TODAY'S PRESENTATION

Ground Water Conditions
in the Salinas Valley:
Ground Water Level and
Seawater Intrusion Information
For 2011

Presentation Outline

- Introduction
- Background Information
- 2011 Ground Water Level Information
- 2011 Seawater Intrusion Information
- Summary

Introduction

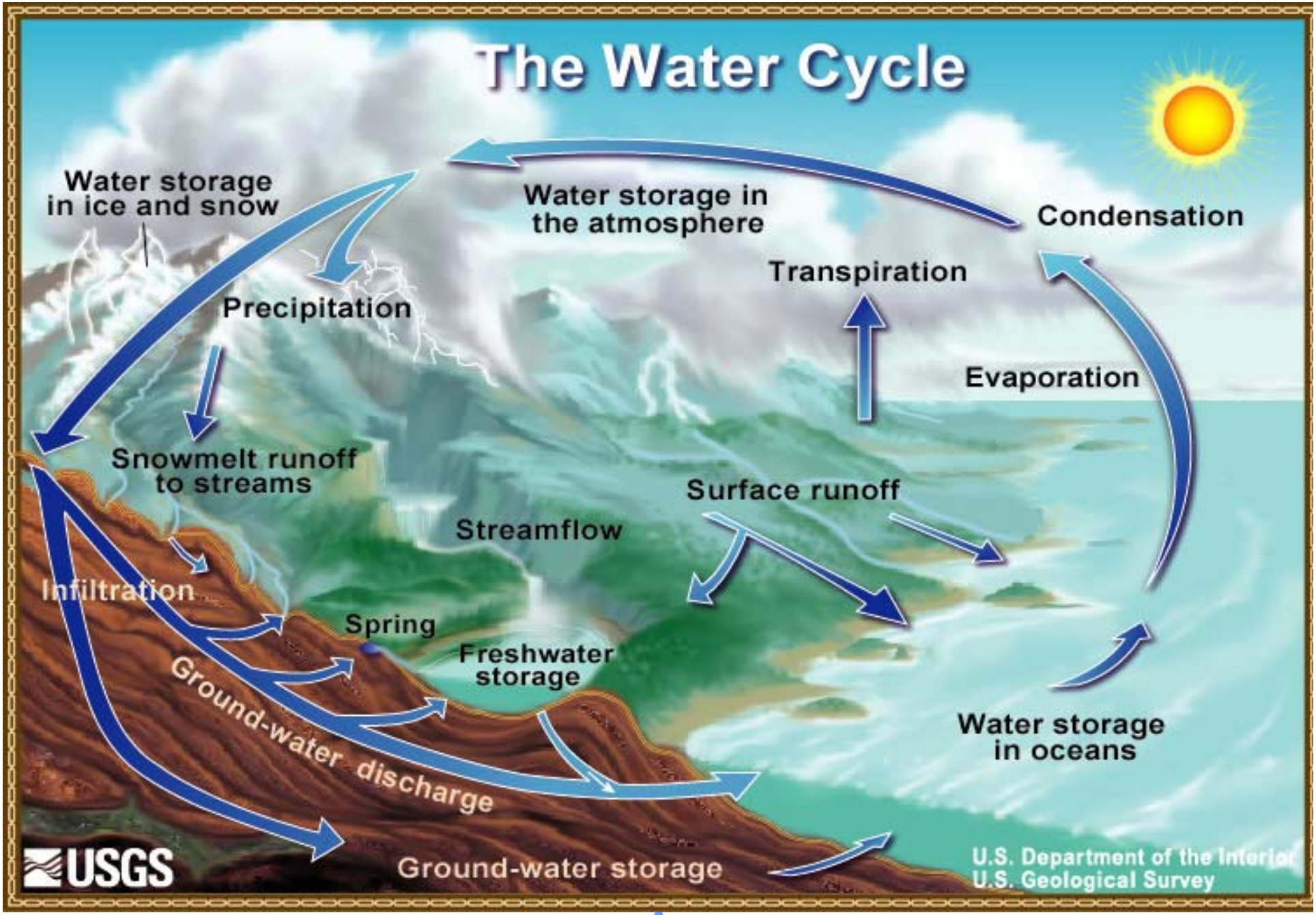
- Presenters
  - Robert Johnson
  - Howard Franklin
  - Kathleen Thomasberg

- Combined Agency Experience > 60 years

- Presenting Ground Water Level and Seawater Intrusion Information

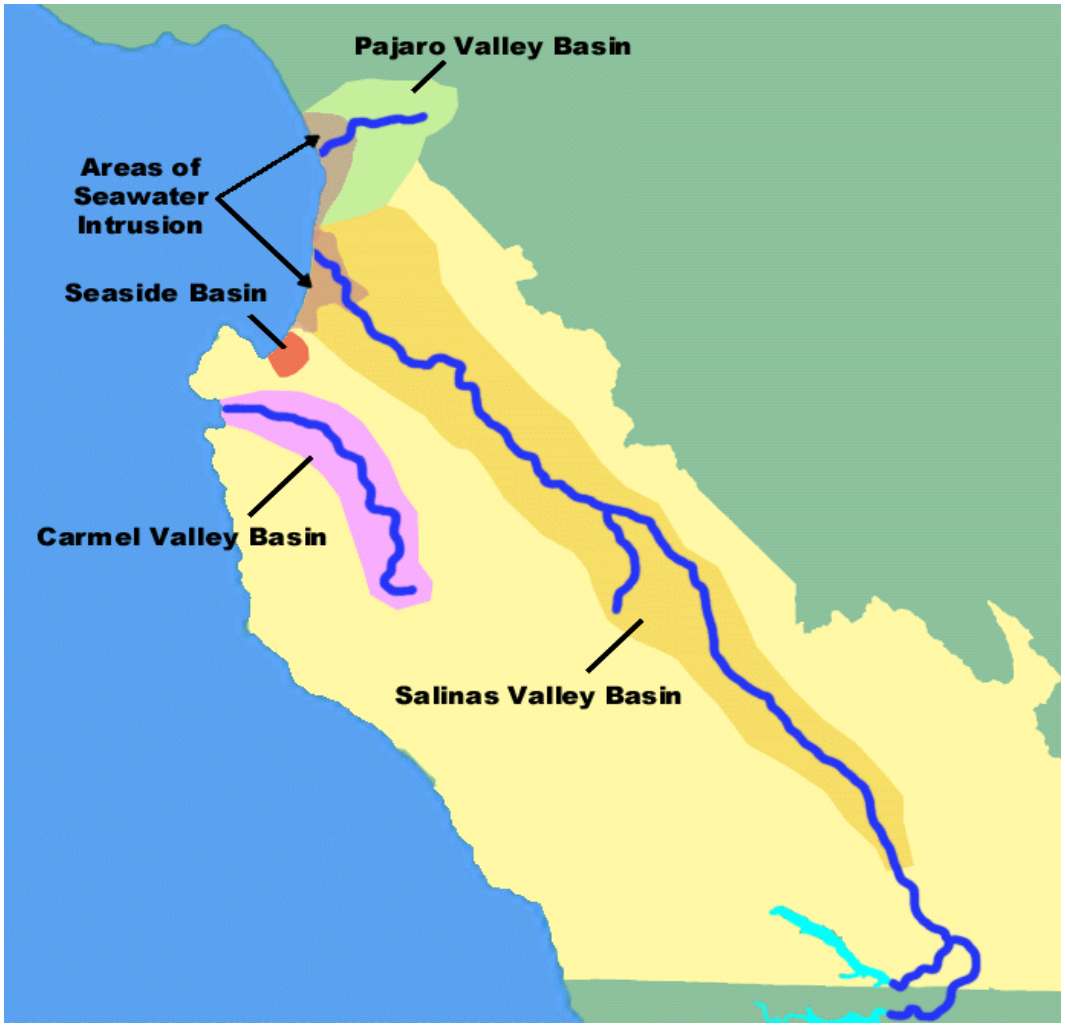
Background Information

- Where does our water come from?
- Local Issue / Local Solution
- Why does the Agency collect these data?


The Water Cycle
Water storage in ice and snow
Water storage in the atmosphere
Condensation
Transpiration
Precipitation
Evaporation
Snowmelt runoff to streams
Surface runoff
Streamflow
Infiltration
Spring
Freshwater storage
Ground-water discharge
Water storage in oceans
USGS
Ground-water storage
U.S. Department of the Interior
U.S. Geological Survey

Surface Water Supplies of Monterey County

Groundwater is the Primary Source of Supply and Storage



Local Issue / Local Solution

- Seawater intrusion in the Salinas Valley
  - First documented – mid 1930s
  - State study completed in 1946
  - Strategy developed by MCFC&WCD / SVWAC
    - Monterey County Flood Control & Water Conservation District (pre-cursor to Agency)
    - Salinas Valley Water Advisory Committee

Local Issue / Local Solution (cont.)

- Solution Strategy:
  - (A) Develop a new water source
  - (B) Move water north to reduce need for coastal pumping
  - (C) Stop pumping along the coast

- Agency has implemented the following:
  - Nacimiento and San Antonio Reservoirs (A)
  - Monterey County Water Recycling Projects (C)
  - Salinas Valley Water Project (B)

Why collect these data?

- Monitoring can measure effectiveness and success of project(s)

- Ground water level data programs / output
  - Monthly / Quarterly Conditions Reports
  - Annual / Map
  - August Trough / Map

- Seawater intrusion data program / output
  - Summer sampling / Map

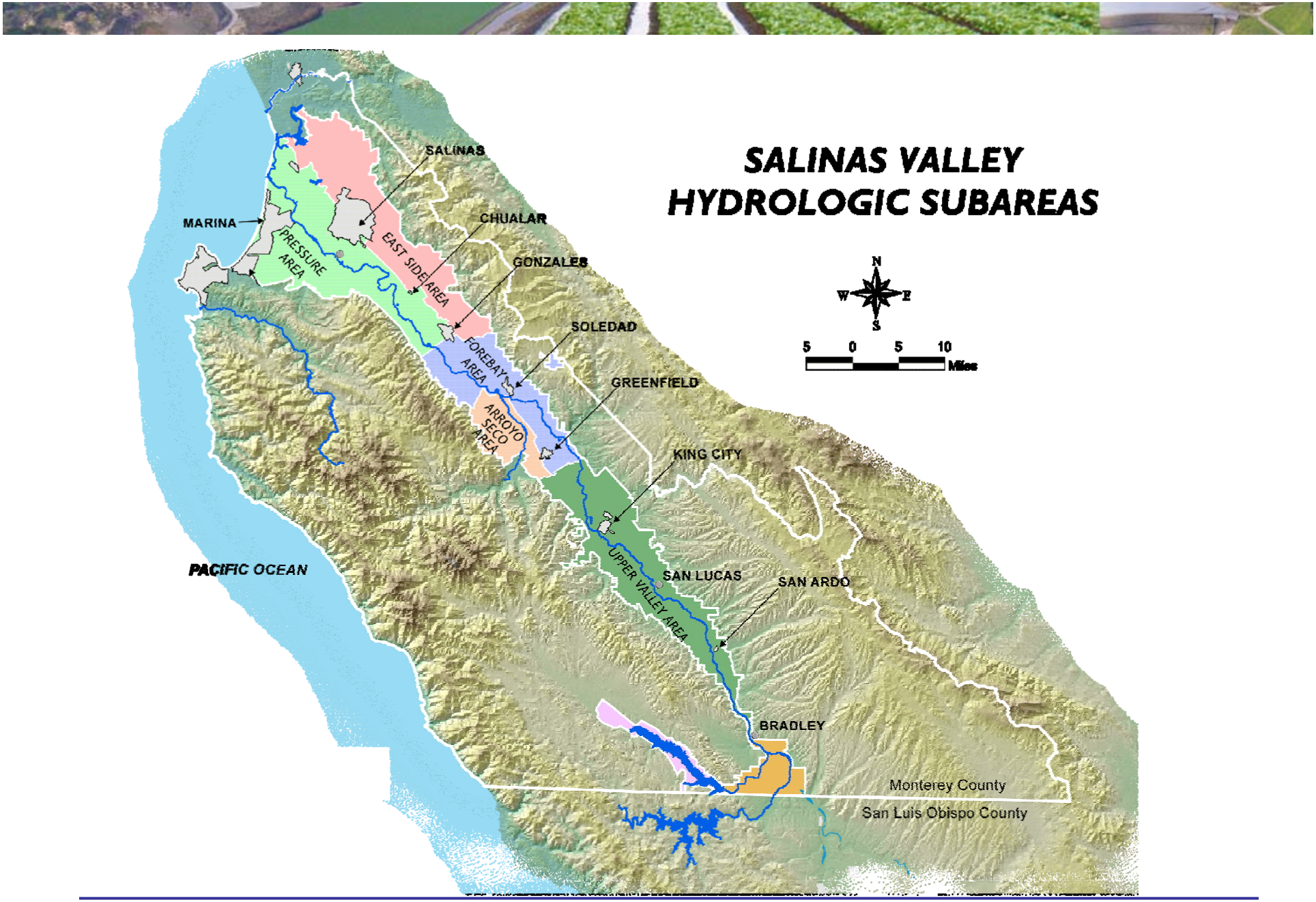
Why collect these data? (cont.)

- Monitoring activities covered by Proposition 218 for SVWP

- Monitoring governed by objectives of SVWP
  - Stop Seawater Intrusion
  - Provide adequate water supplies to meet current and future (2030) needs

Why collect these data? (cont.)

- Salinas Valley – complex hydrogeologic system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SAN ARDO
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San Luis Obispo County

Why collect these data? (cont.)

- Data necessary to evaluate success of SVWP

- Research has shown that success of these types of projects is measured in decades
  - Meaningful evaluation after 10 years of operation

Salinas Valley Ground Water Level Contour Maps

August 2011

Fall 2011

Overview of Data Program

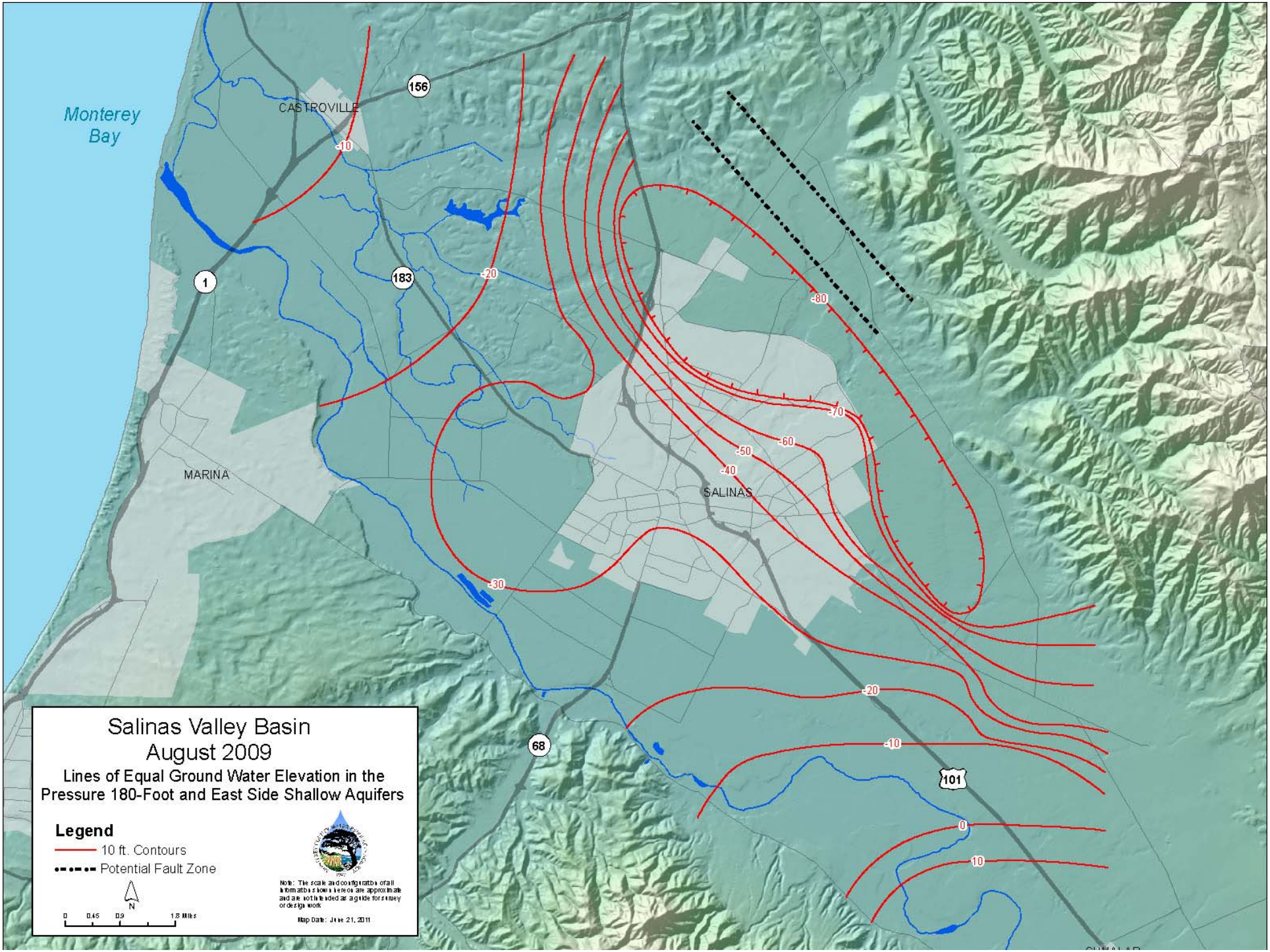
- GWL Data collected and analyzed since 1947
- Data collected to:
  - Monitor health of basin
  - Evaluate effectiveness of Agency projects
- GWL Data Programs
  - Monthly: 94 wells
  - Fall (Annual): 403 wells
  - August Trough: 130 wells
  - Pressure Transducers: 23 wells

GWL Contour Maps

- 2011 August Trough Contours:
  - Map 1 –
    - Pressure 180-Foot Aquifer
    - East Side Shallow
  - Map 2 –
    - Pressure 400-Foot Aquifer
    - East Side Deep

GWL Contour Maps (cont.)

- 2011 Fall Contours:
  - Map 3 – (north and south)
    - Pressure 180-Foot Aquifer
    - East Side Shallow
    - Forebay Aquifer
    - Upper Valley Aquifer
  - Map 4 –
    - Pressure 400-Foot Aquifer
    - East Side Deep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Salinas Valley Basin
August 2009
Lines of Equal Ground Water Elevation in the Pressure 180-Foot and East Side Shallow Aquifers
Legend
10 ft. Contours
Potential Fault Zone
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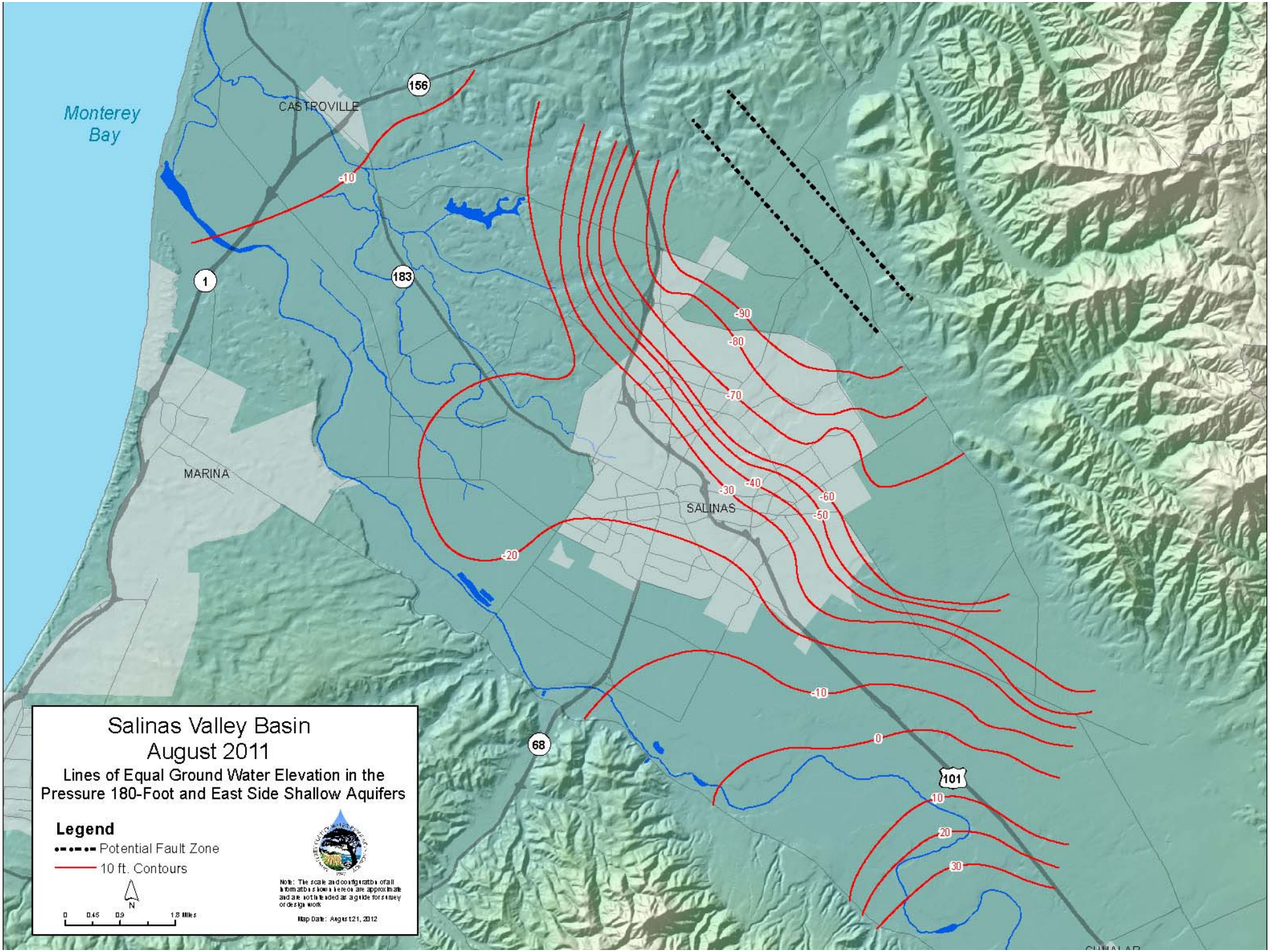
Note: The scale and configuration of all information shown hereon are approximate and are not intended as a guide for survey or design work
Map Date: June 21, 2011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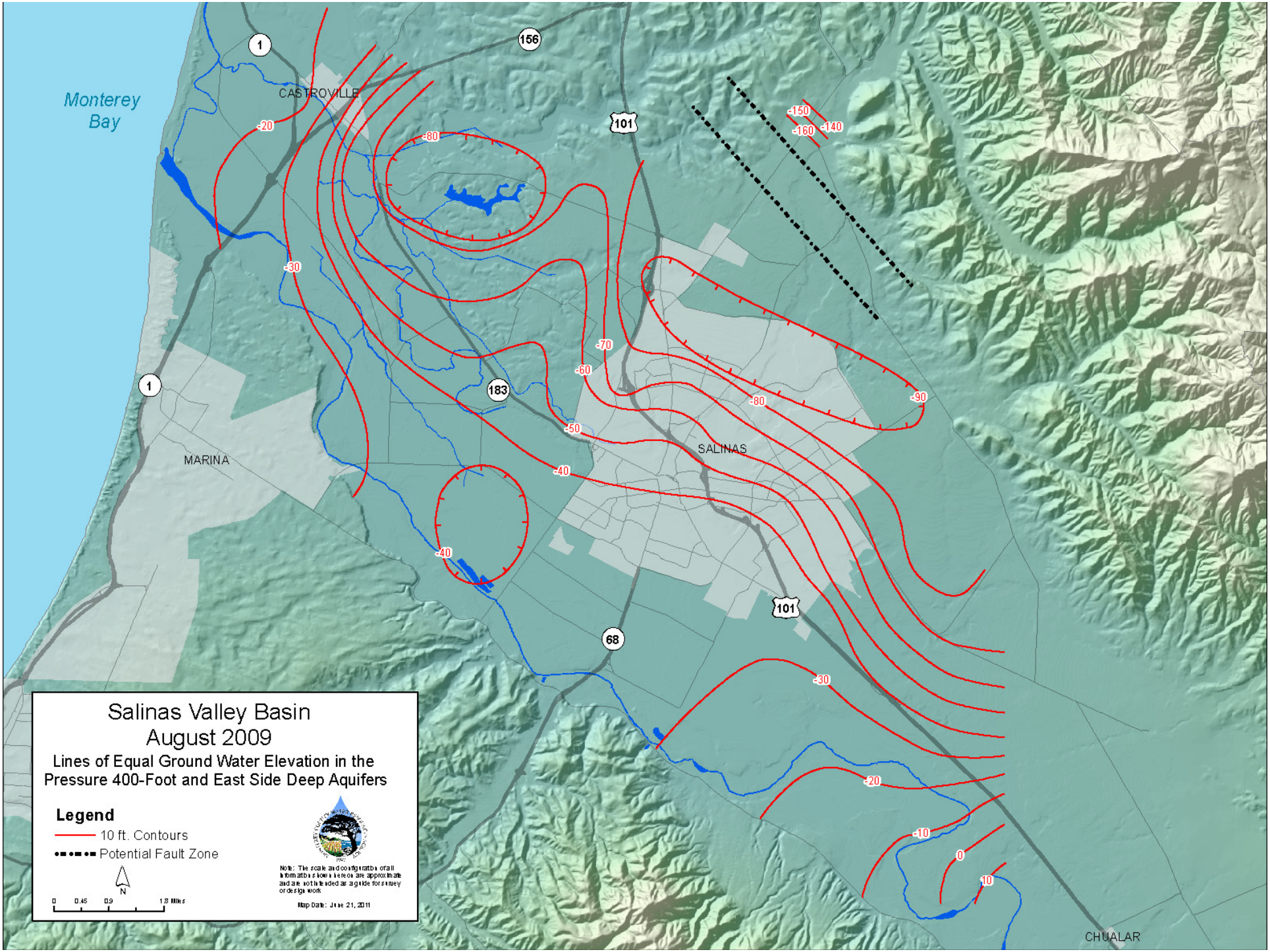
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Salinas Valley Basin
August 2009
Lines of Equal Ground Water Elevation in the Pressure 400-Foot and East Side Deep Aquifers
Legend
10 ft. Contours
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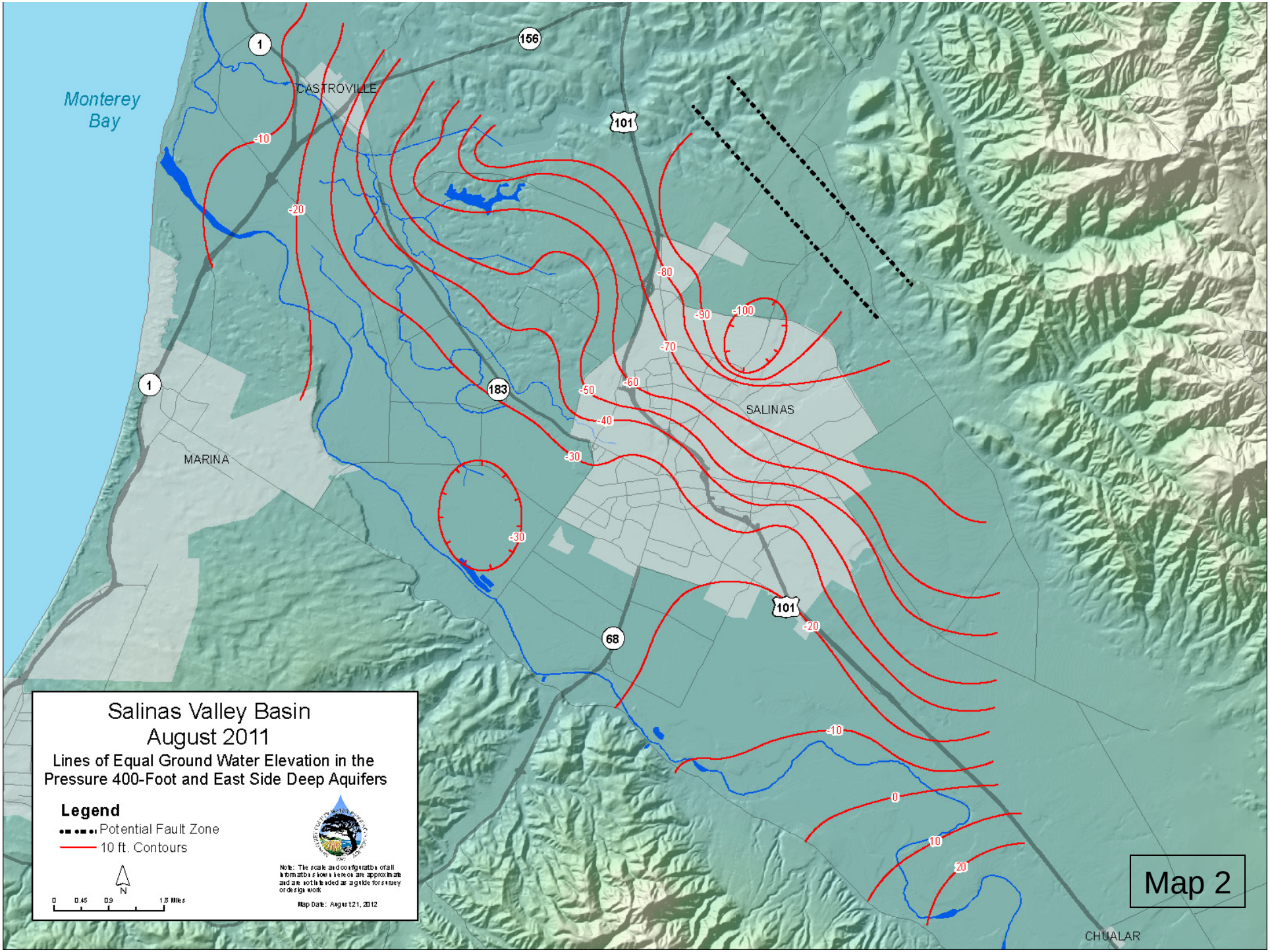
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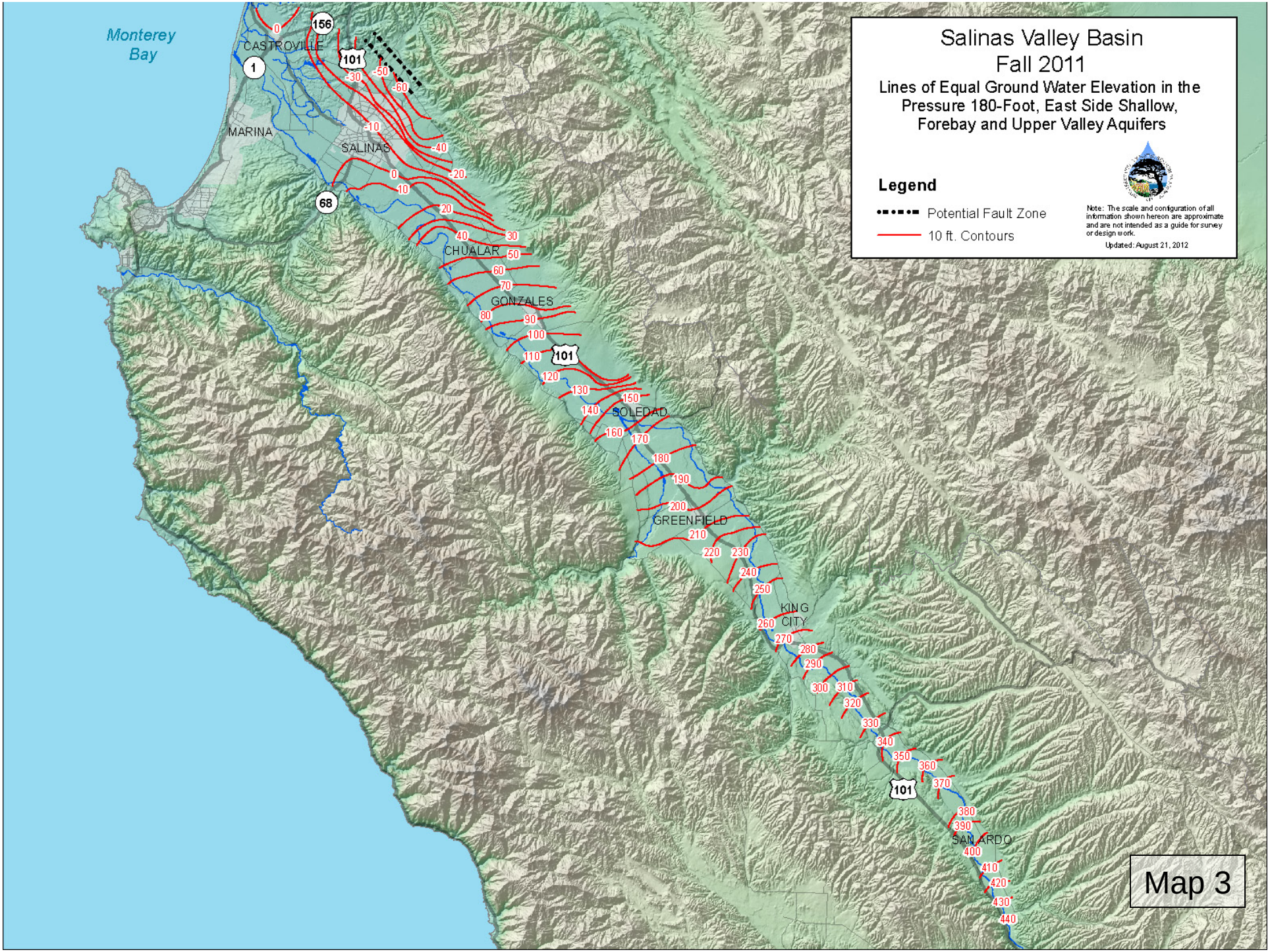
Map 2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Salinas Valley Basin
Fall 2011
Lines of Equal Ground Water Elevation in the Pressure 180-Foot, East Side Shallow, Forebay and Upper Valley Aquifers
Legend
Potential Fault Zone
10 ft. Contours
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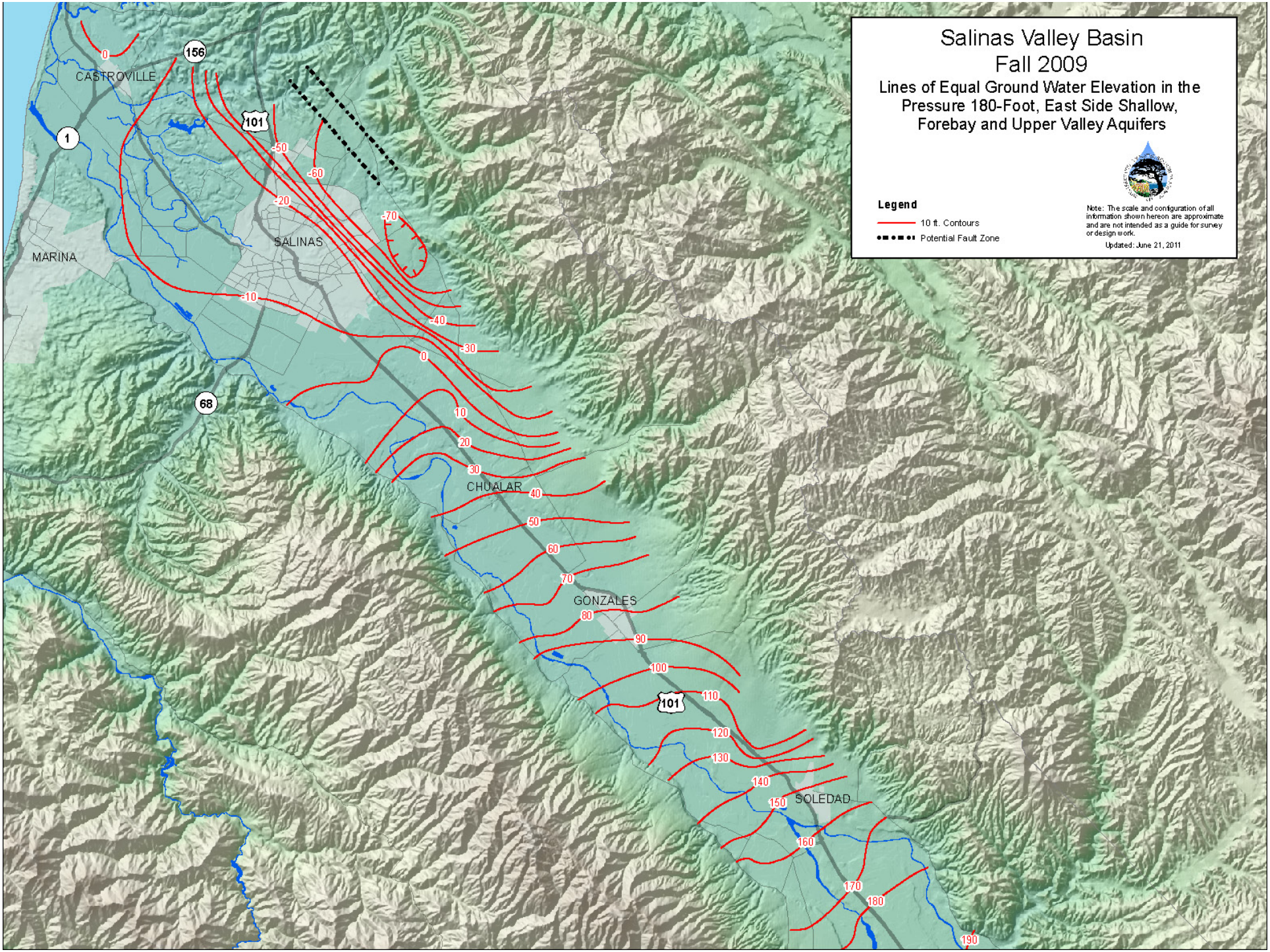
Updated: August 21, 2012
Map 3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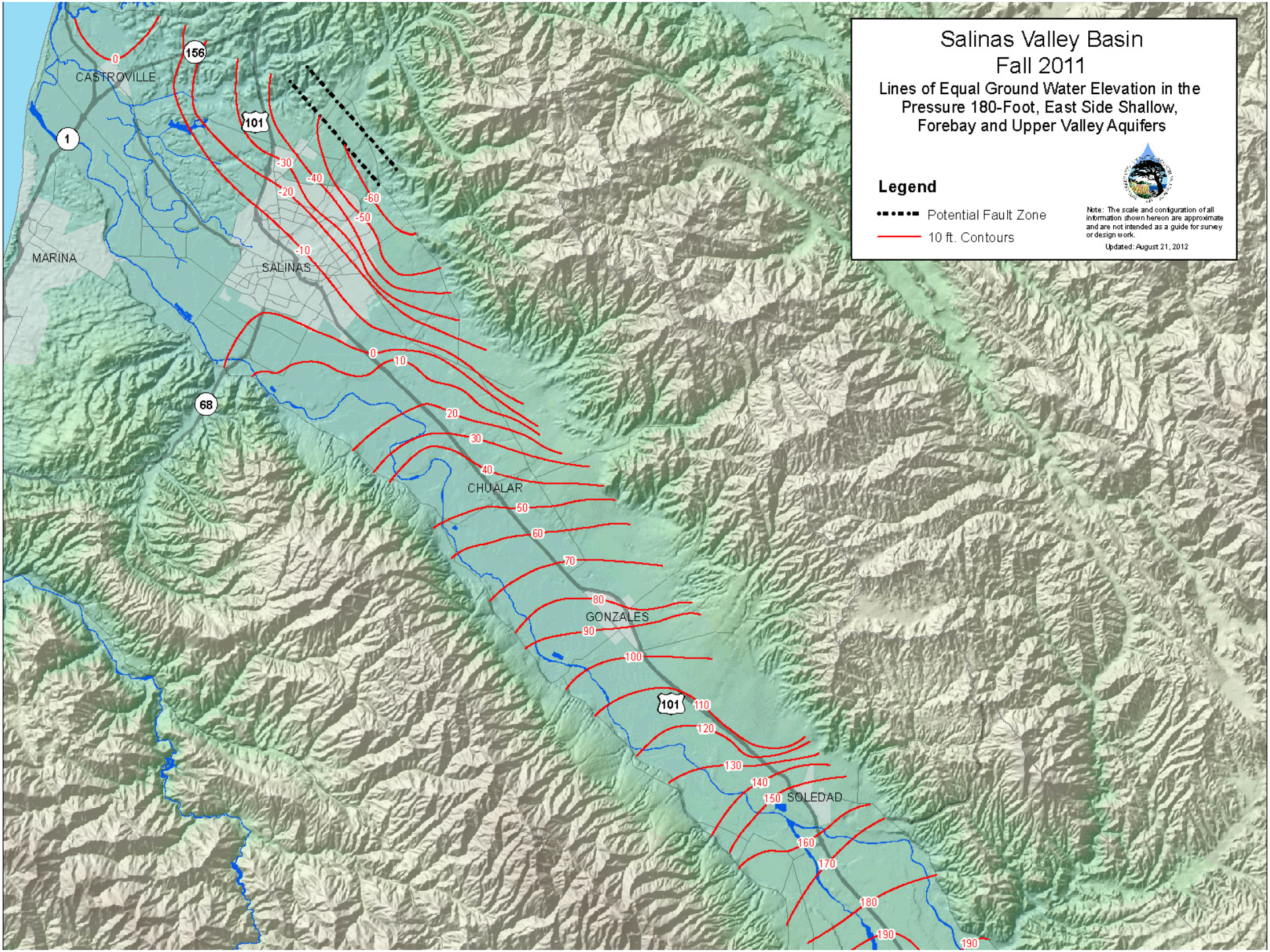
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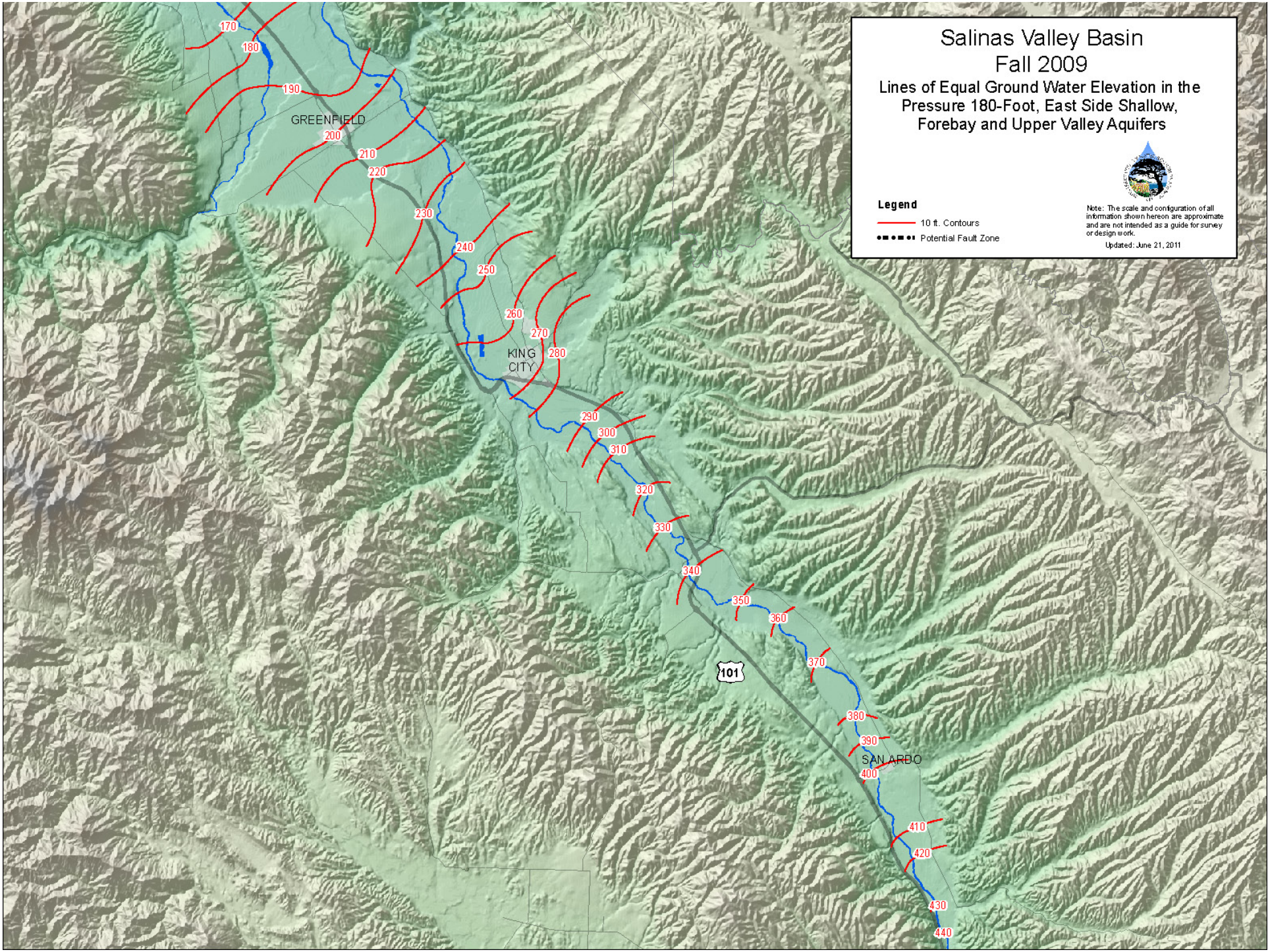
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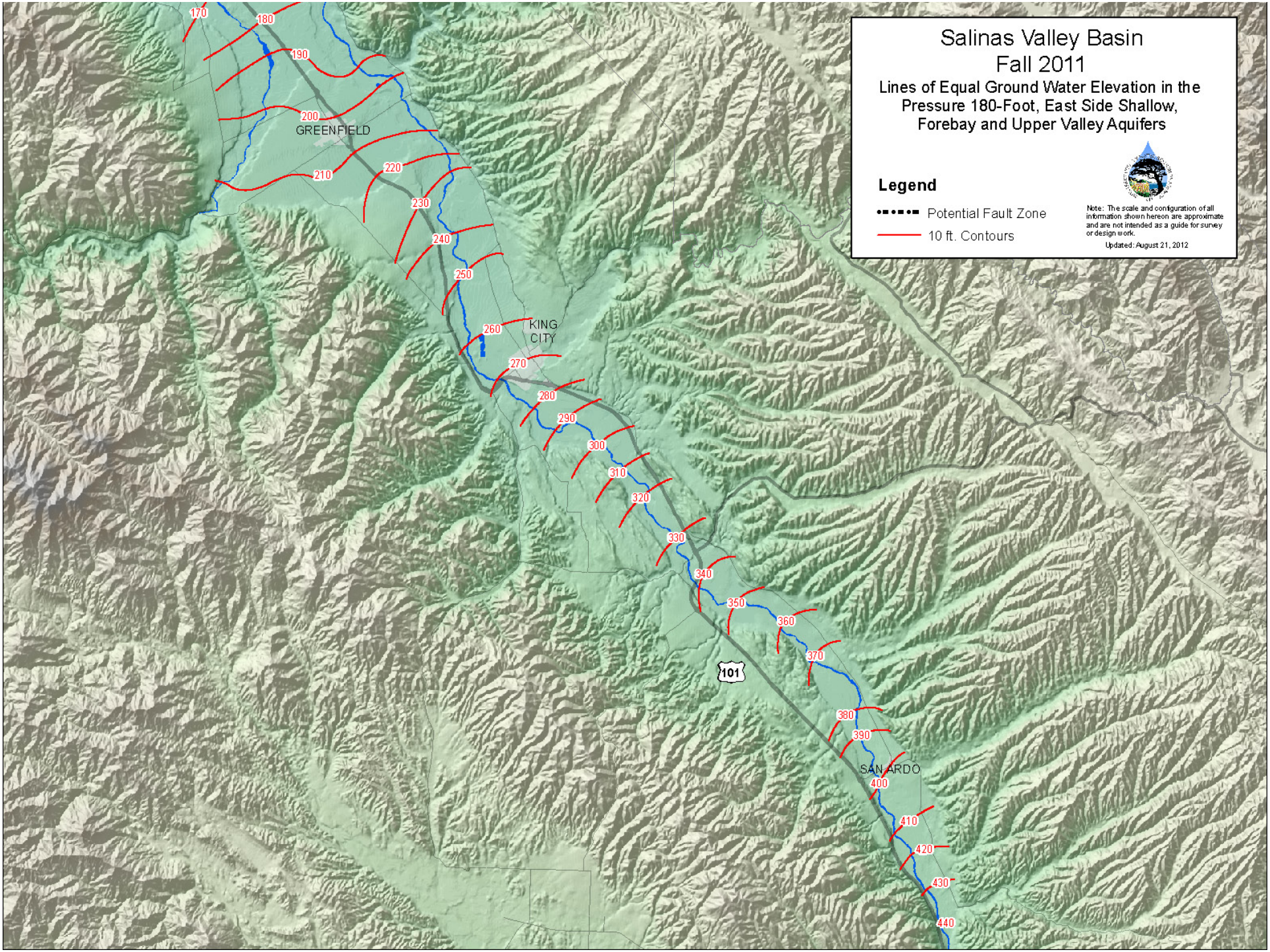
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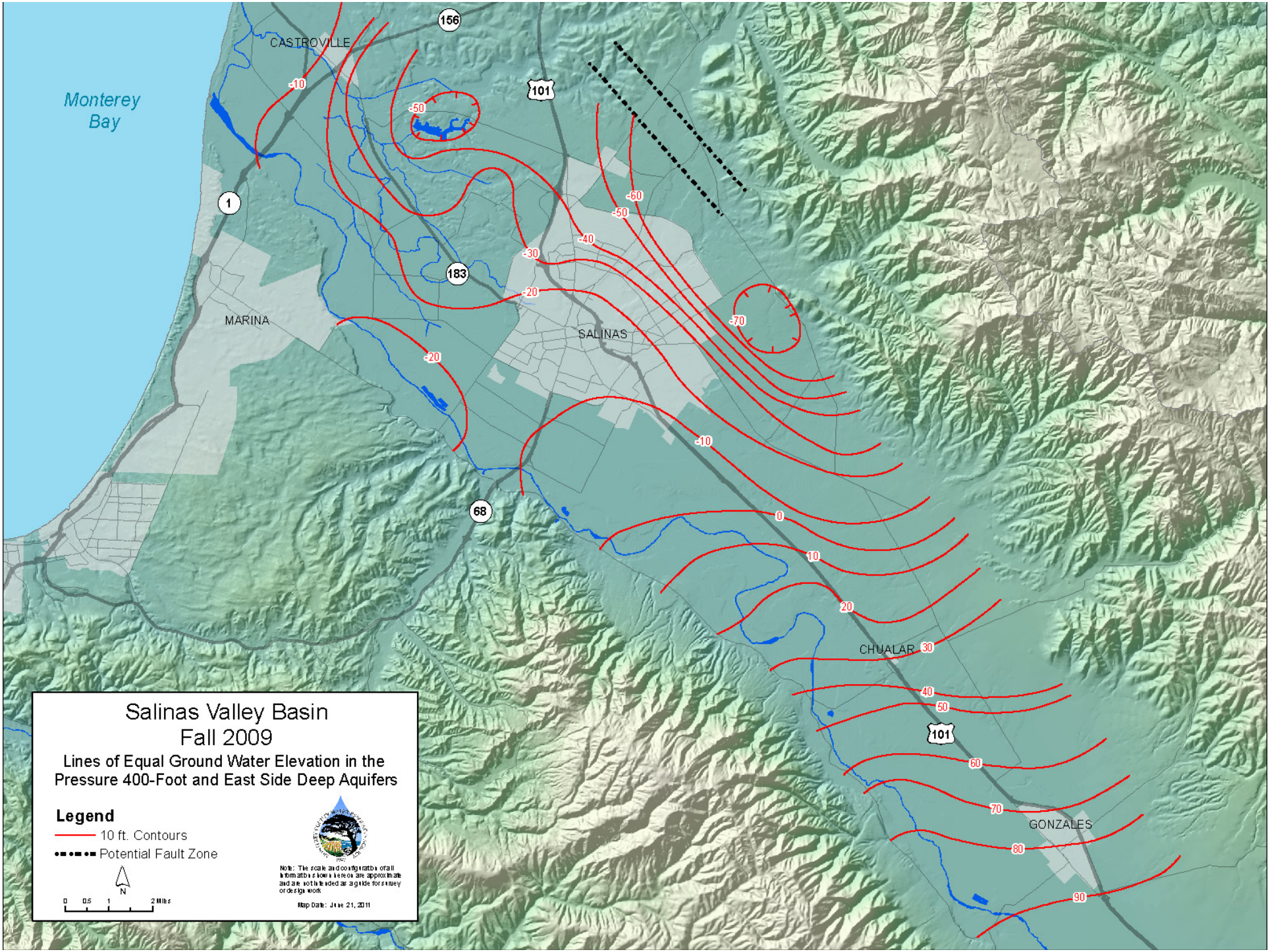
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Salinas Valley Basin
Fall 2009
Lines of Equal Ground Water Elevation in the Pressure 400-Foot and East Side Deep Aquifers
Legend
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Potential Fault Zone
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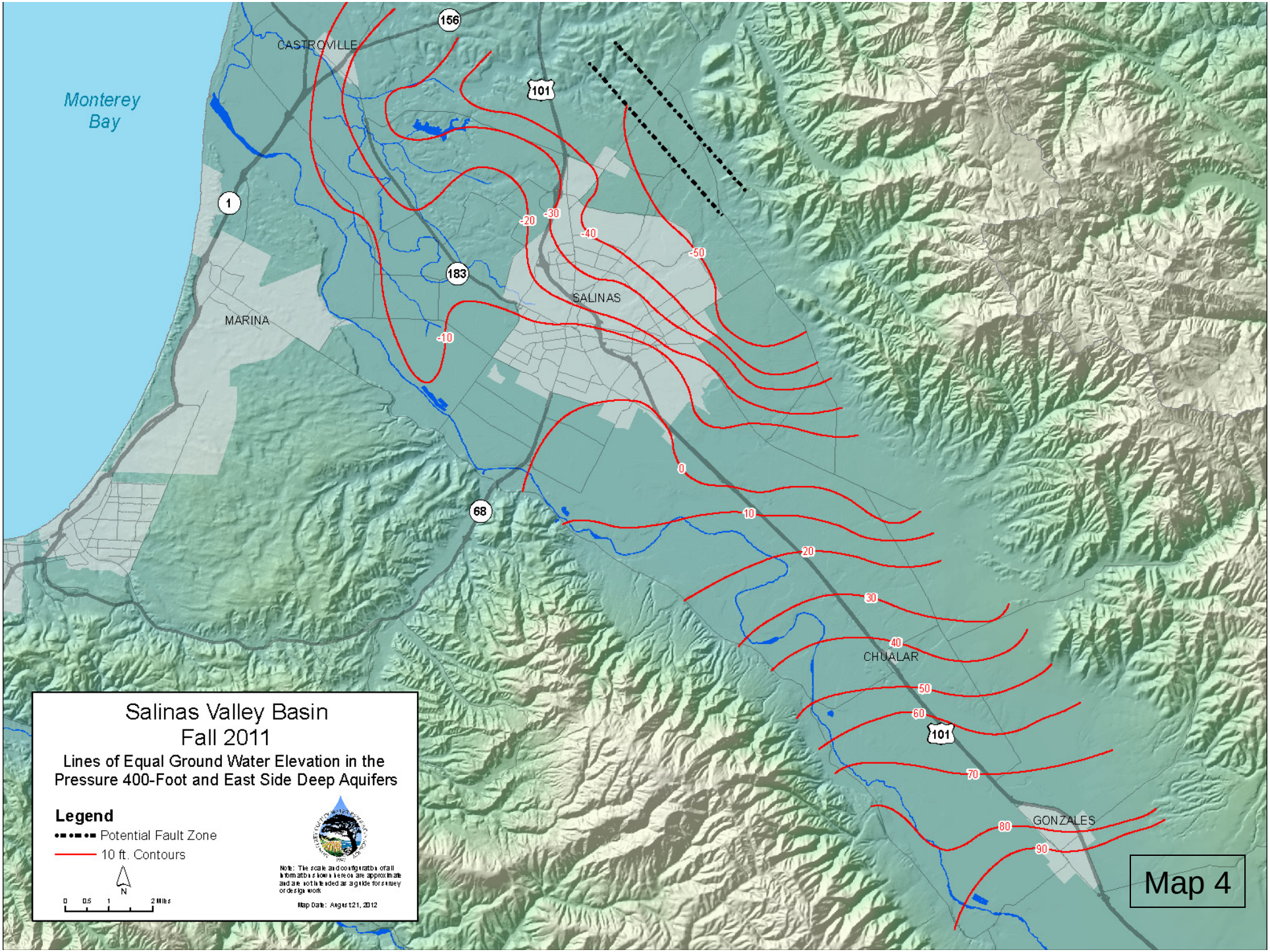
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Note: The scale and configuration of all information shown hereon are approximate and are not intended as a guide for survey or design work
Map Date: August 21, 2012
Map 4

Summary

Comparing 2011 data to 2009 data…

- GWLs have increased 5 to 10 feet on average, throughout the Salinas Valley
- Near the coast: GWLs increased in the Pressure 400-Foot Aquifer in August but were otherwise unchanged
- The zero contour line has migrated down valley approximately 2-3 miles
- In some cases, troughs have disappeared, in others, although deeper, the areal extent has decreased
- The mechanism for seawater intrusion persists

Coastal Salinas Valley Seawater Intrusion Maps

500 mg/L Chloride Contours

2011

Seawater Intrusion Data

- Coastal Groundwater Quality Monitoring
  - Wells
    - Sampled annually peak pumping season
    - 90 Agricultural wells sampled 2-3 times
    - 17 Dedicated monitoring wells sampled
  - Test for General Minerals – indicators of intrusion

Seawater Intrusion Data (cont.)

- WQ Tested Annually
  - General Mineral indicators for intrusion
    - Chloride Concentrations
      - Secondary Upper Limit CA Safe Drinking Water Act (500mg/L)

- Contour Odd Years
  - 2007, 2009, 2011, etc.

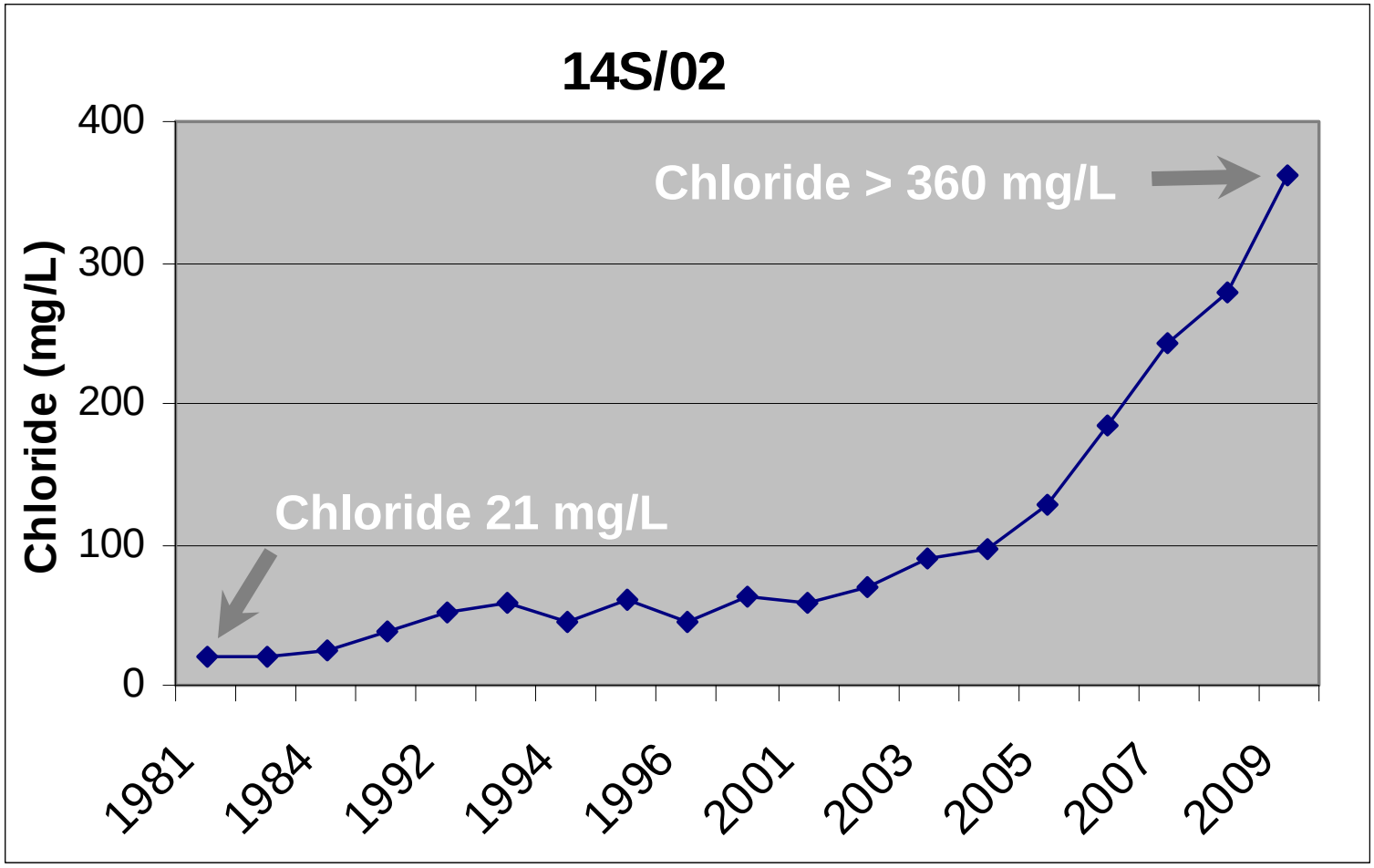
Seawater Intrusion Data (cont.)

- Data Development Process
  - Multiple datasets
    - Water quality
    - Well construction
    - Well pumping
    - Ground water level contours
  - Data Analysis
    - Suite of software tools

Seawater Intrusion Data (cont.)

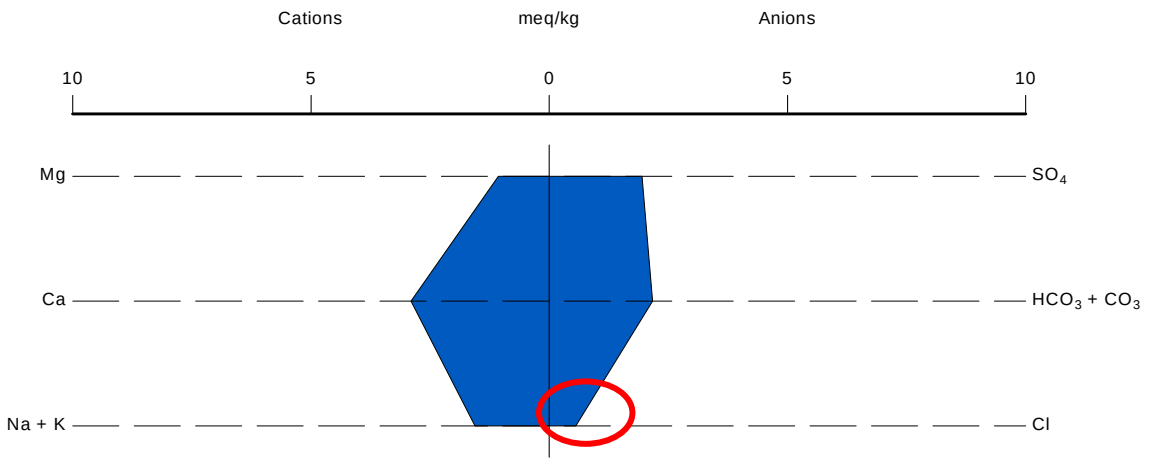
- Data Evaluation
  - Historical Chloride Trends
    - Secondary Upper Limit CA Safe Drinking Water Act 500mg/L
  - Stiff and Piper Diagrams
  - Anion / Cation Shifts

Chloride Time Series Indicating Possible Intrusion

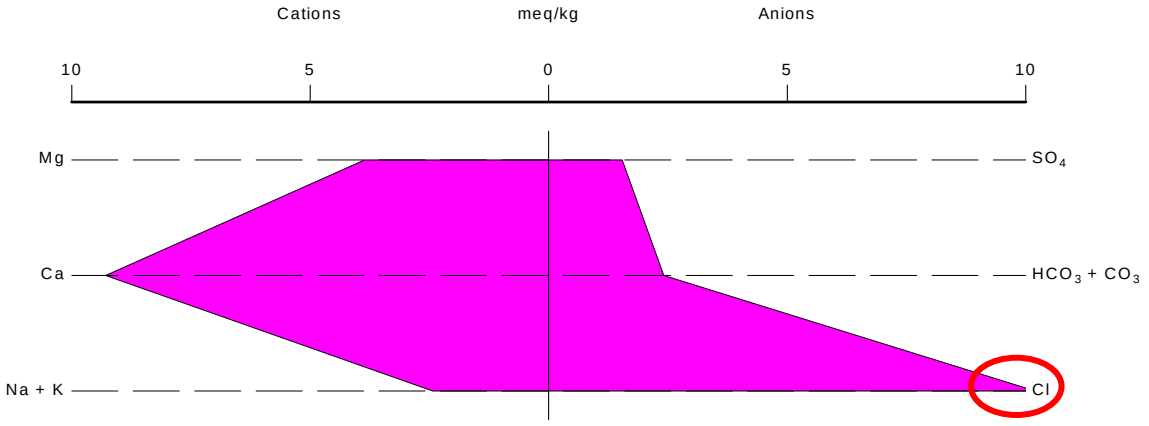


Stiff Diagrams
(general mineral fingerprint)
Well 14S/-2E

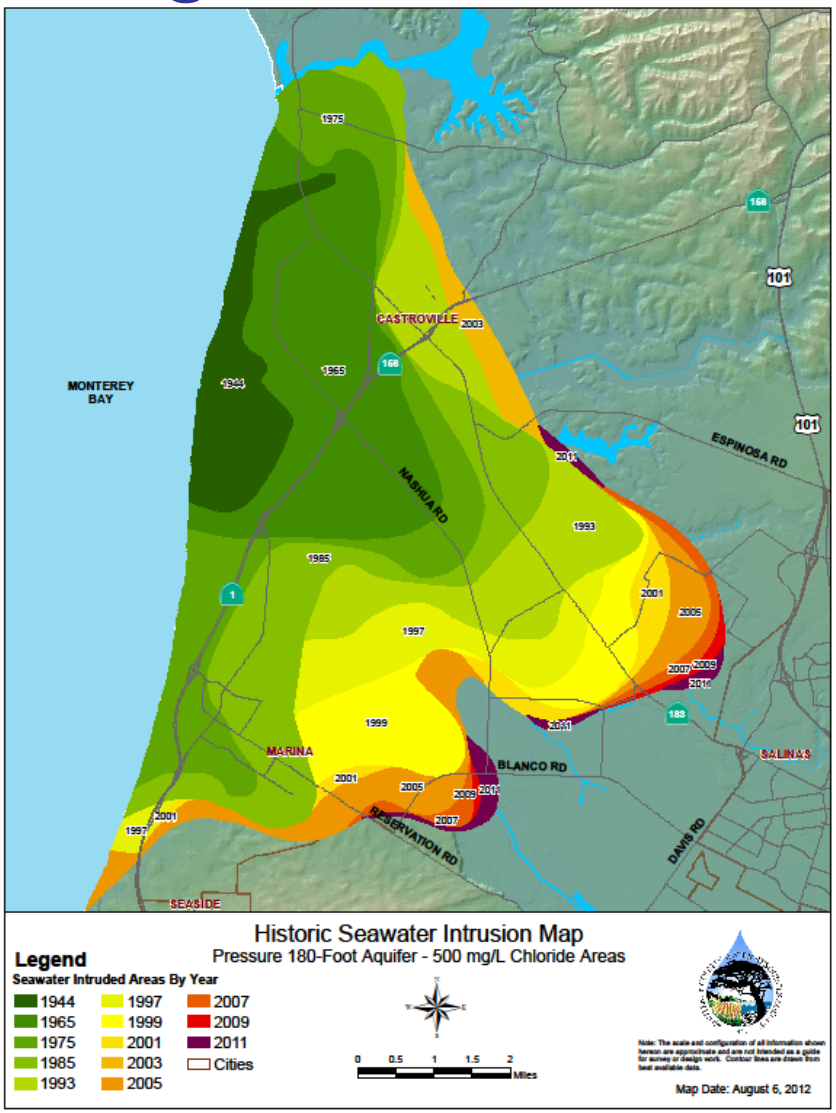
No Intrusion - 1982

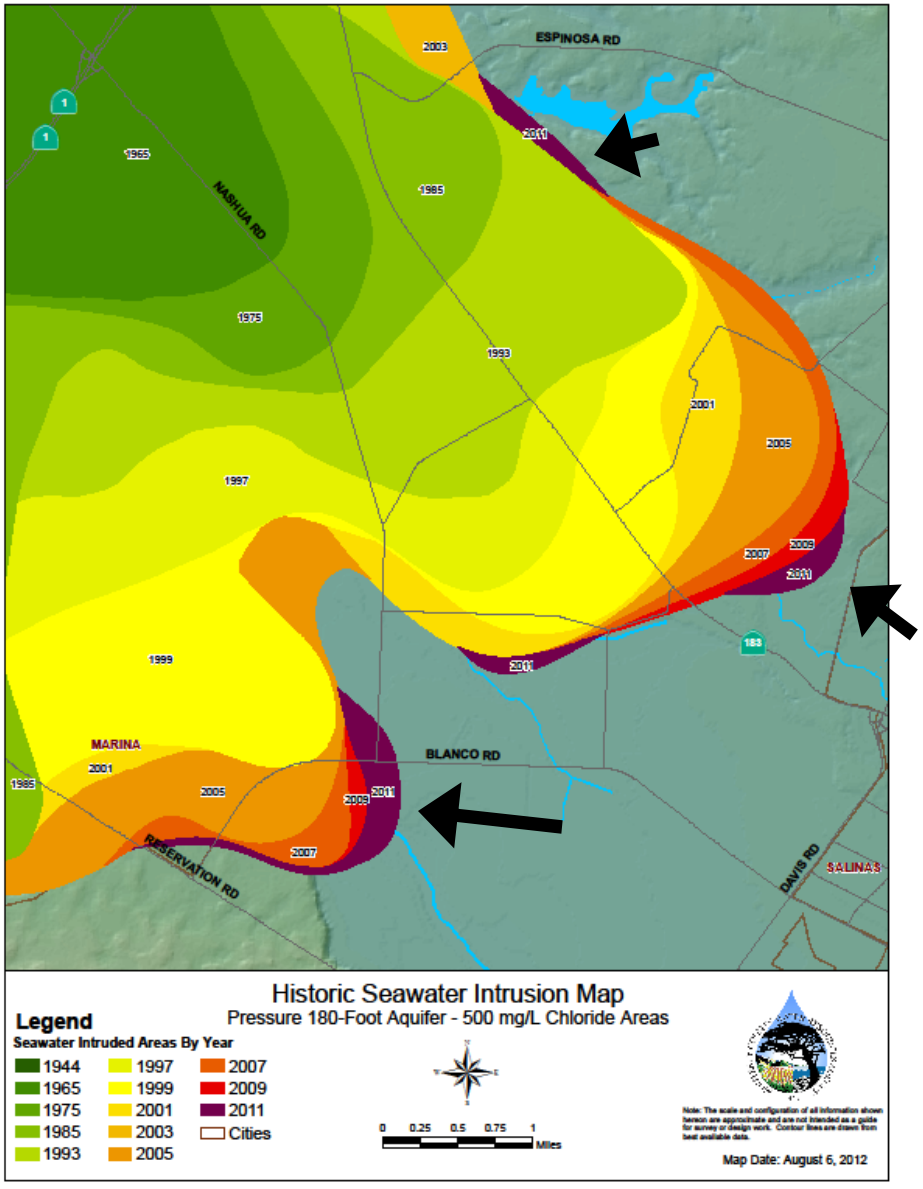


Early Intrusion - 2009



2011 Pressure 180-Foot Aquifer
500 mg/L Chloride Areas

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Historic Seawater Intrusion Map
Pressure 180-Foot Aquifer - 500 mg/L Chloride Areas
Legend
Seawater Intruded Areas By Year
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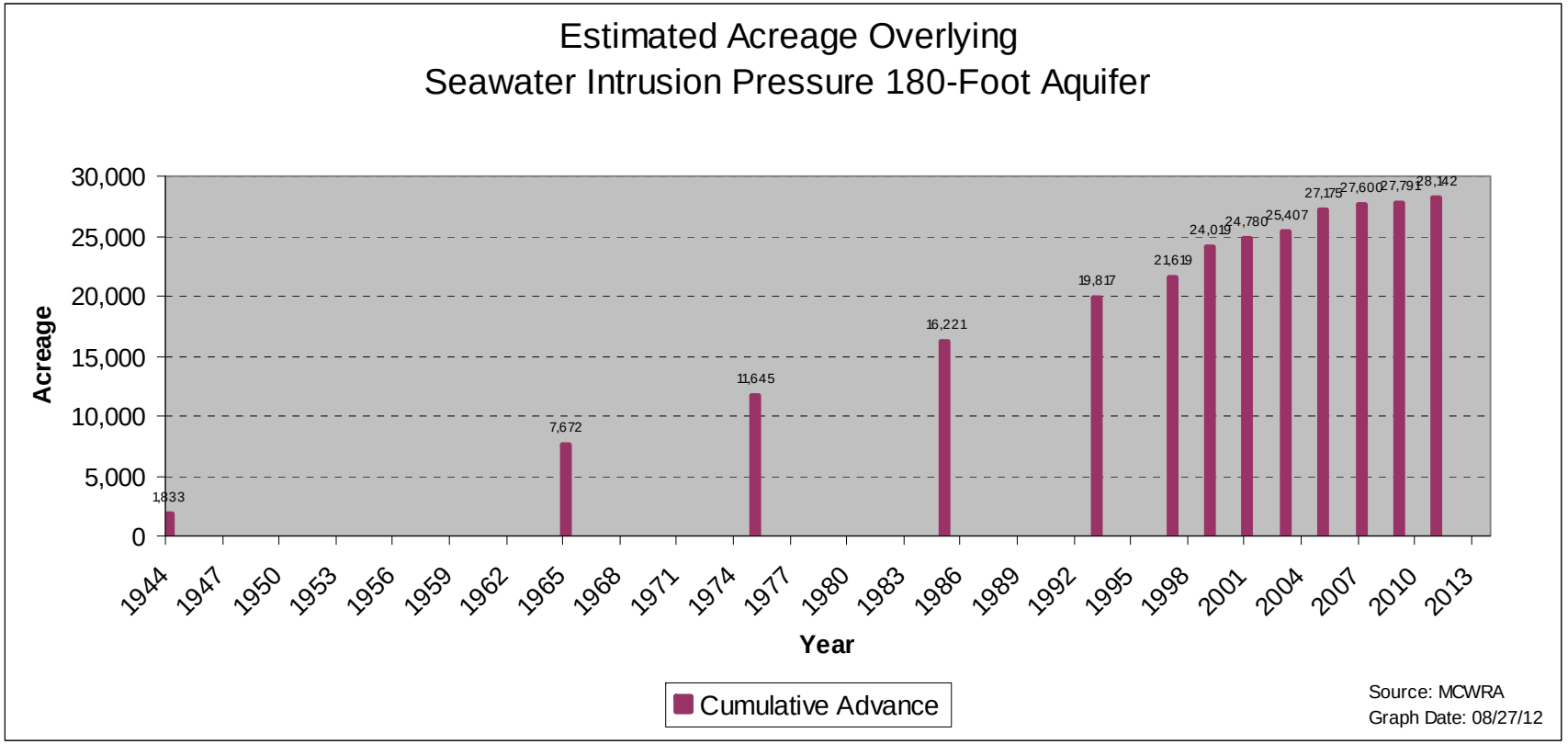
Map Date: August 6, 2012

Pressure 180-Foot Aquifer Historical Advancement



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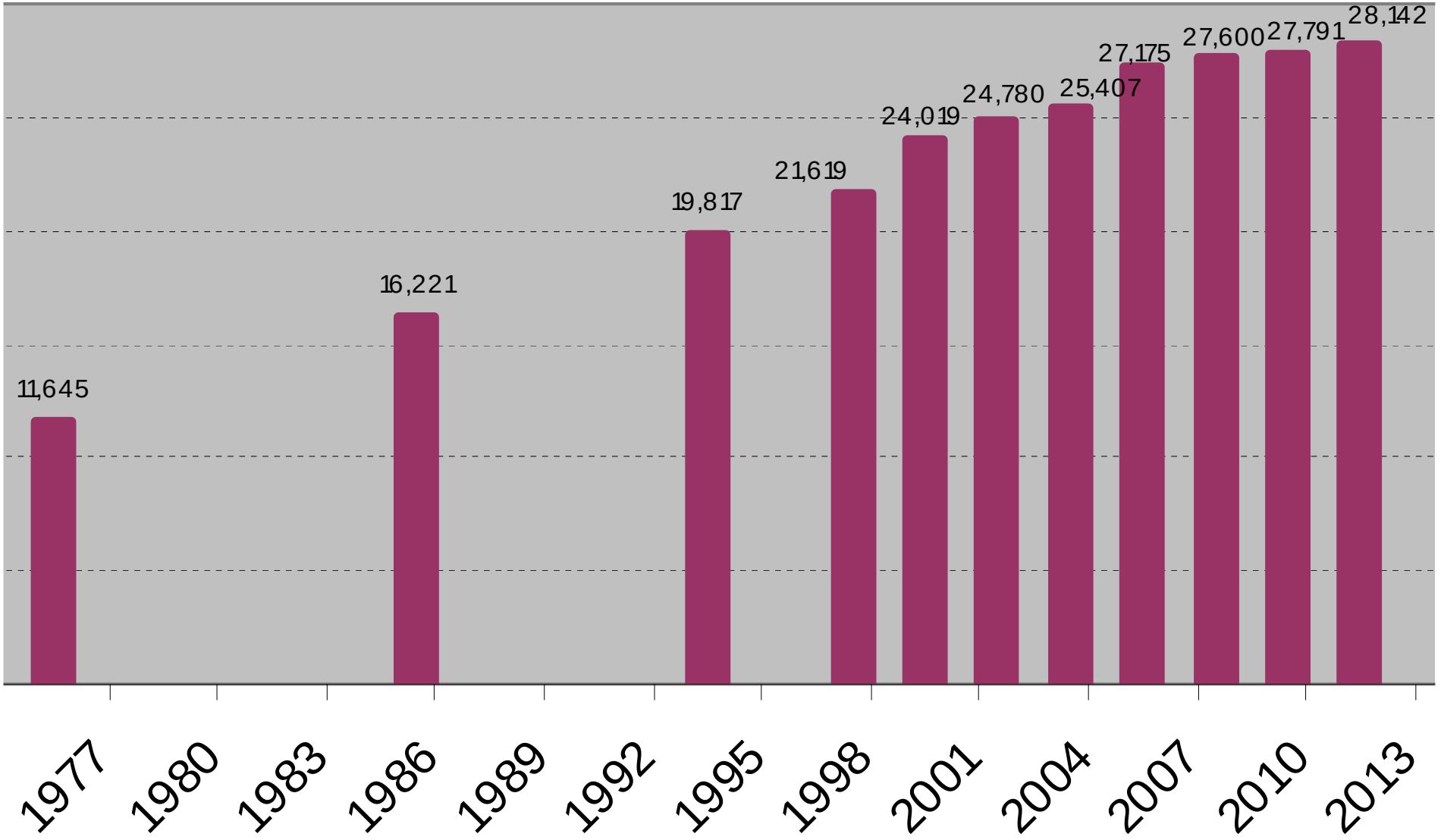
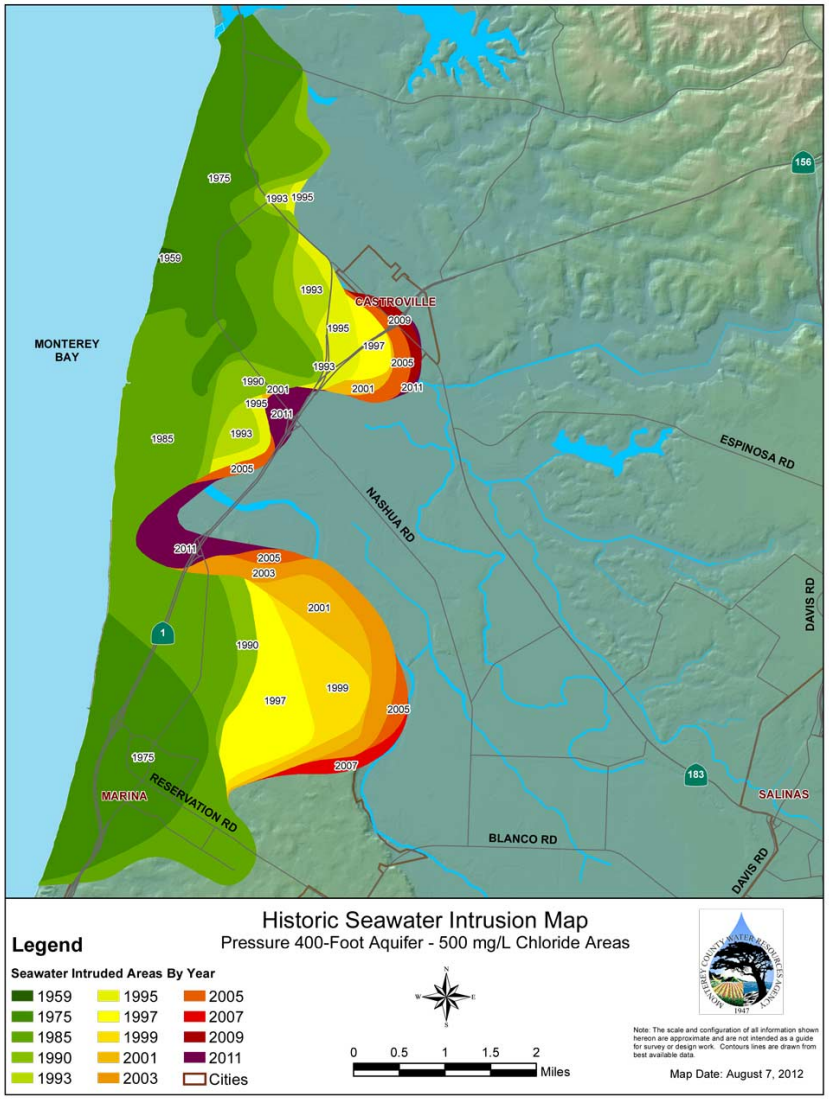
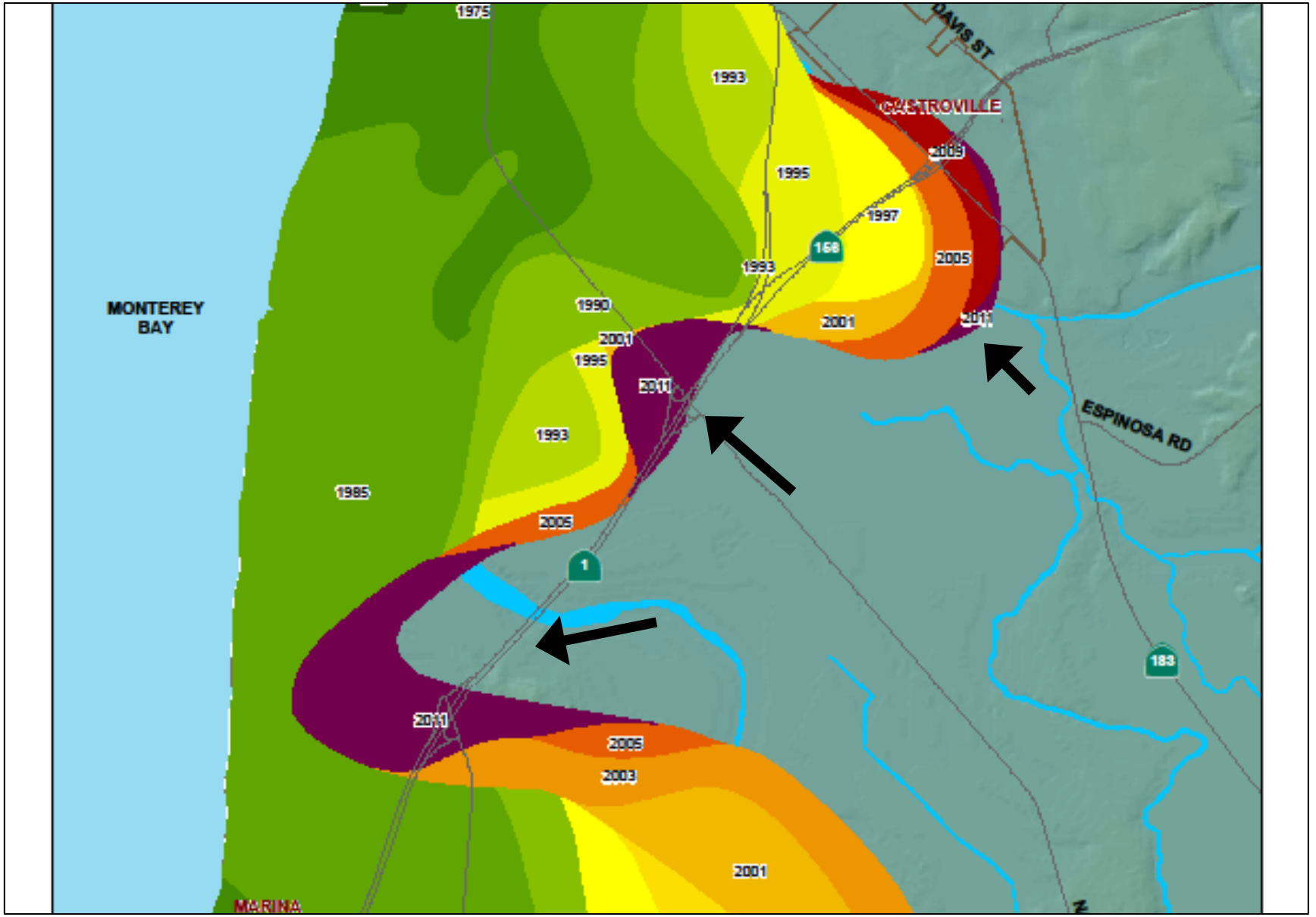


2011 Pressure 400-Foot Aquifer 500 mg/L Chloride Areas

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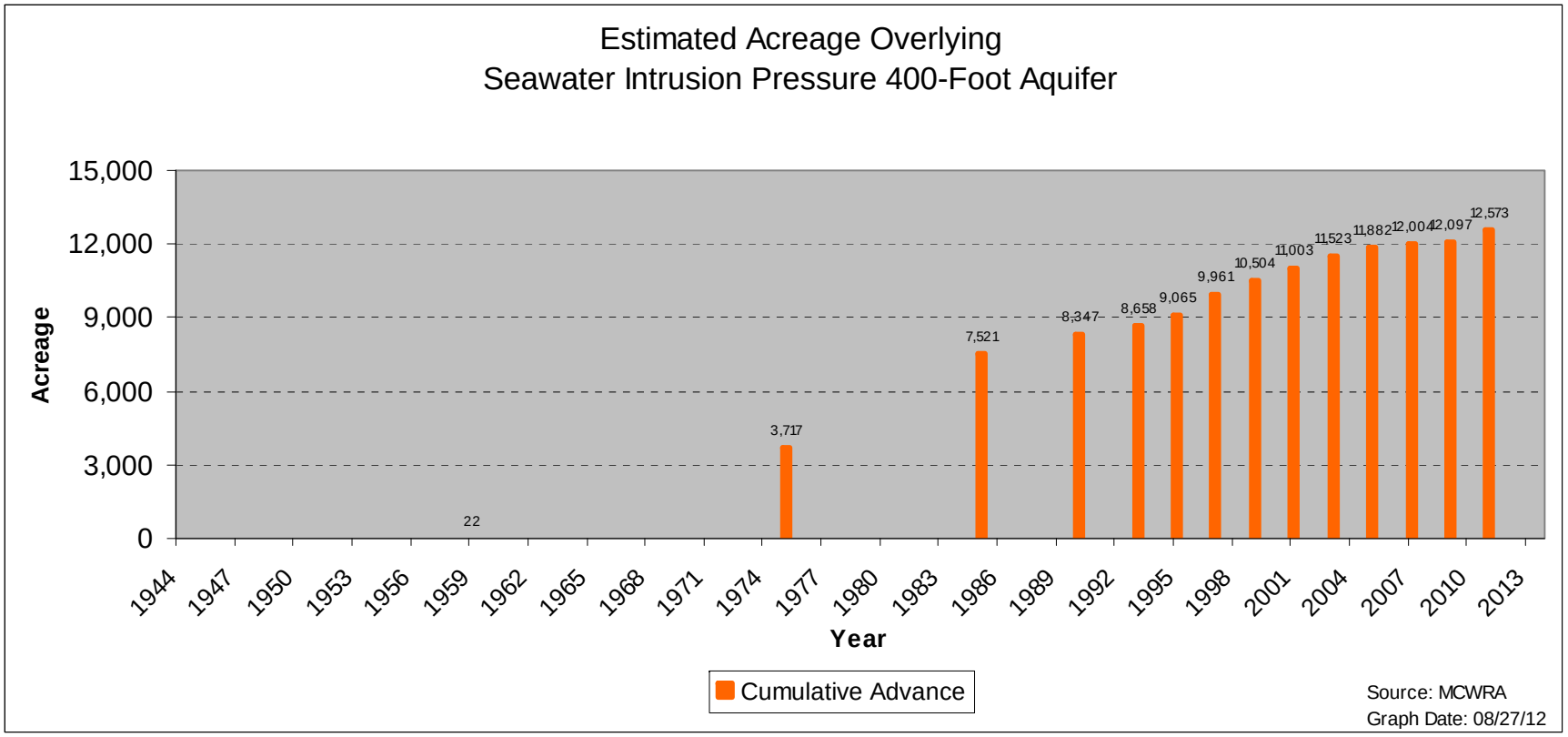
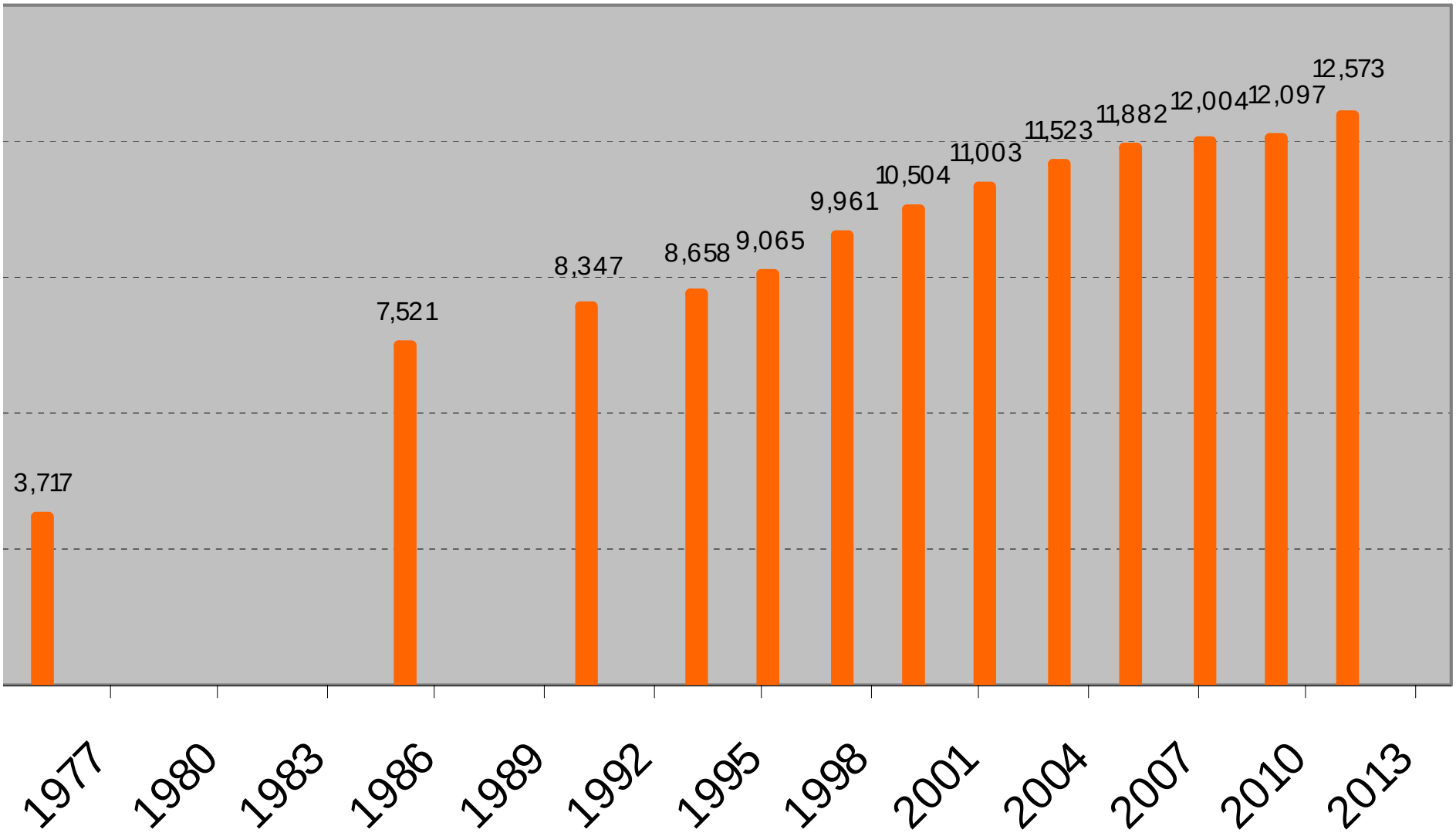
Pressure 400-Foot Aquifer Historical Advancement



Pressure 400-Foot Aquifer Historical Advancement



Summary

2011 Intrusion – 500 mg/L Chloride

- Rate of seawater intrusion continues to decrease

- The complex mechanism for seawater intrusion continues to persist

Summary

- Provided background information
- Ground Water Levels (2011 to 2009)
  - August:
    - In general, GWLs are up
    - Zero line moved 3 miles down valley
  - Fall:
    - GWLs stabilized up valley from Soledad
    - GWLs increasing down valley from Soledad
    - Zero line moved 2 miles down valley

Summary (cont.)

- Seawater Intrusion (2011 to 2009)
  - Rate of SWI continues to decrease
  - Advancement minimal, lobes are broadening
  - Complex SWI mechanism persists

- Ground water levels are up, rate of Seawater Intrusion is decreasing

- Too early to call “Project Suite” successful

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Ground Water Level and
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For 2011