2017 Salinas Valley

Groundwater Level Contours
&
Seawater Intrusion Maps
TODAY’S ACTION

Consider Receiving the 2017 Groundwater Level Contours and Coastal Salinas Valley Seawater Intrusion Maps
Committee Action/Financial Impact

- No previous committee action
- No financial impact from receiving this report
Agency Groundwater Monitoring Programs

• GWL & WQ data collected & analyzed since 1947

• Purposes:
  ➢ Monitor health of basin
  ➢ Evaluate Agency projects
  ➢ Develop basin management strategies
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- Monthly: 113 wells
- Fall: 343 wells
- August Trough: 130 wells
- Pressure Transducers: 23 wells
- Seawater Intrusion: 121 wells

Agency Groundwater Data Programs
Monthly: 113 wells

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Seawater Intrusion: 121 wells
2017 Groundwater Level Contours
August 2017
Pressure-180 and East Side Shallow Aquifers
August 2017
Pressure-180 and East Side Shallow Aquifers
August 2017
Pressure-400 & East Side Deep Aquifers
Summary: 2017 August GWL Changes Since 2015

• P180
  ➢ Coastal GWLs remain below sea level
  ➢ East Side GWLs have risen 20 feet
  ➢ Zero line moved two miles down valley

• P400
  ➢ GWLs are recovering nearly everywhere
  ➢ Coastal GWLs remain below sea level
  ➢ “Espinosa Trough” has disappeared
  ➢ East Side Trough has shrunken; GWLs up 10-30ft
  ➢ Zero line has not moved
Fall 2017
Pressure-180, East Side Shallow, Forebay & Upper Valley Aquifers
Fall 2017
Pressure-400 and East Side Deep Aquifers
Fall 2017
Pressure-400 and East Side Deep Aquifers
Summary: 2017 Fall GWL Changes Since 2015

• P180, East Side Shallow, Forebay, Upper Valley Aquifers
  ➢ Coastal GWLs: little to no change
  ➢ East Side: trough 10 feet recovery
  ➢ Zero line moved three miles down valley
  ➢ Largest recoveries near King City (30ft)
  ➢ San Lucas to San Ardo area: little change
Summary: 2017 Fall GWL Changes Since 2015

• P400, East Side Deep
  ➢ Coastal GWLs: No change to 5ft higher
  ➢ Salinas area: Little change
  ➢ East Side: little to no change north, up to 10 ft recovery between Chualar & Gonzales
  ➢ Zero line two miles down valley
  ➢ 10 ft recovery near Chualar; little change near Gonzales
GWL Changes Since 1944

Fall data (1944-2017)

- Indicator of change in aquifer storage
- Approximately 400 GWL measurements
- 200-300 used for comparison
- Each Subarea represented by one value
Fall Groundwater Level Changes by Subarea

Ground Water Level Changes (FT)

-70 -60 -50 -40 -30 -20 -10 0 10


-70 -60 -50 -40 -30 -20 -10 0 10

Nacimiento Reservoir 1957
San Antonio Reservoir 1967
CSIP 1998
SVWP 2010

Pressure
East Side
Forebay
Upper Valley
Coastal Salinas Valley
Seawater Intrusion Maps

500 mg/L Chloride Contours
2017
Seawater Intrusion – Transition Zone

- Monterey Bay
- Seawater 19,000 mg/L Cl
- Freshwater 50 mg/L Cl
- Transition Zone
- Land Surface
- Water Table
Seawater Intrusion – Pathways

Lateral Pathway

- Confining clay unit
- Water Level in Pressure 180' Foot Aquifer
- Water Level in Pressure 400' Foot Aquifer
Seawater Intrusion – Pathways

1. Overlying Seawater Intrusion
2. Downward hydraulic gradient
3. Presence of a Conduit

1. Overlying Seawater Intrusion
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3. Presence of a Conduit
Seawater Intrusion – Monitoring Program

- Groundwater Wells
  - Sampled annually during peak pumping
  - 96 Agricultural wells sampled twice (Jun & Aug)
  - 25 Dedicated monitoring wells sampled
    - Agency’s wells and MPWSP wells
  - Analyzed for General Minerals
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
Chloride & Conductivity Time Series Indicating Intrusion
Stiff Diagrams

No Intrusion - 1982

Early Intrusion - 2009
Piper Diagram
Indicating Phase-I Intrusion
Chloride vs. Na/Cl Molar Ratio

0.86
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
2017 Pressure 180-Foot Aquifer 500 mg/L Chloride Areas

Historical Seawater Intrusion Map
Pressure 180-Foot Aquifer - 500 mg/L or Greater Chloride Areas

- 1944
- 1965
- 1993
- 2003
- 2005
- 2007
- 2010
- 2011/2013

* Seawater Intruded Areas By Year

Map Date: 4/12/2018
Acreage Overlying the 500 mg/L Chloride Contour
Pressure 180-Foot Aquifer

Cumulative Acreage

1998 - CSIP Online

2010 - SRDF Online

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2017 Pressure 400-Foot Aquifer 500 mg/L Chloride Areas
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Acreage Overlying the 500 mg/L Chloride Contour Pressure 400-Foot Aquifer

Cumulative Acreage

1998 - CSIP Online

2010 - SRDF Online


0 22 3,717 7,521 6,347 6,693 9,065 9,961 10,504 11,003 11,503 11,892 12,004 12,579 12,579 12,579 12,579 12,579 12,579 12,579 12,579 12,579 12,579 12,579 12,579 12,579 17,125 17,887

Cumulative Acreage
Conclusion

Pressure 180-Ft Contours

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

Pressure 400-Ft Contours

• Continued Lobe Broadening
• Expansion of the Intruded WQ in Front of the 500 mg/L Contour (“Islands”)
• Minimal Advancement
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