

Attachment J
MCWRA Ground Water Level and
Seawater Intrusion Information for 2011
MCWRA Board of Directions presentation –
August 27, 2013)

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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

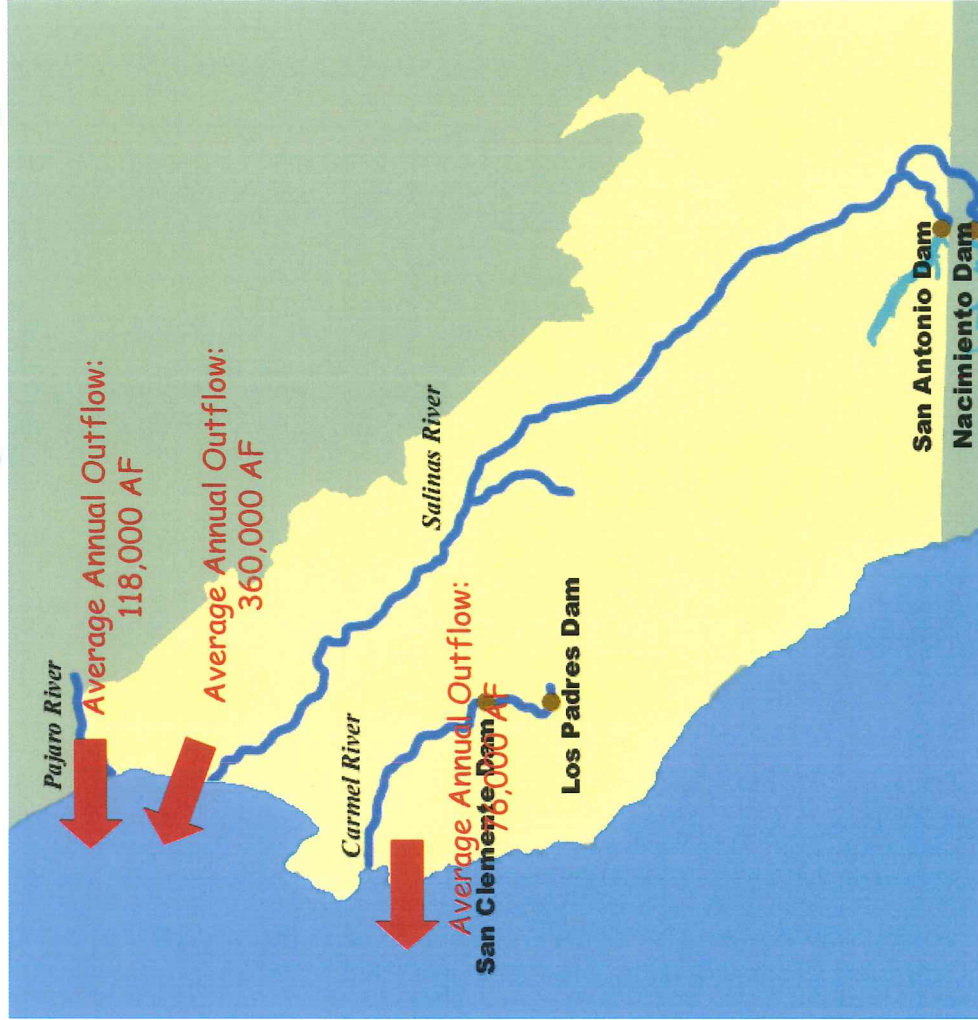


U.S. Department of the Interior
U.S. Geological Survey



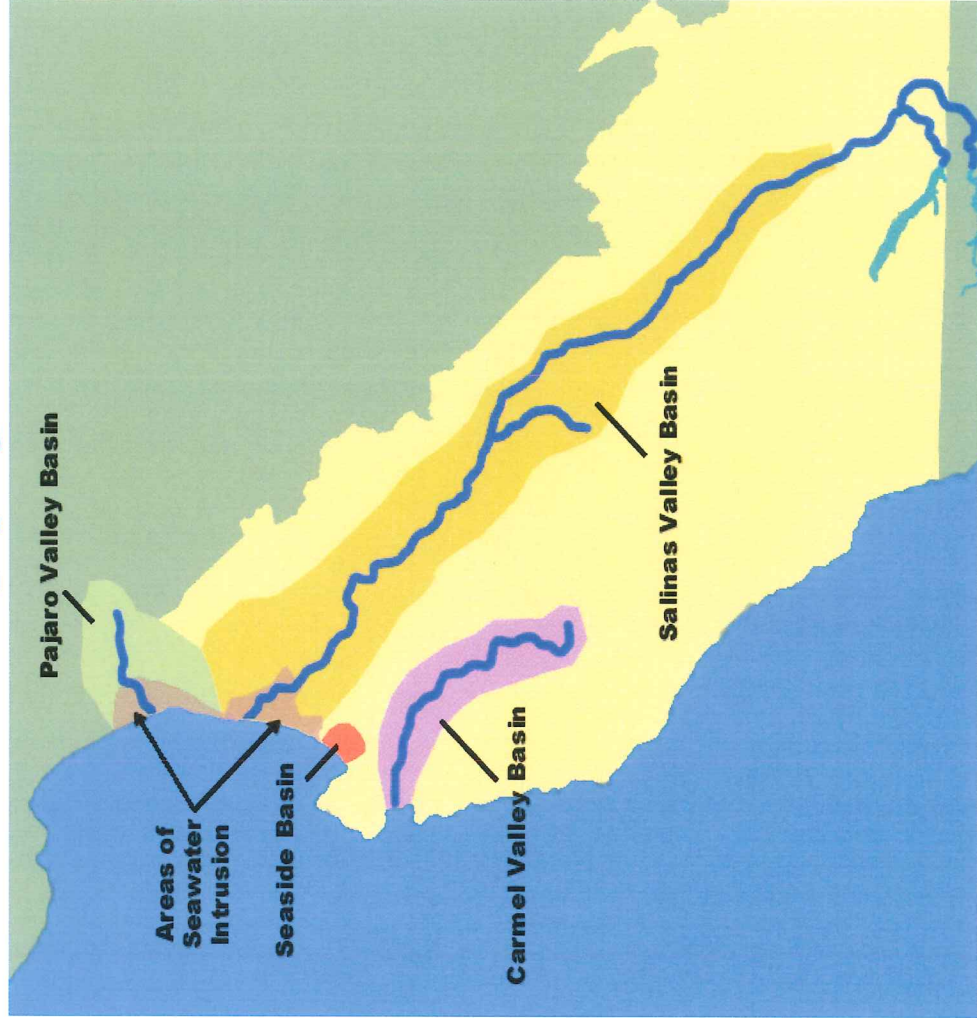


Surface Water Supplies of Monterey County





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 SWWP
 - Stop Seawater Intrusion
 - Provide adequate water supplies to meet current and future (2030) needs



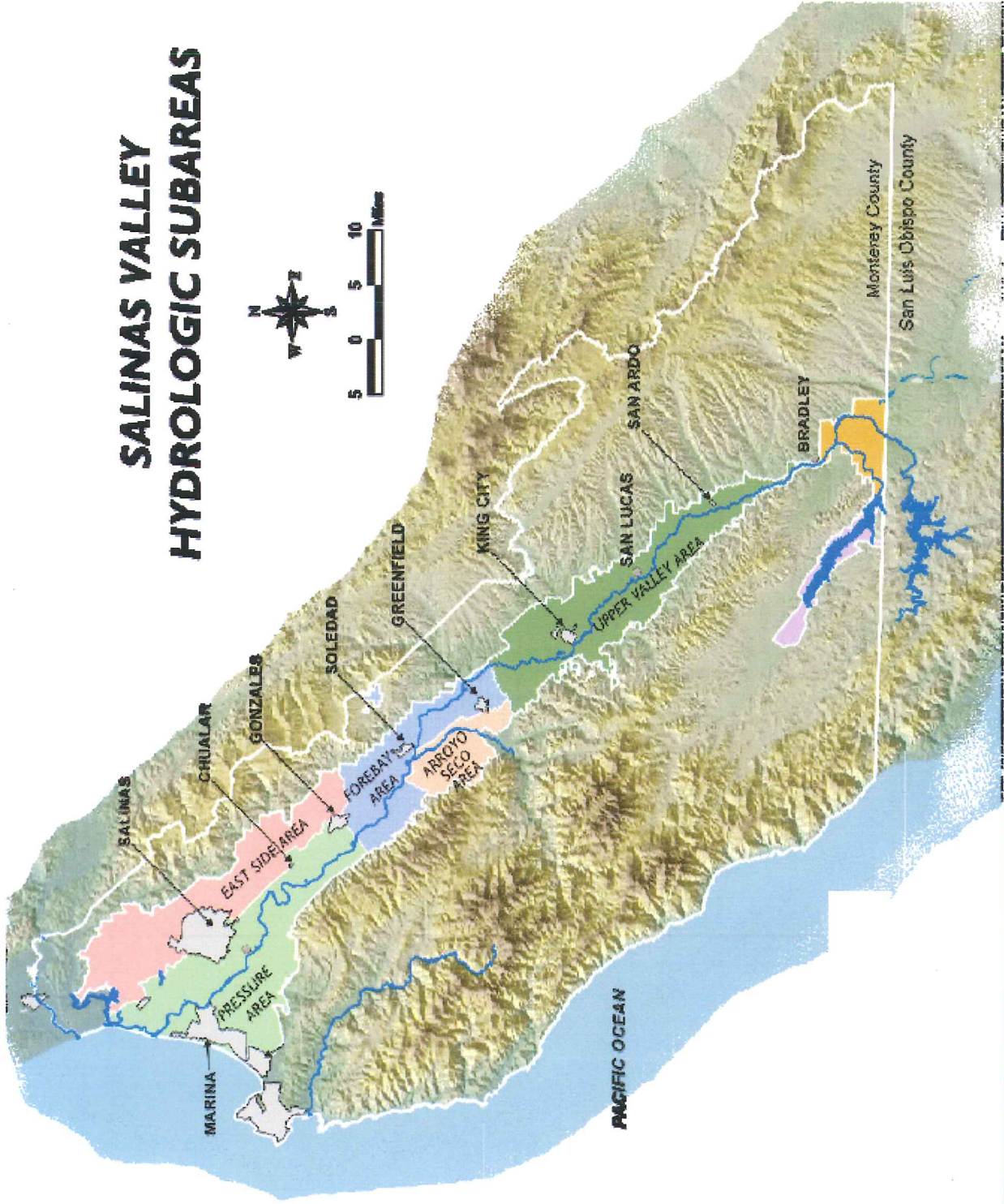


Why collect these data? (cont.)

- Salinas Valley – complex hydrogeologic system



SALINAS VALLEY HYDROLOGIC SUBAREAS





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

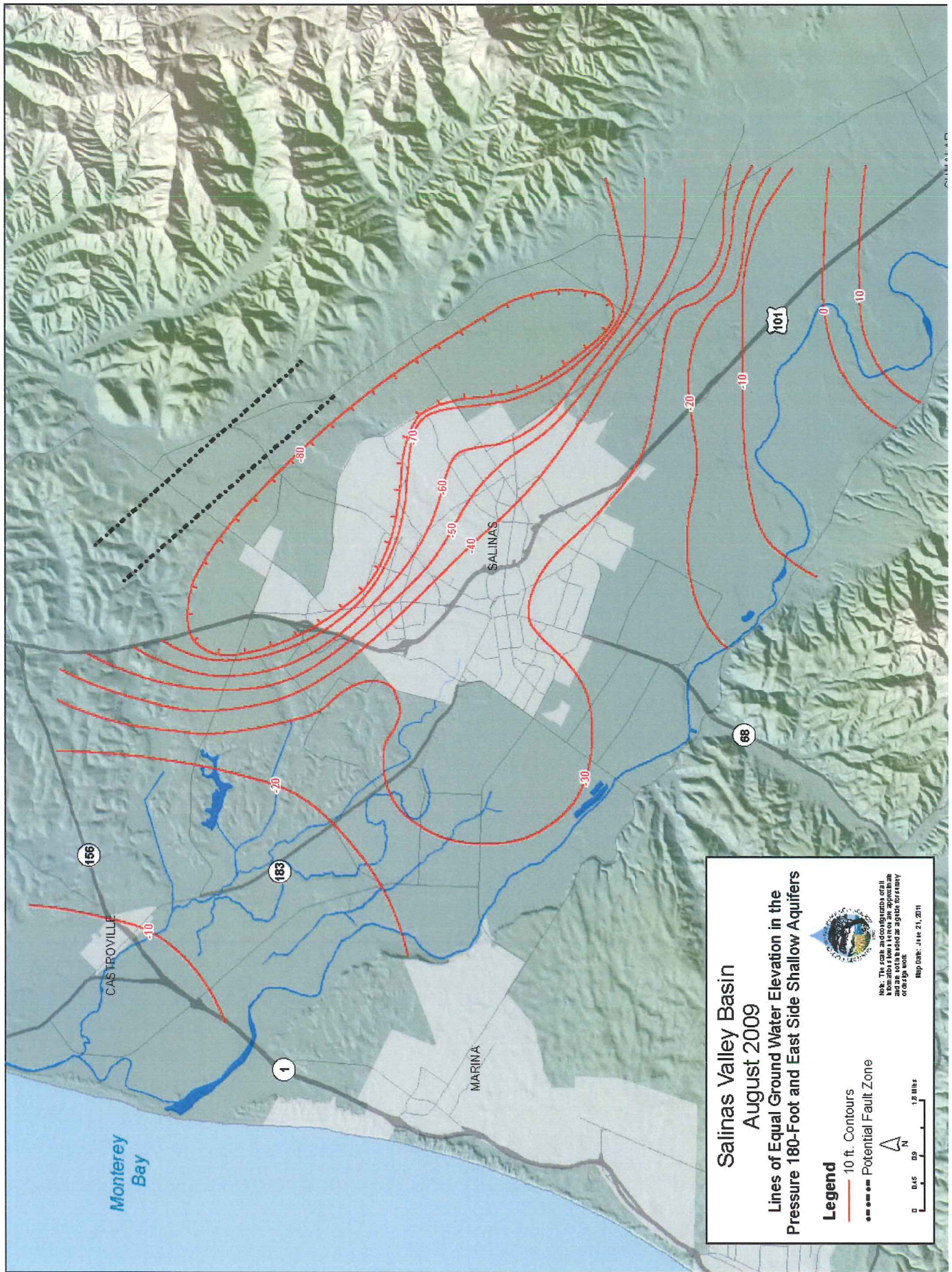




GWL Contour Maps (cont.)

- **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**



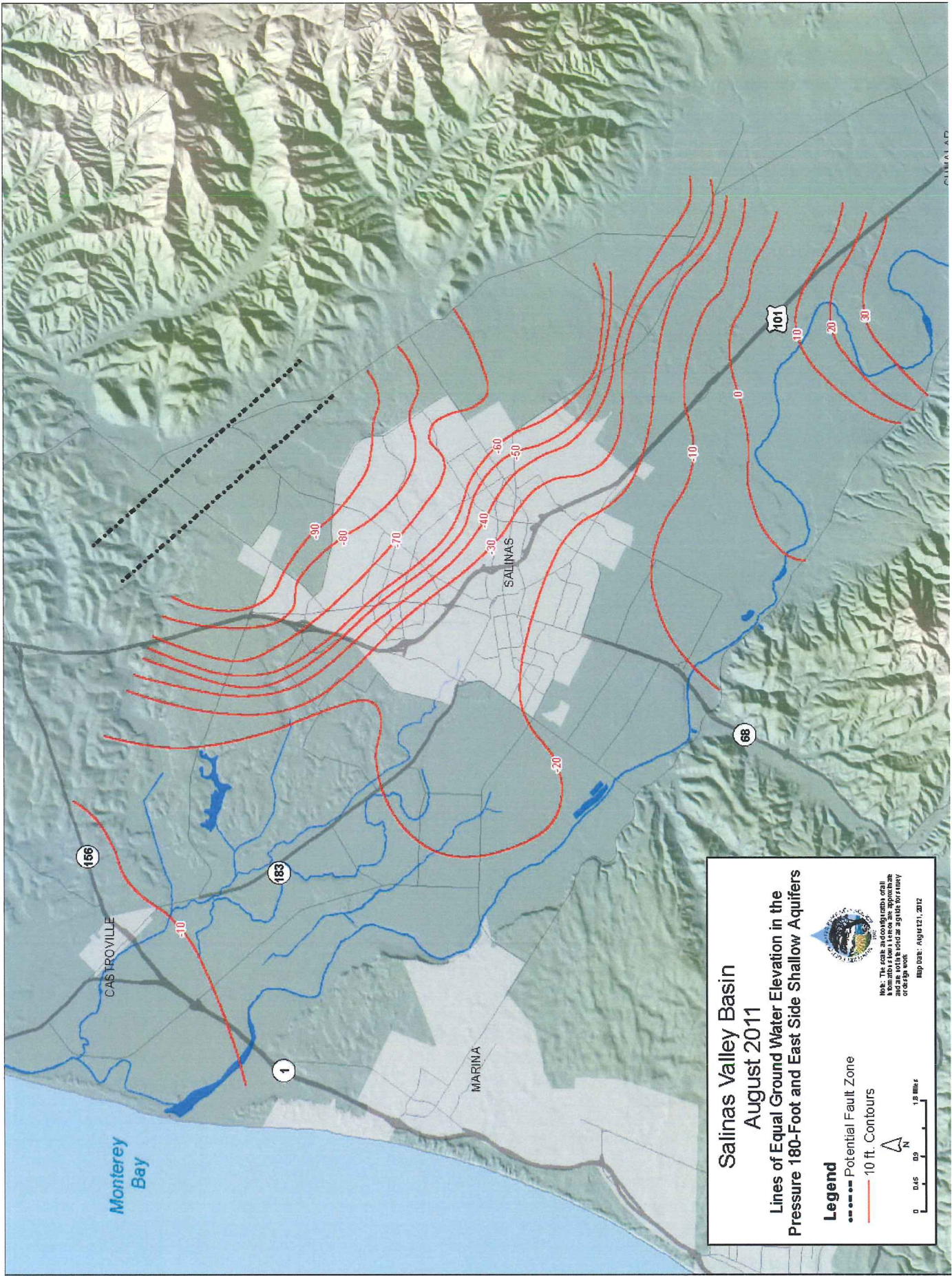


Salinas Valley Basin
August 2009
Lines of Equal Ground Water Elevation in the
Pressure 180-Foot and East Side Shallow Aquifers

Legend
 — 10 ft. Contours
 - - - - - Potential Fault Zone

0 0.6 1.2 Miles
 N

Web: The data on this website are for informational purposes only and are not intended as a substitute for professional engineering work.
 Map Date: June 21, 2011

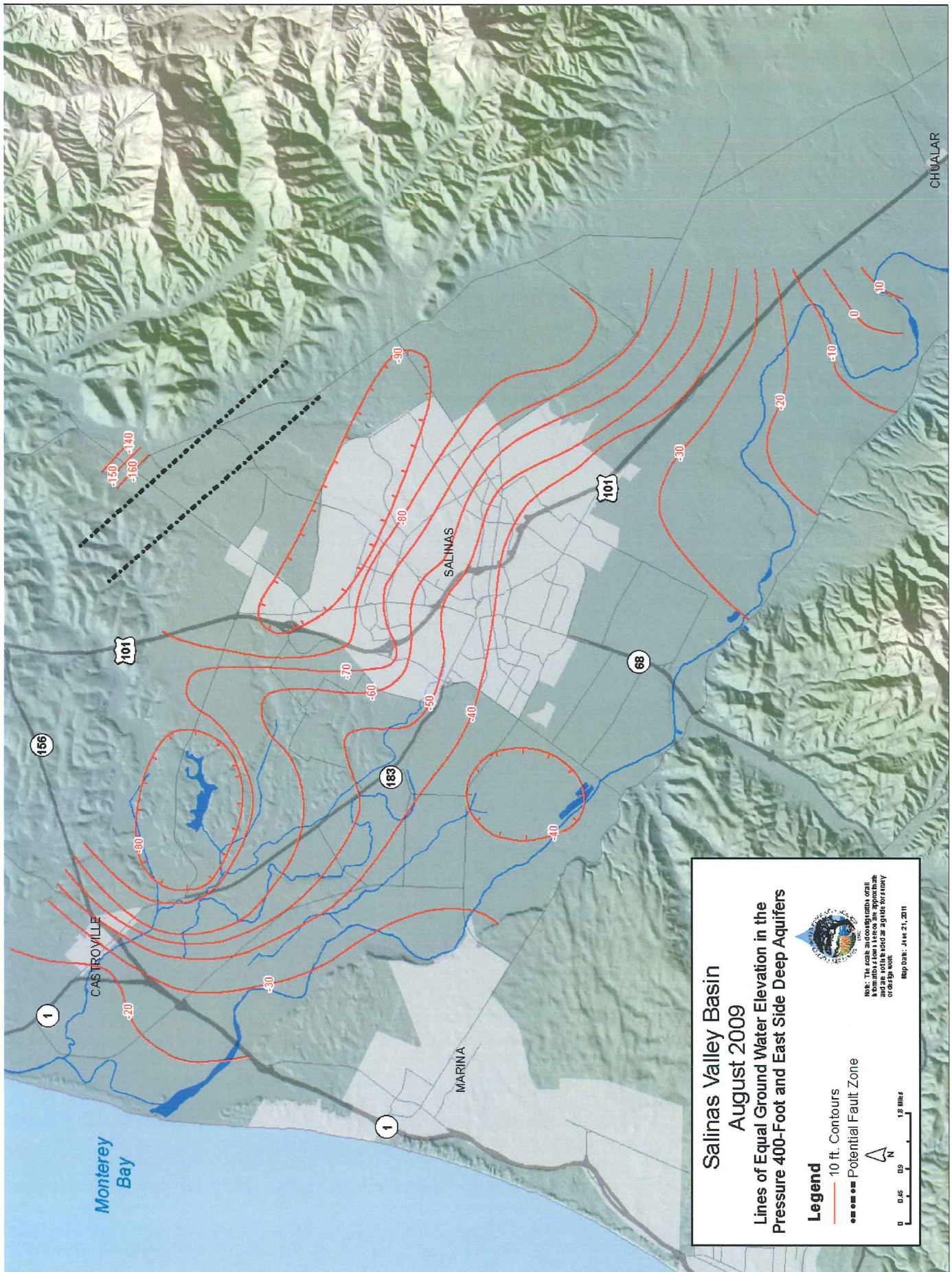


Salinas Valley Basin
August 2011
Lines of Equal Ground Water Elevation in the
Pressure 180-Foot and East Side Shallow Aquifers


Legend
 - - - - - Potential Fault Zone
 ——— 10 ft. Contours

Note: The scale on this map is only approximate and is not intended as a guide for any other purpose.
 map date: August 12, 2012

0 0.45 0.9 1.8 Miles
 N



Salinas Valley Basin
August 2009
Lines of Equal Ground Water Elevation in the
Pressure 400-Foot and East Side Deep Aquifers



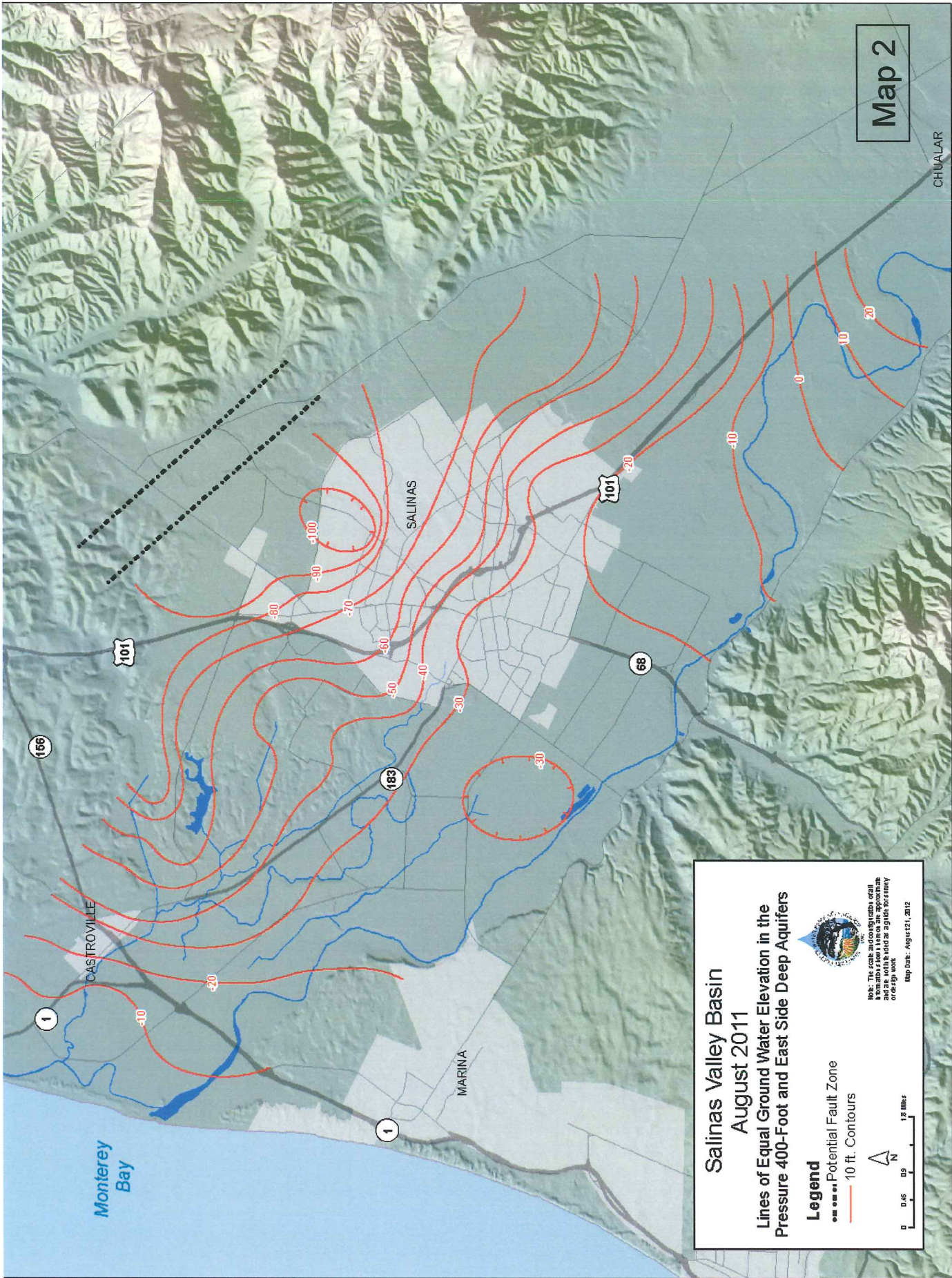
Legend
 — 10 ft. Contours
 - - - - - Potential Fault Zone

Note: The scale and contours are all approximate and should not be used for any engineering or design work.


Map Date: June 21, 2011

0 0.5 1 1.5 Miles

N



Salinas Valley Basin
August 2011
Lines of Equal Ground Water Elevation in the
Pressure 400-Foot and East Side Deep Aquifers



Legend
- - - - - Potential Fault Zone
— 10 ft. Contours

Note: The scale and contiguity of all symbols is for informational purposes only and should not be used as a substitute for field work.

Map Date: August 21, 2012

0 0.5 1 1.5 Miles

Salinas Valley Basin

Fall 2011

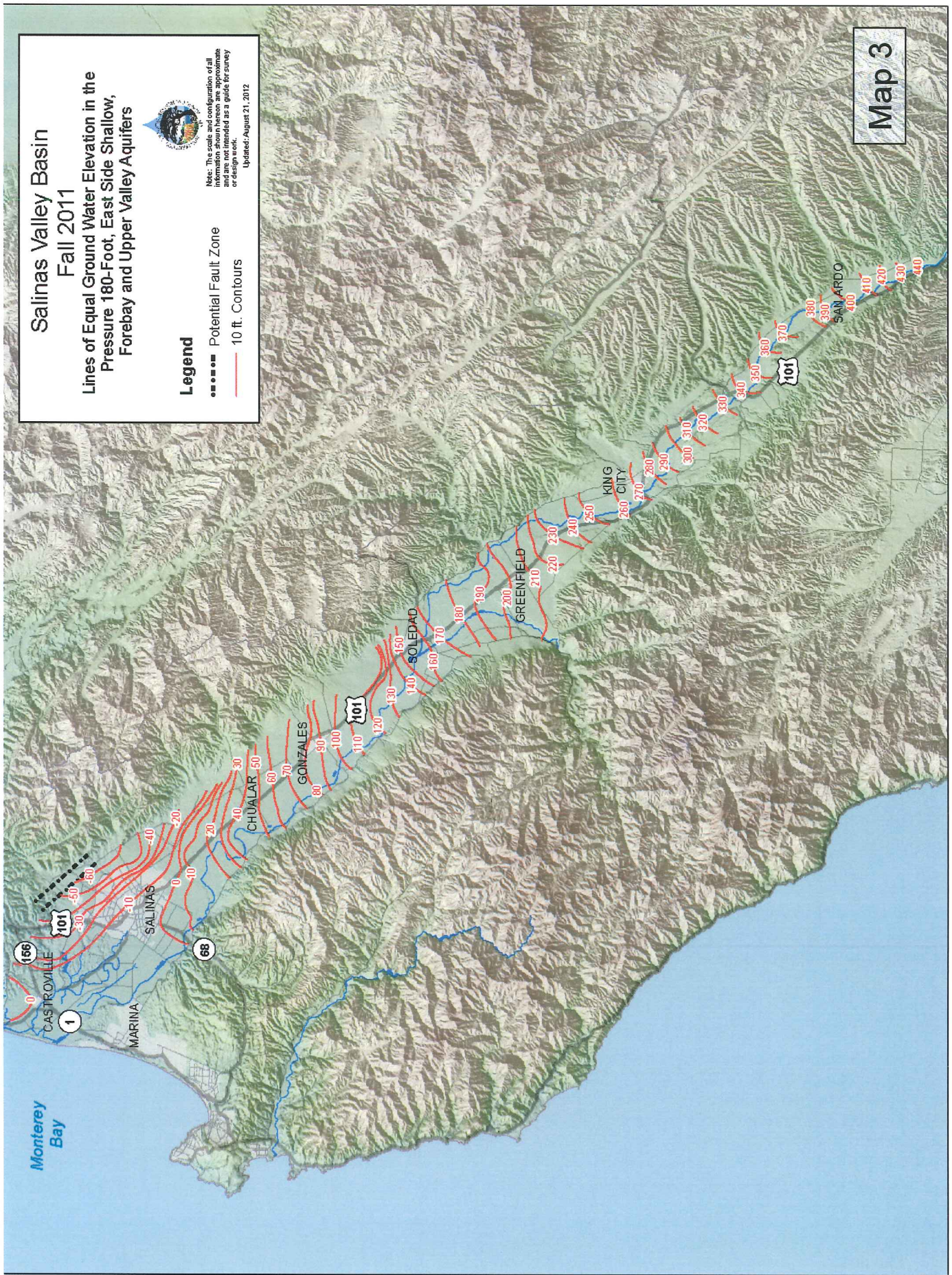
Lines of Equal Ground Water Elevation in the Pressure 180-Foot, East Side Shallow, Forebay and Upper Valley Aquifers



Note: The scale and configuration of all information shown herein are approximate and are not intended as a guide for survey or design work.
Updated: August 21, 2012

Legend

- Potential Fault Zone
- 10 ft. Contours



Map 3

Salinas Valley Basin

Fall 2009

Lines of Equal Ground Water Elevation in the
Pressure 180-Foot, East Side Shallow,
Forebay and Upper Valley Aquifers



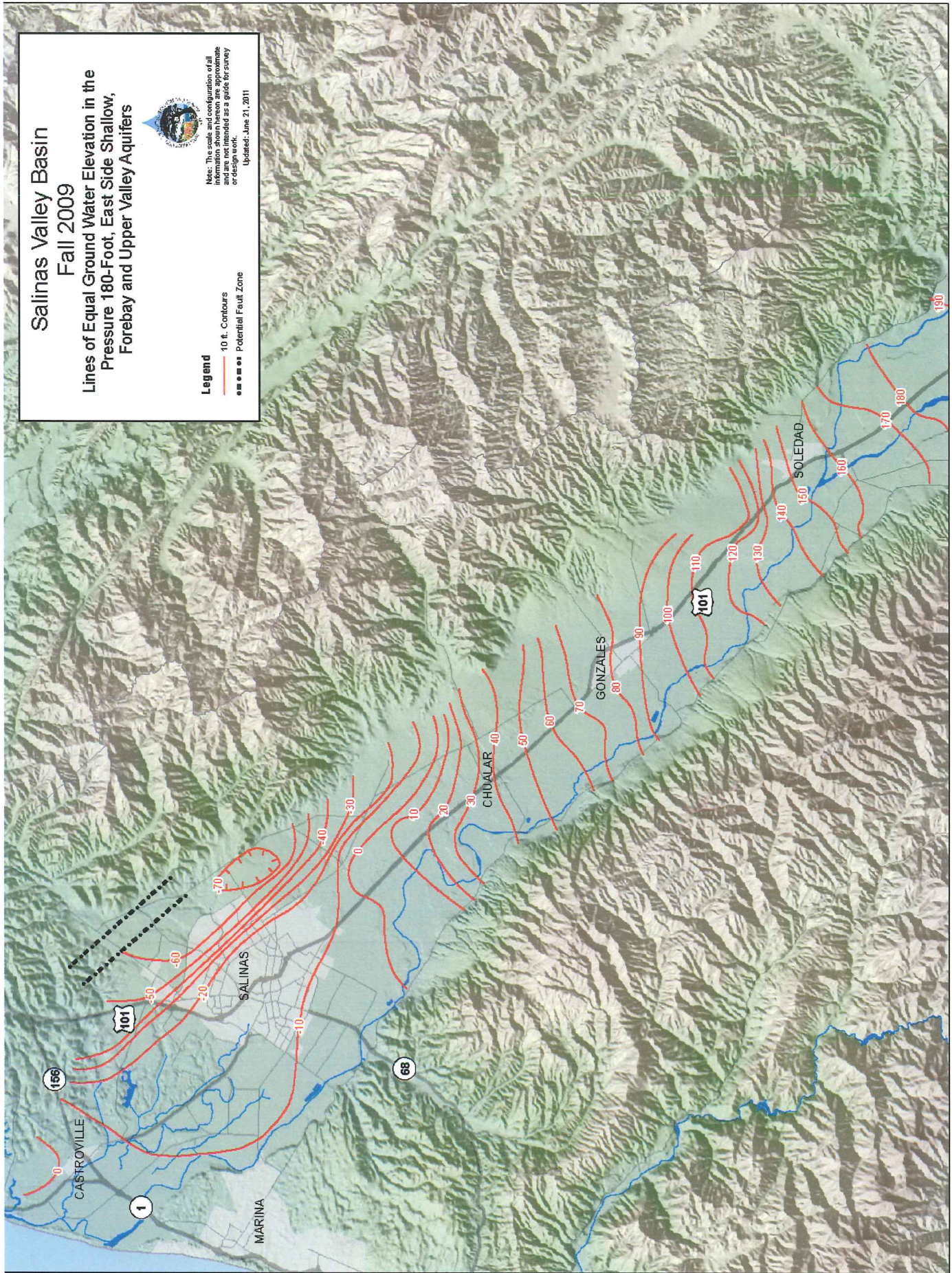
Note: The scale and configuration of all
information shown herein are approximate
and are not intended as a guide for survey
or design work.

Updated: June 21, 2011

Legend

— 10 ft. Contours

--- Potential Fault Zone



Salinas Valley Basin

Fall 2011

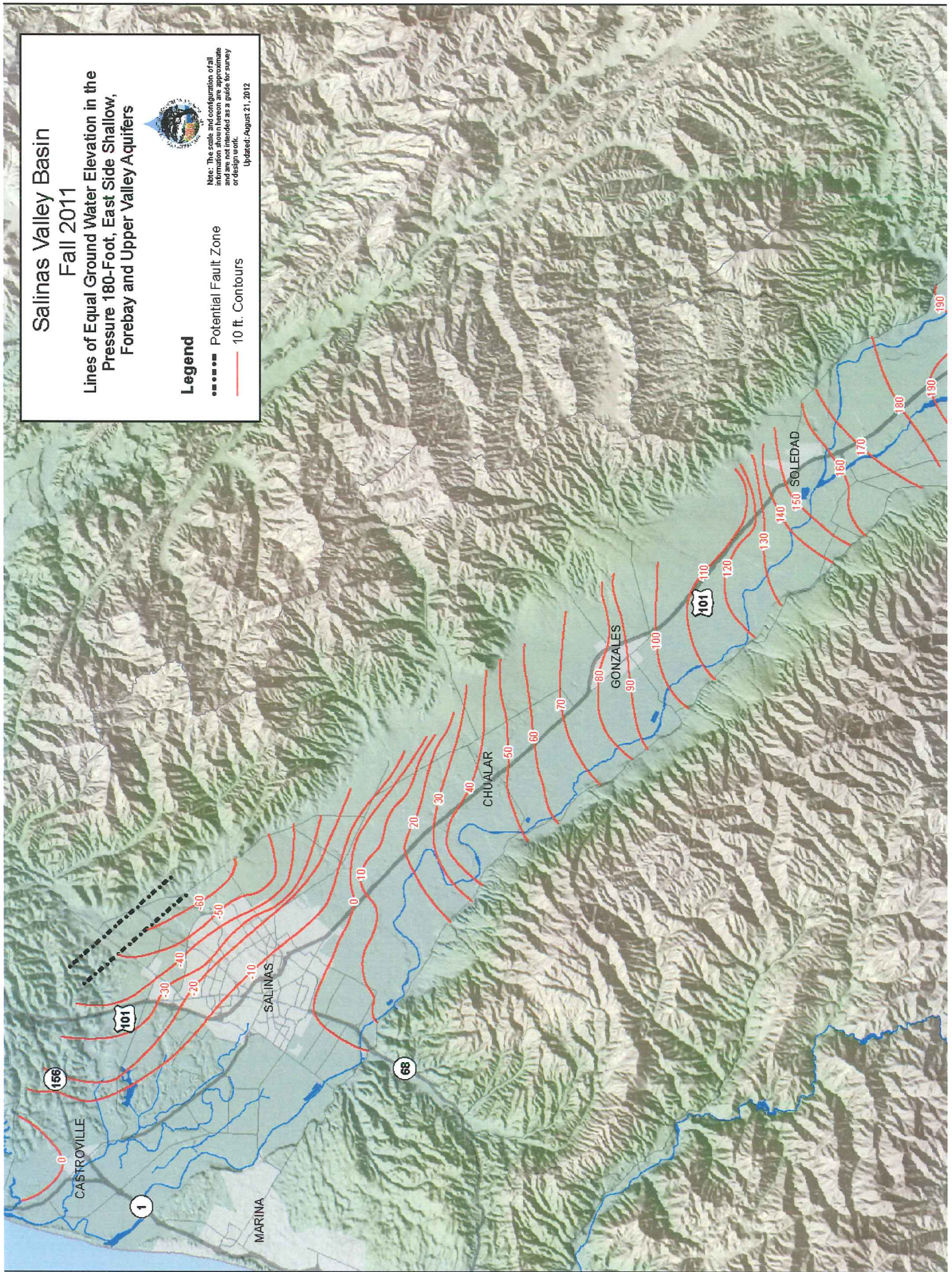
Lines of Equal Ground Water Elevation in the
Pressure 180-Foot, East Side Shallow,
Forebay and Upper Valley Aquifers



Note: The scale and configuration of all
information shown herein are approximate
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or design work.
Updated: August 21, 2012

Legend

- Potential Fault Zone
- 10 ft. Contours



Salinas Valley Basin

Fall 2009

Lines of Equal Ground Water Elevation in the
Pressure 180-Foot, East Side Shallow,
Forebay and Upper Valley Aquifers



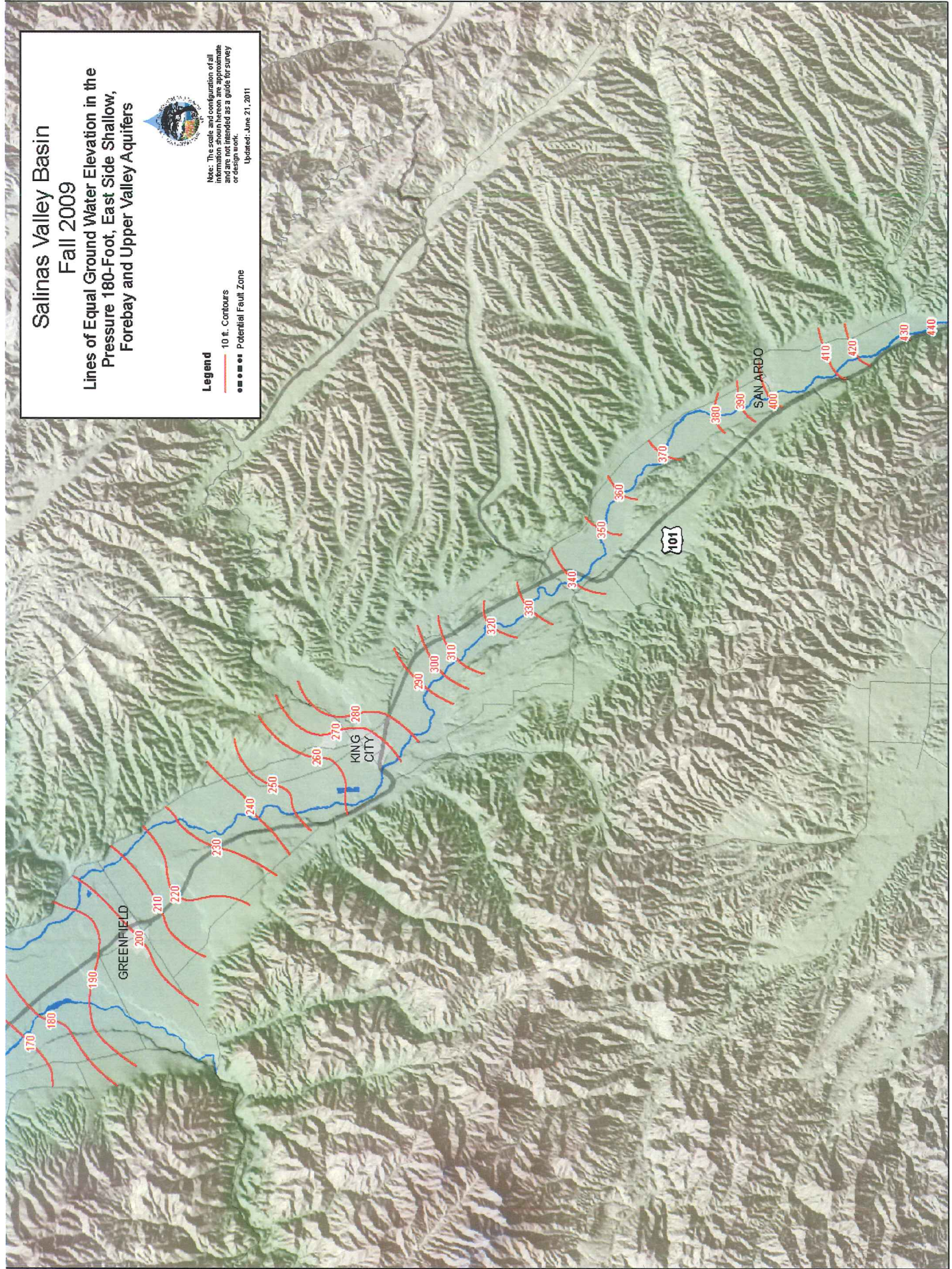
Note: The scale and configuration of all
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Updated: June 21, 2011

Legend

10 ft. Contours

Potential Fault Zone



Salinas Valley Basin Fall 2011

Lines of Equal Ground Water Elevation in the
Pressure 180-Foot, East Side Shallow,
Forebay and Upper Valley Aquifers

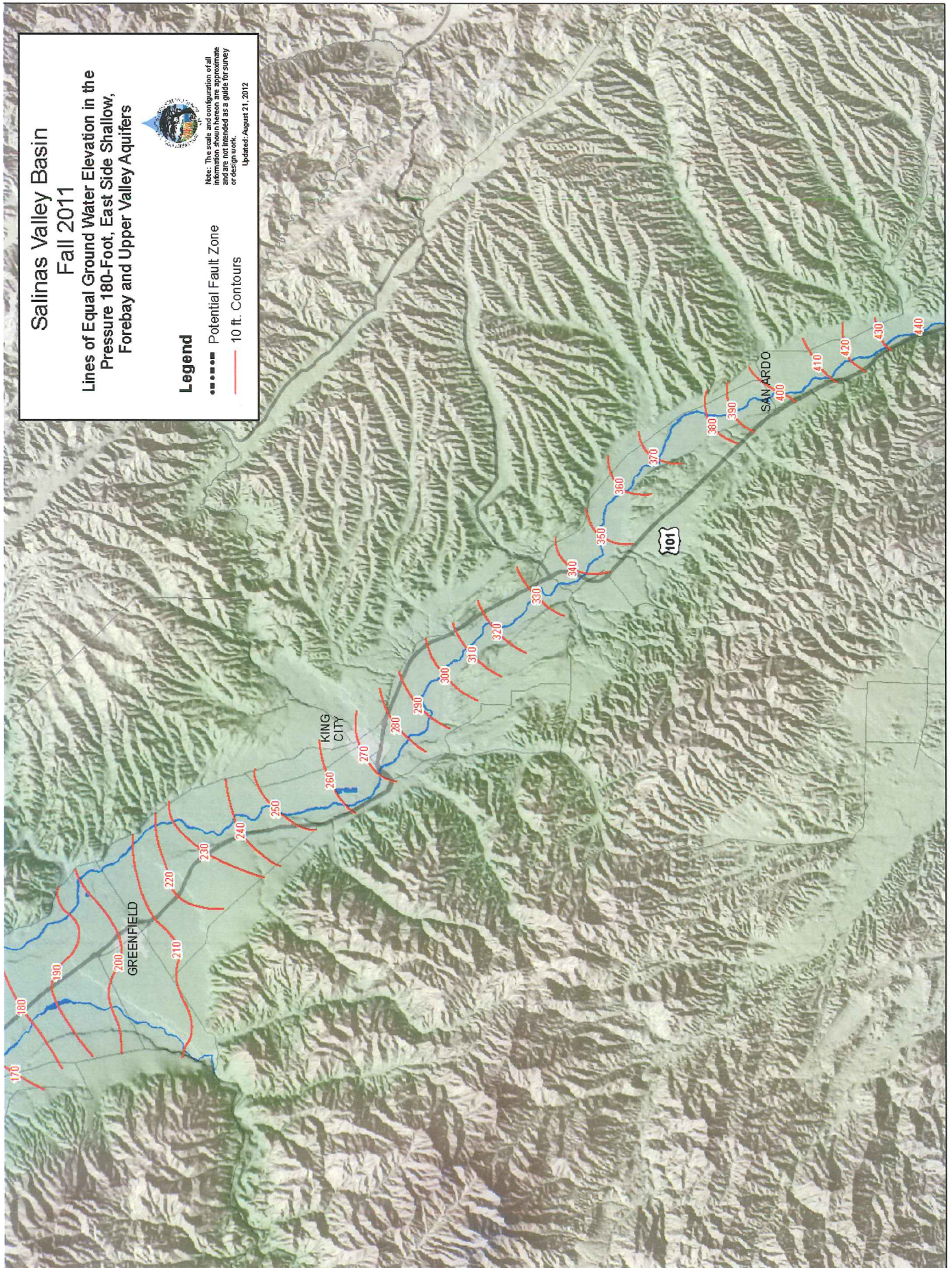


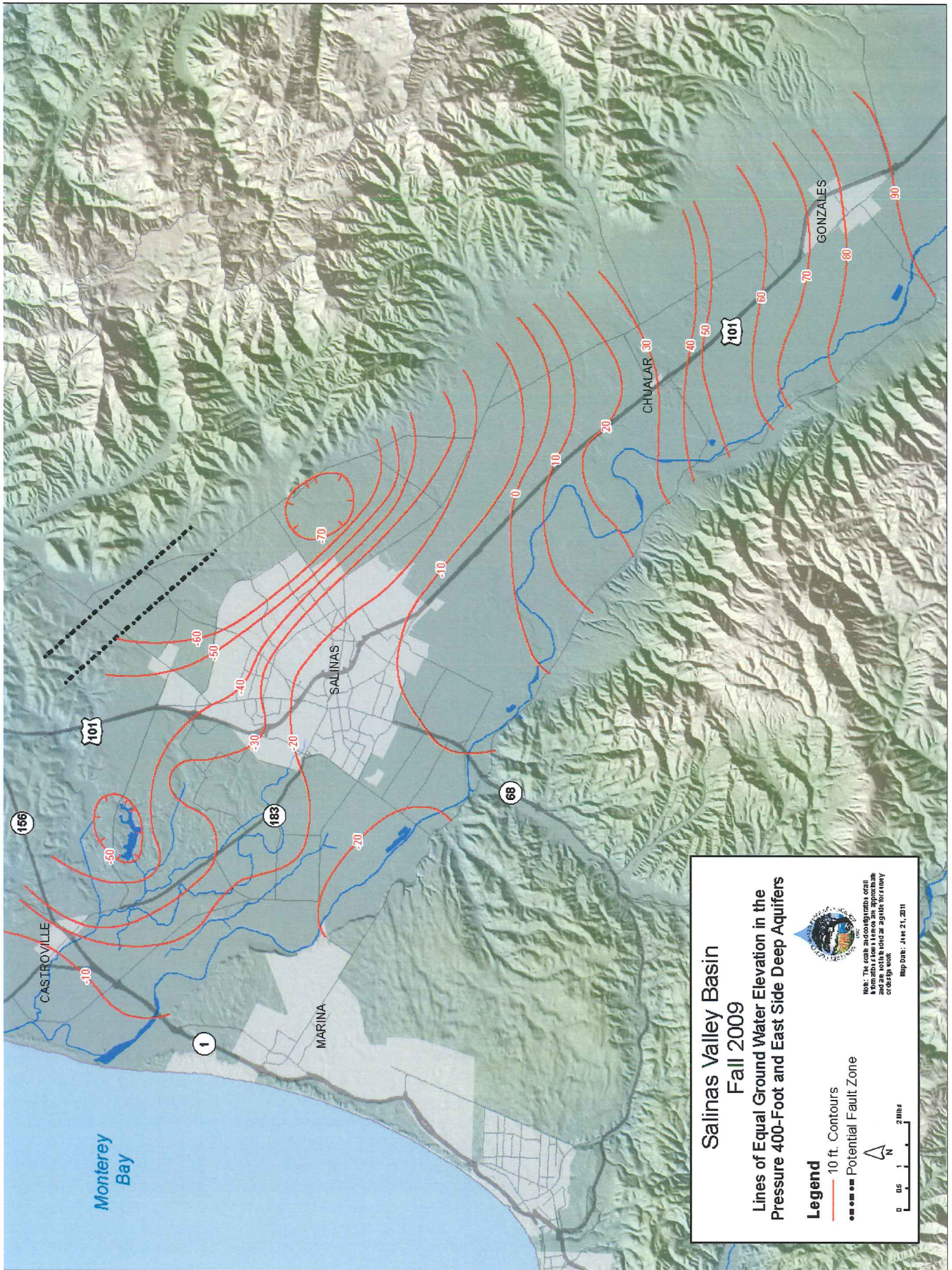
Note: The scale and configuration of all
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or design work.

Updated: August 21, 2012

Legend

- Potential Fault Zone
- 10 ft. Contours





Salinas Valley Basin
Fall 2009

**Lines of Equal Ground Water Elevation in the
 Pressure 400-Foot and East Side Deep Aquifers**

Legend

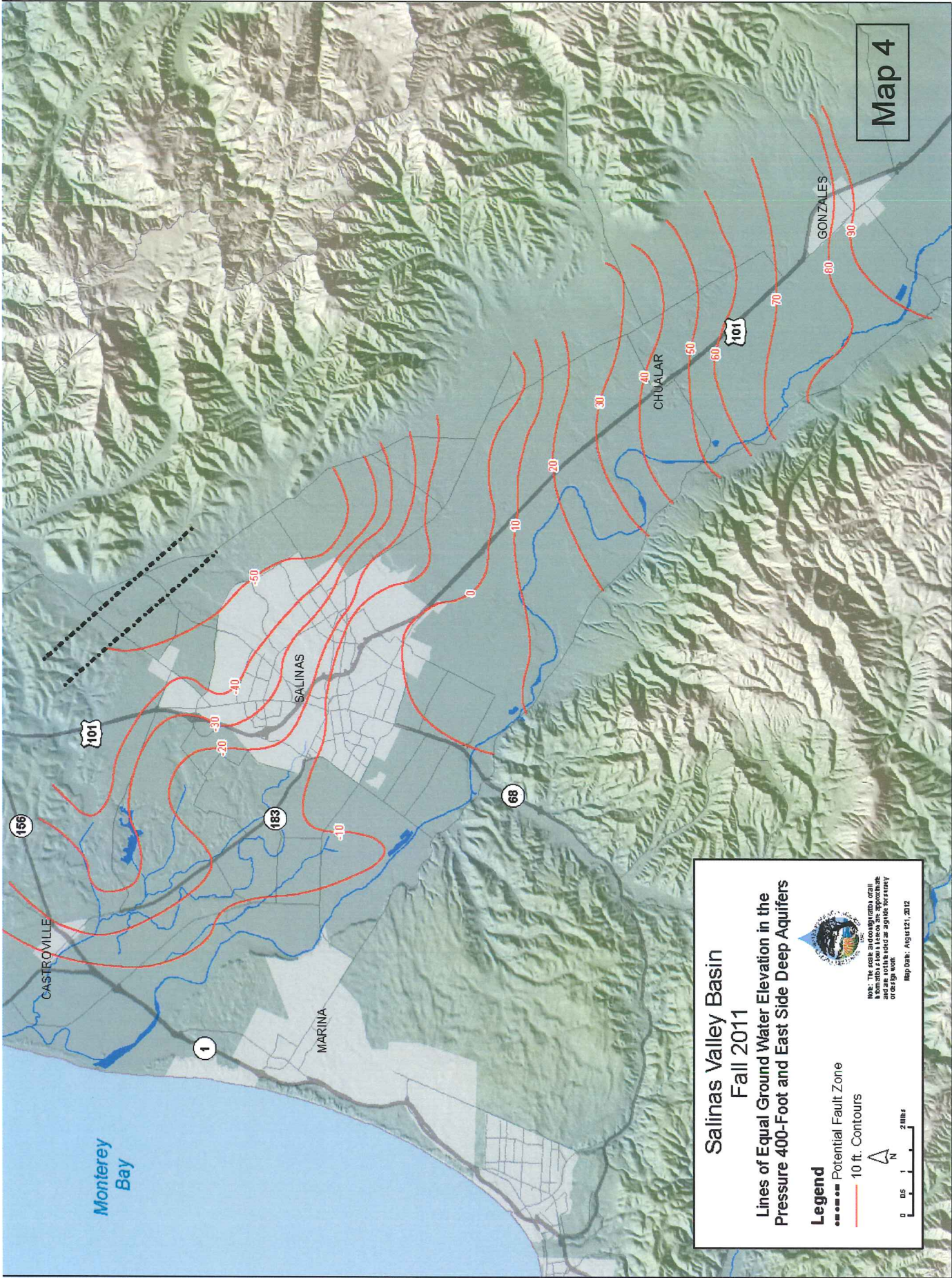
- 10 ft. Contours
- - - - Potential Fault Zone

0 0.5 1 2 miles

N

Note: The scale and contour interval
 in this map are approximate and
 should not be used for surveying
 or design work.

Map Date: June 21, 2011





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





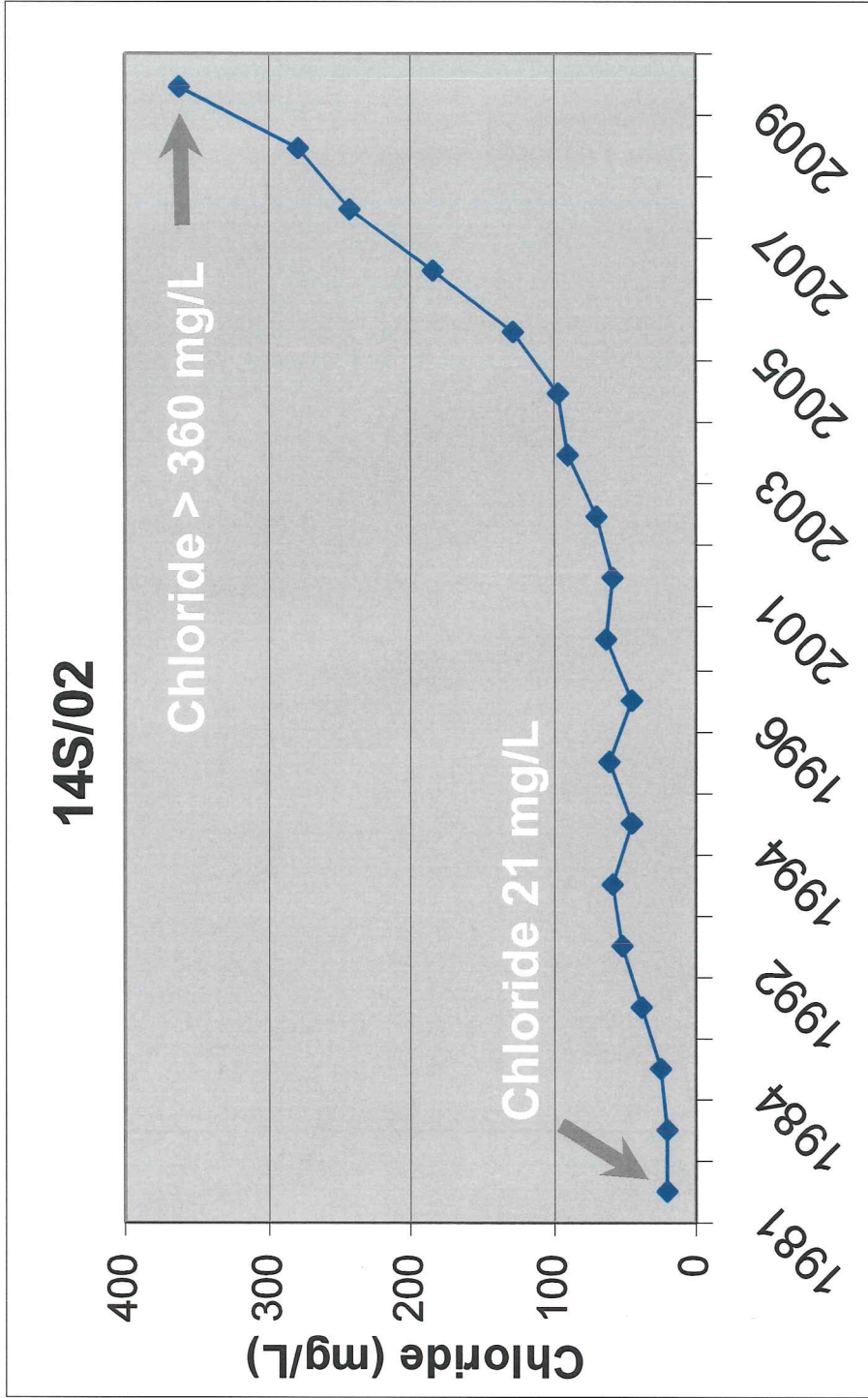
Seawater Intrusion Data (cont.)

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



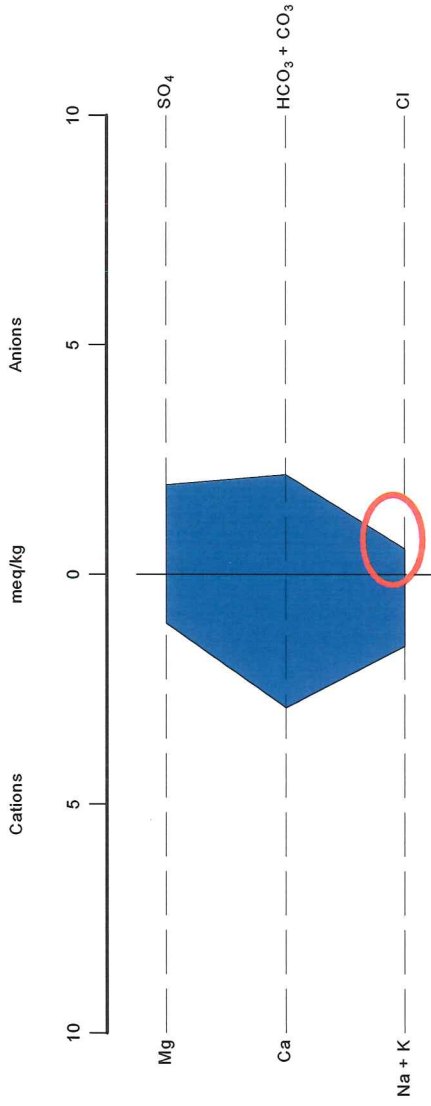


Chloride Time Series Indicating Possible Intrusion

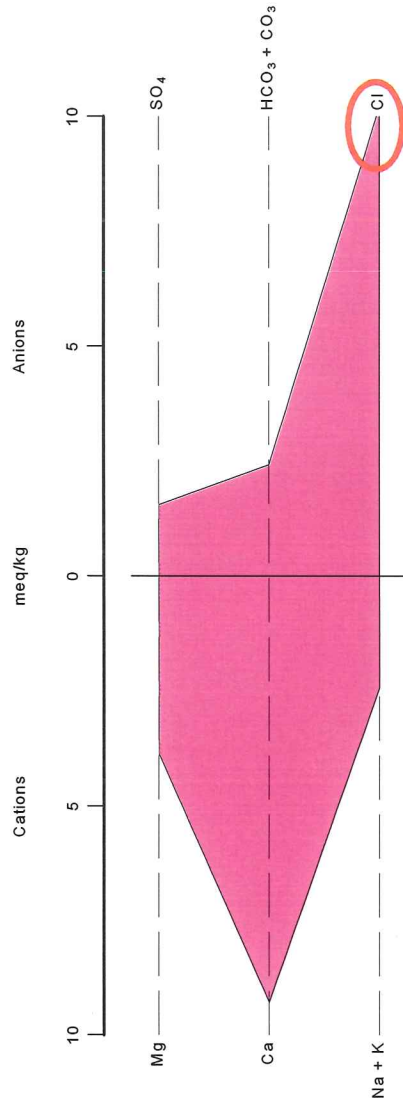




No Intrusion - 1982

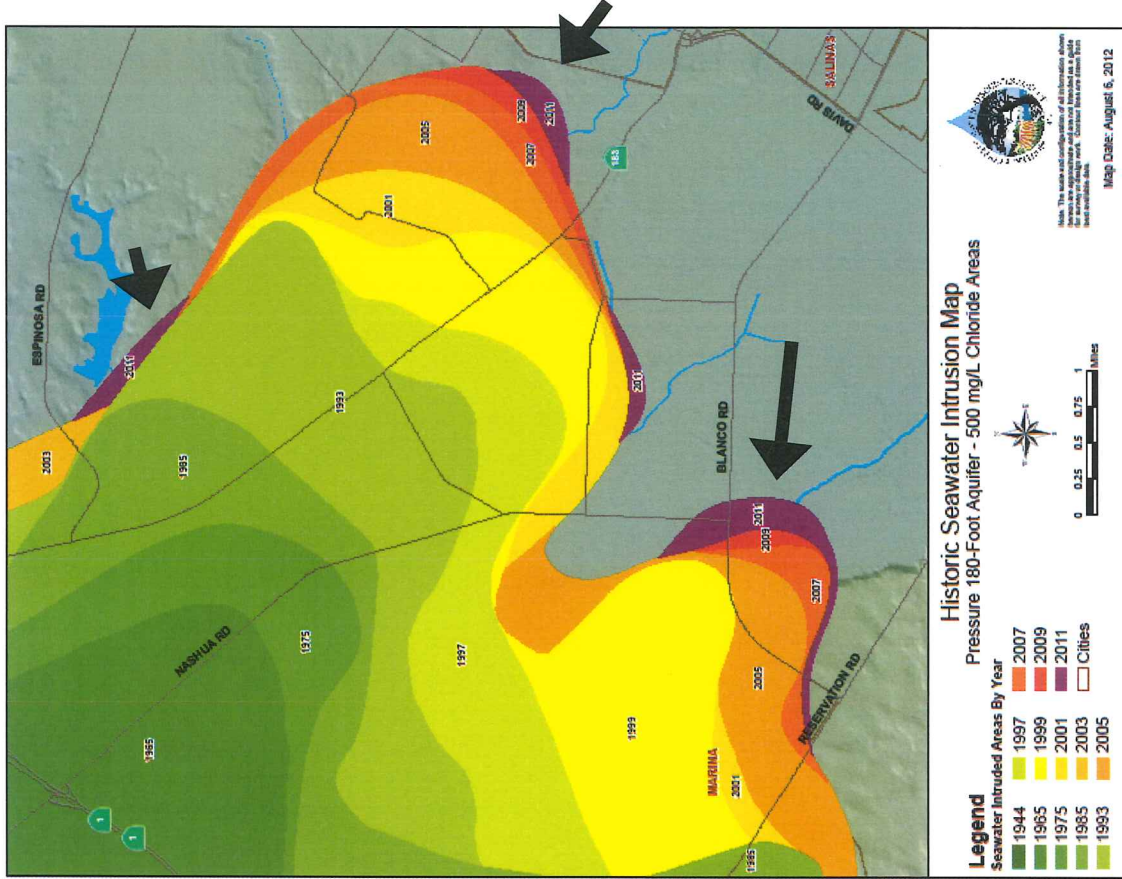


Early Intrusion - 2009



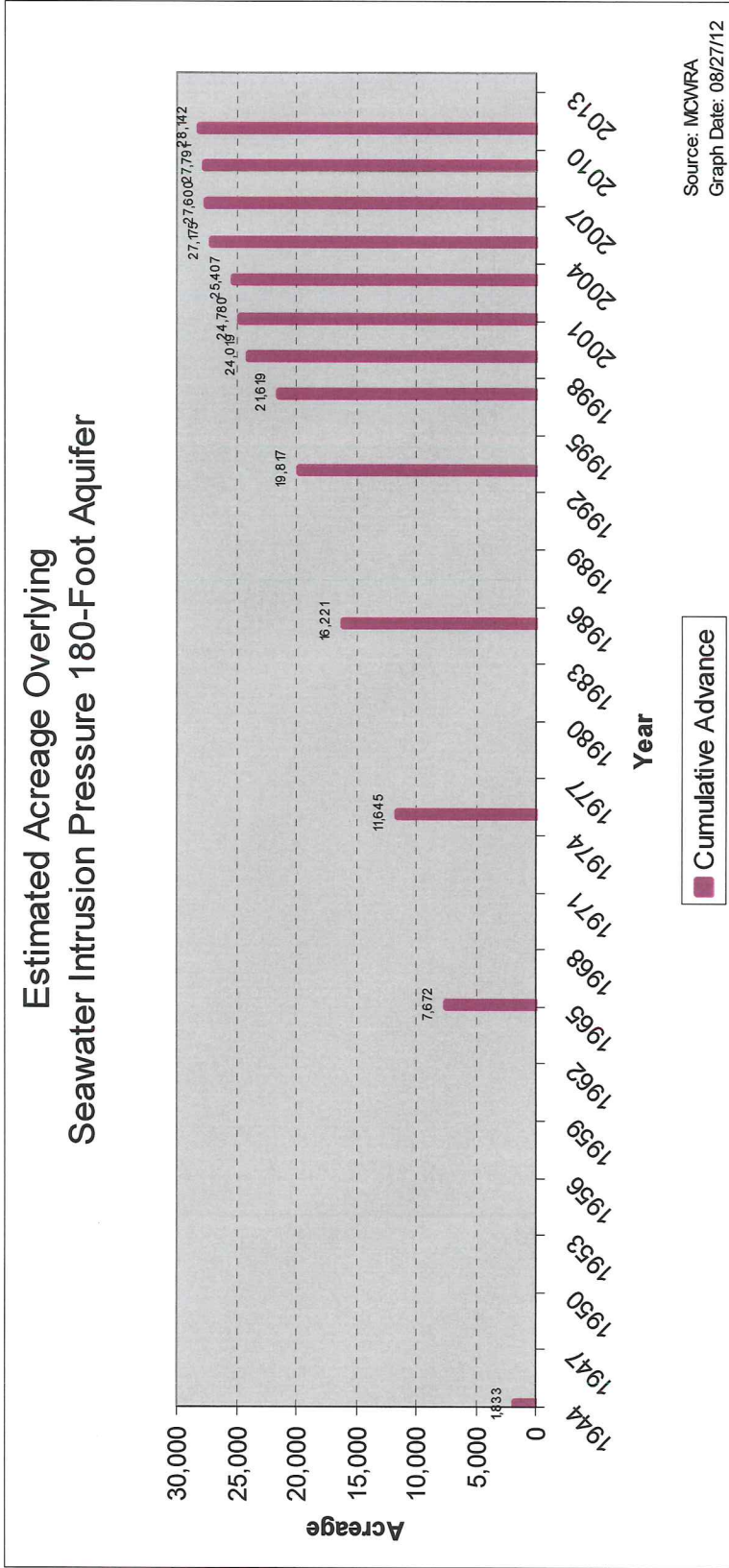
Stiff Diagrams (general mineral fingerprint) Well 14S/-2E



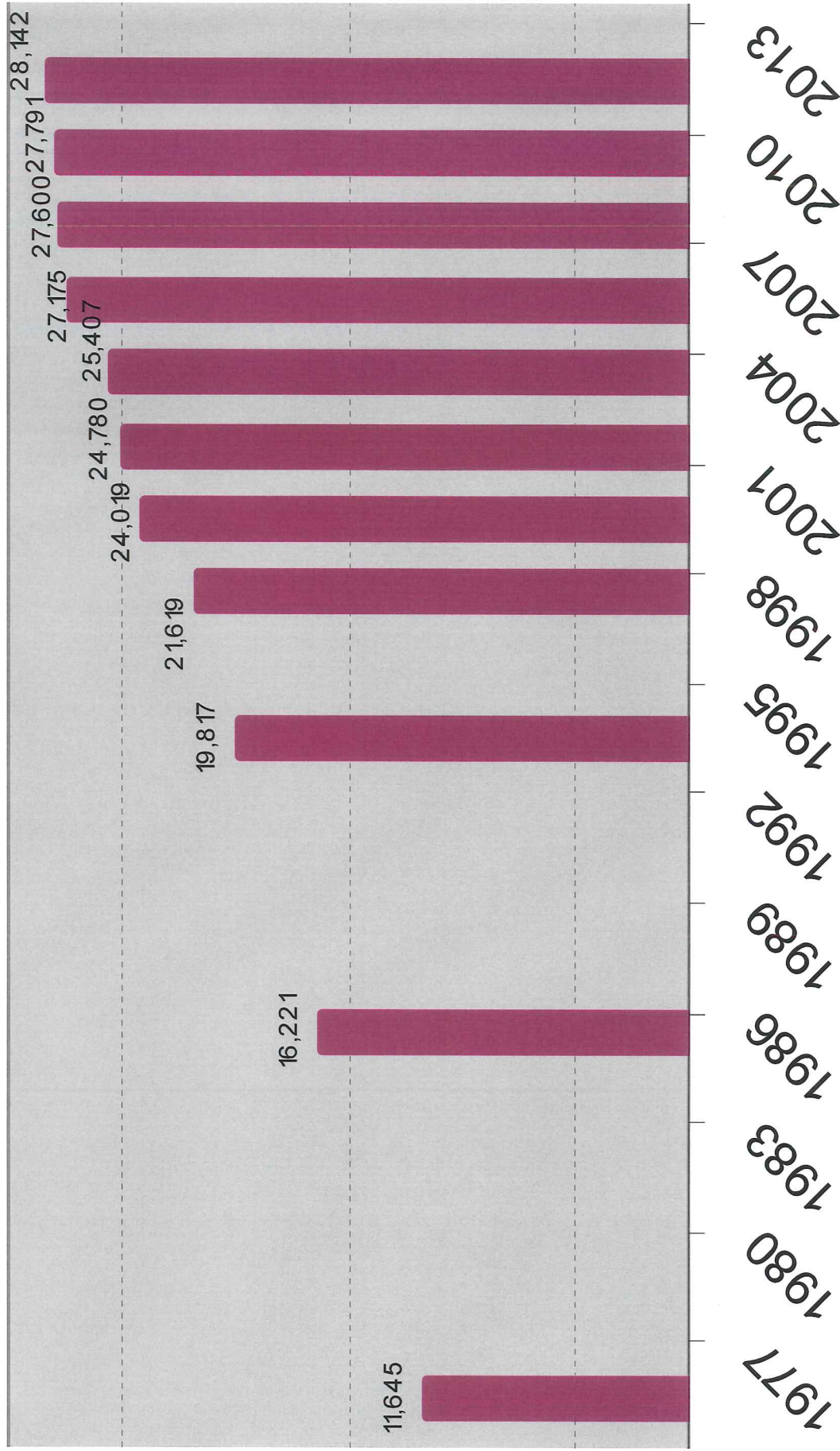




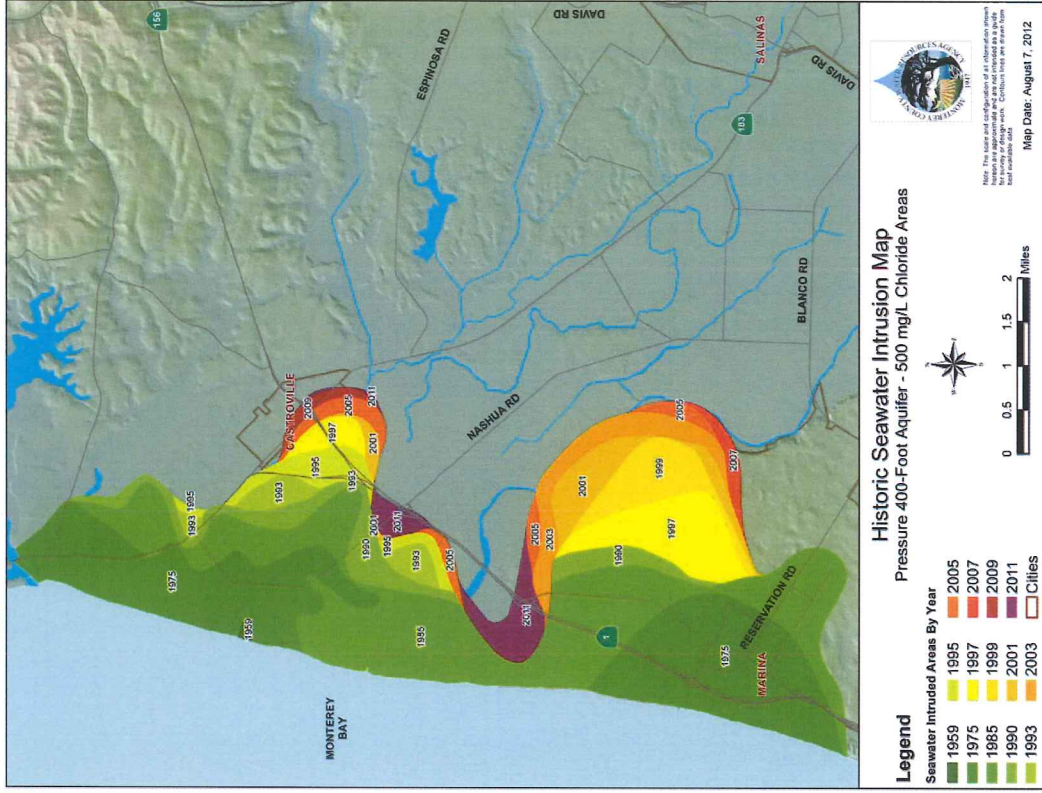
Pressure 180-Foot Aquifer Historical Advancement

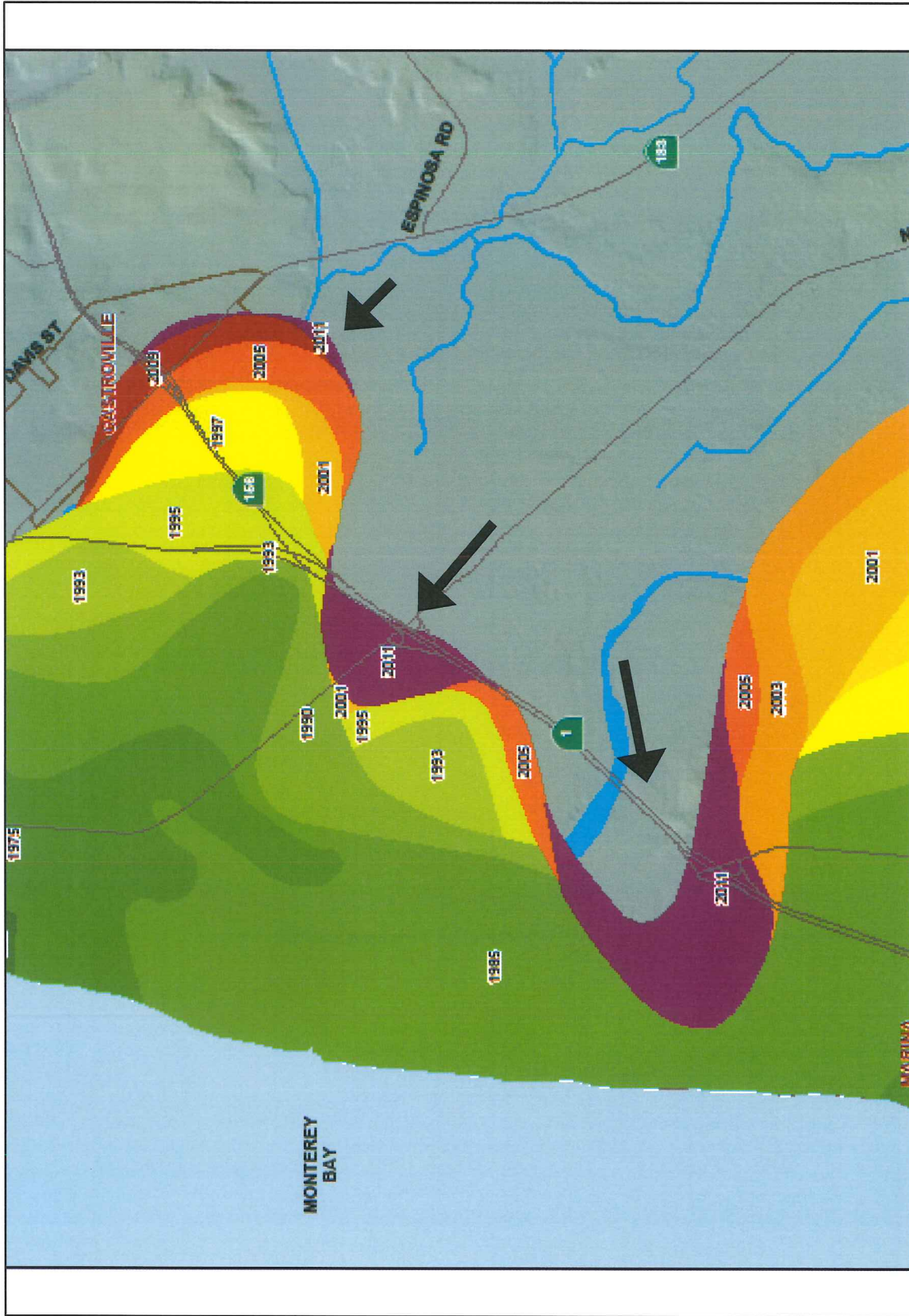


Pressure 180-Foot Aquifer Historical Advancement



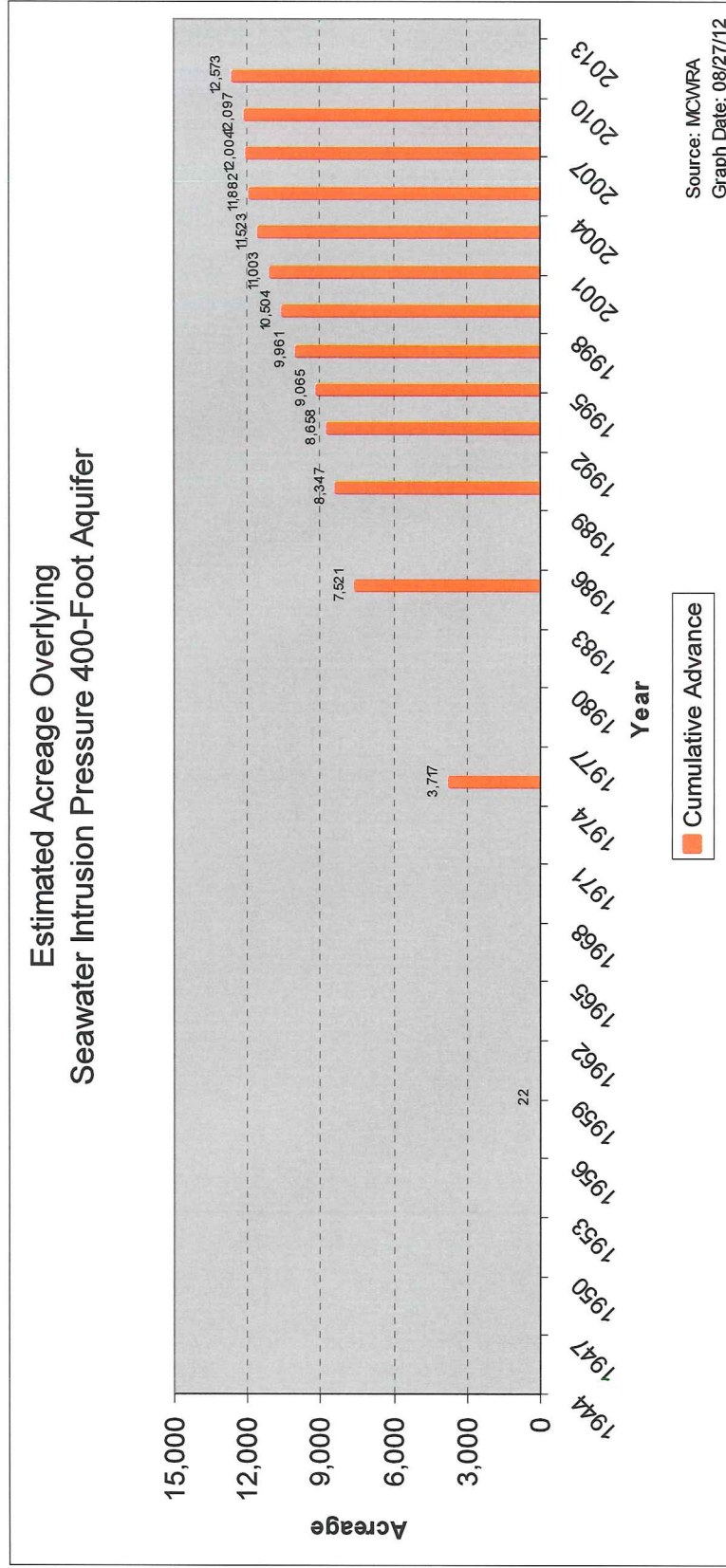
2011 Pressure 400-Foot Aquifer 500 mg/L Chloride Areas



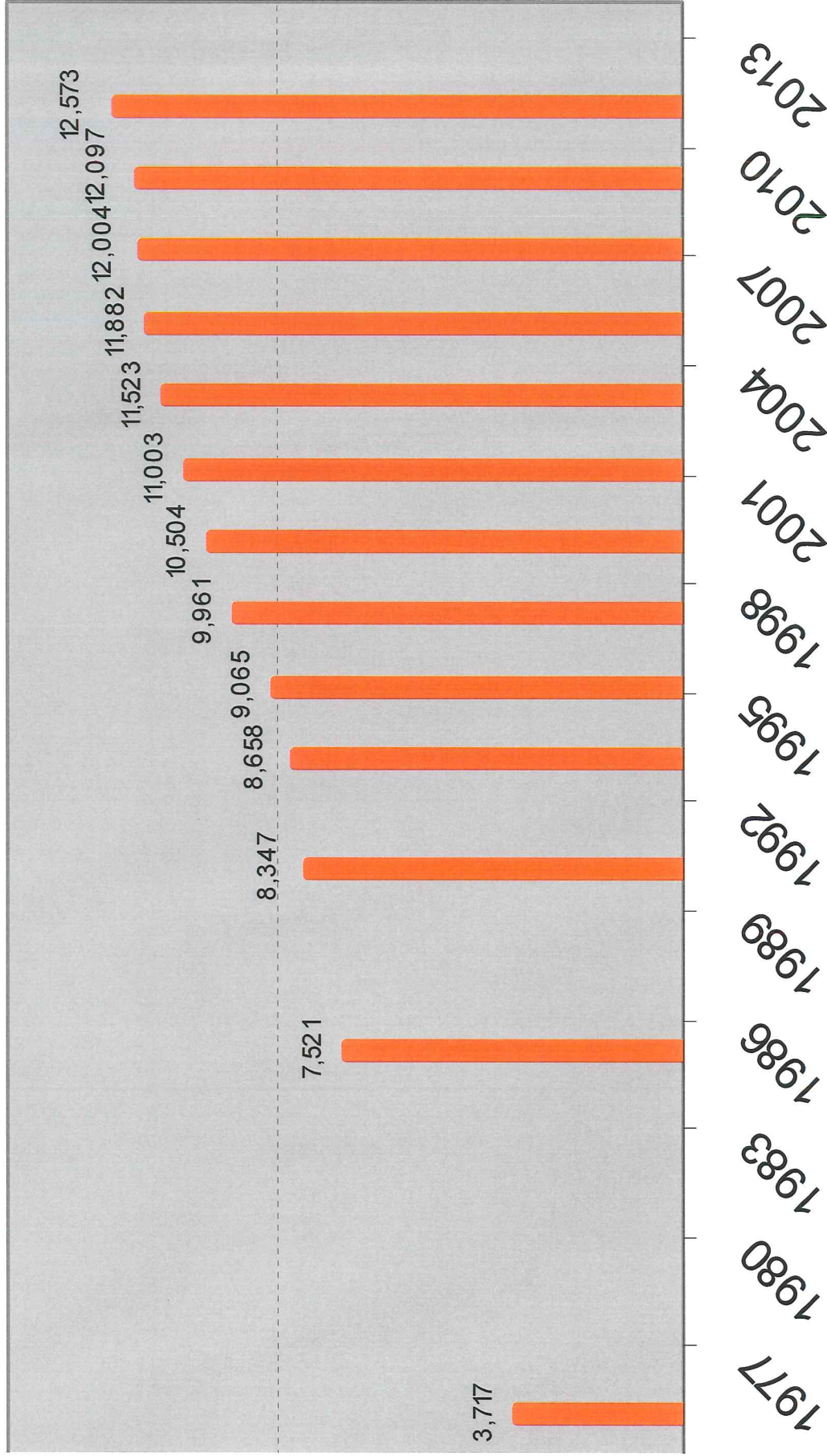




Pressure 400-Foot Aquifer Historical Advancement



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



TODAY'S PRESENTATION

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



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