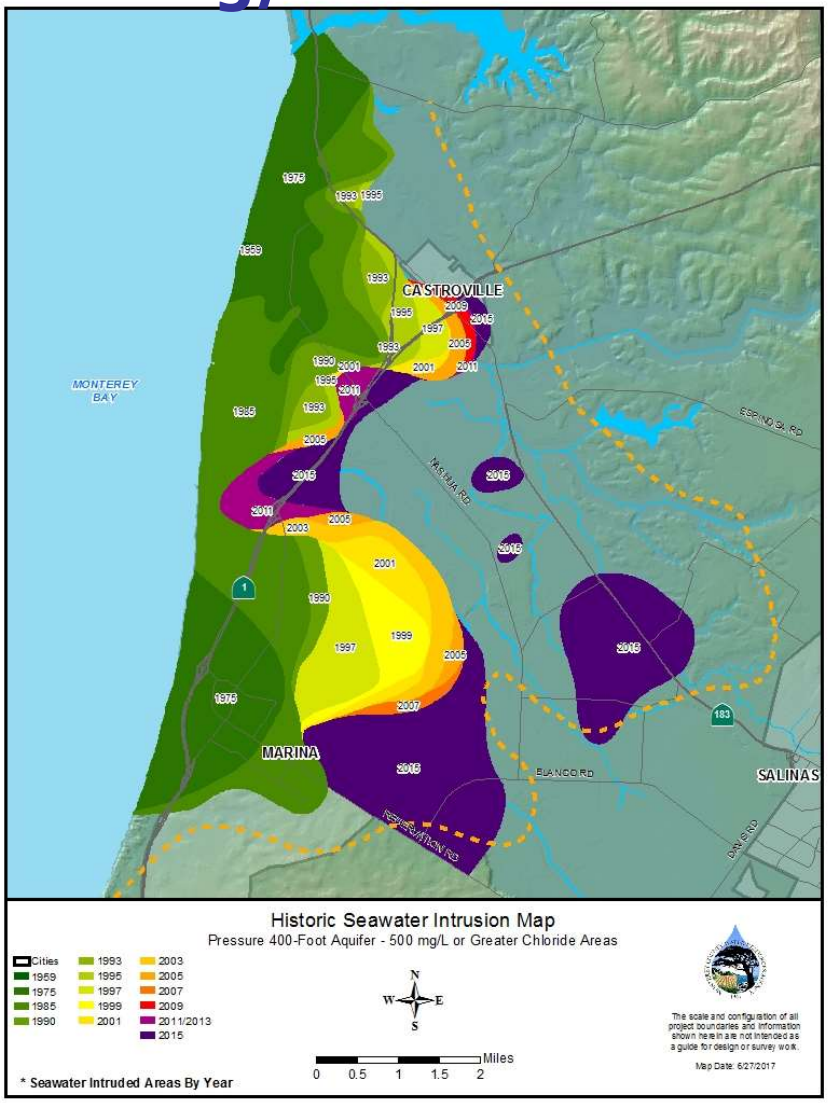
- Included delineation of “islands” of seawater intruded groundwater in the Pressure 400-Foot Aquifer beyond the contiguous seawater intrusion front

Seawater Intrusion in the Salinas Valley





2015 Pressure 400-Foot Aquifer
500 mg/L Chloride Areas



Seawater Intrusion in the Salinas Valley

- On July 11, 2017 when these maps were presented at a special Joint Meeting of the Board of Supervisors and Board or Directors of the Water Resources Agency:

Staff was directed to provide to the Board recommendations for actions that, if implemented, would slow or halt the further expansion of seawater intrusion.

Seawater Intrusion in the Salinas Valley

"Recommendations to Address the Expansion of Seawater Intrusion in the Salinas Valley Groundwater Basin" (October, 2017)

- Provided a discussion of the current knowledge and related background information surrounding seawater intrusion pathways and potential impacts.
- Served as a body of evidence to catalogue the findings used to support the recommendations

Seawater Intrusion in the Salinas Valley

"Recommendations to Address the Expansion of Seawater Intrusion in the Salinas Valley Groundwater Basin"

(October, 2017)

- Each recommendation was developed to be implemented on its own or in concert with the others, and the relative importance of each was discussed in the Report.

- The recommendations were developed as a comprehensive solution that, along with continued operation of projects that have been constructed for the same purpose, have the strongest potential to ensure success in slowing or halting further seawater intrusion.

Seawater Intrusion in the Salinas Valley

"Recommendations to Address the Expansion of Seawater Intrusion in the Salinas Valley Groundwater Basin"

(October, 2017)

Recommendations - Overview

1. An immediate moratorium on groundwater extractions from new wells in the Pressure 400-Foot Aquifer within an identified Area of Impact.
2. Enhancement and expansion of the Castroville Seawater Intrusion Project (CSIP) Service Area.

Seawater Intrusion in the Salinas Valley

"Recommendations to Address the Expansion of Seawater Intrusion in the Salinas Valley Groundwater Basin" (October, 2017)

Recommendations - Overview

3. Following expansion of the CSIP Service Area, termination of all pumping from existing wells within the Area of Impact, except for the following use categories:
   a. Municipal drinking water supply wells;
   b. Wells operating under the auspices of the Castroville Seawater Intrusion Project; and,
   c. Monitoring wells owned and maintained by the Agency or other water management agencies.

Seawater Intrusion in the Salinas Valley

"Recommendations to Address the Expansion of Seawater Intrusion in the Salinas Valley Groundwater Basin"

(October, 2017)

Recommendations - Overview

4. Initiate and diligently proceed with destruction of wells in Agency Zone 2B, in accordance with Agency Ordinance No. 3790, to protect the Salinas Valley Groundwater Basin against further seawater intrusion.
5. An immediate moratorium on groundwater extractions from new wells within the entirety of the Deep Aquifers until such a time as an investigation determines its long-term viability.

Seawater Intrusion in the Salinas Valley

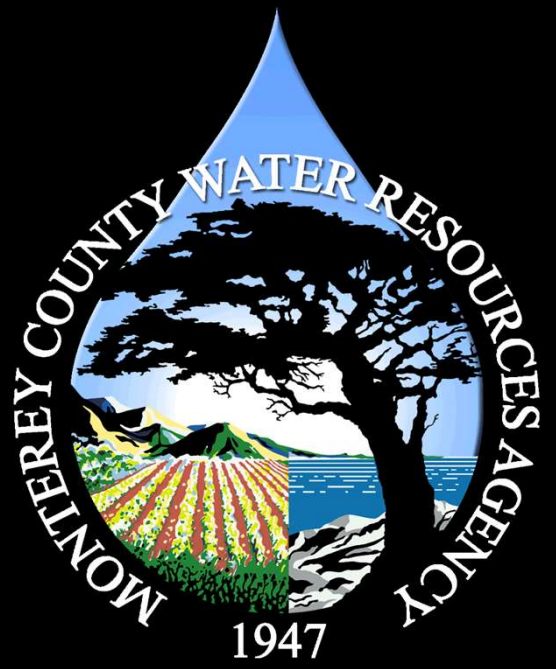
"Recommendations to Address the Expansion of Seawater Intrusion in the Salinas Valley Groundwater Basin" (October, 2017)

Recommendations - Overview

6. Initiate and diligently proceed with an investigation to determine the long term viability of the Deep Aquifers.

Salinas River Groundwater Basin Summary

- The Basin is currently out of balance – usage exceeds yield by approximately 17,000 to 24,000 afy.
- However, the estimated volume of groundwater in reserve (i.e. storage) is about 16.4 million acre-feet.
- Significant groundwater reserve – which could be used to offset temporary overdraft conditions.
- Consequences of extended use of this reserve will result in water level and water quality declines; along with continued seawater advancement into the coastal regions of the aquifer.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