



Update on Stony Creek Fan Aquifer Performance Testing

An Investigative Activity under the
Stony Creek Fan Conjunctive Water Management Program

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*Local Management of Water Resources in the Sacramento Valley
Sponsored by University of California Cooperative Extension
December 16, 2011*

Presentation Structure

- Part 1: Project Background (*Why?*)
- Part 2: Aquifer Performance Test (*What?*)

Part 1 Presentation Outline

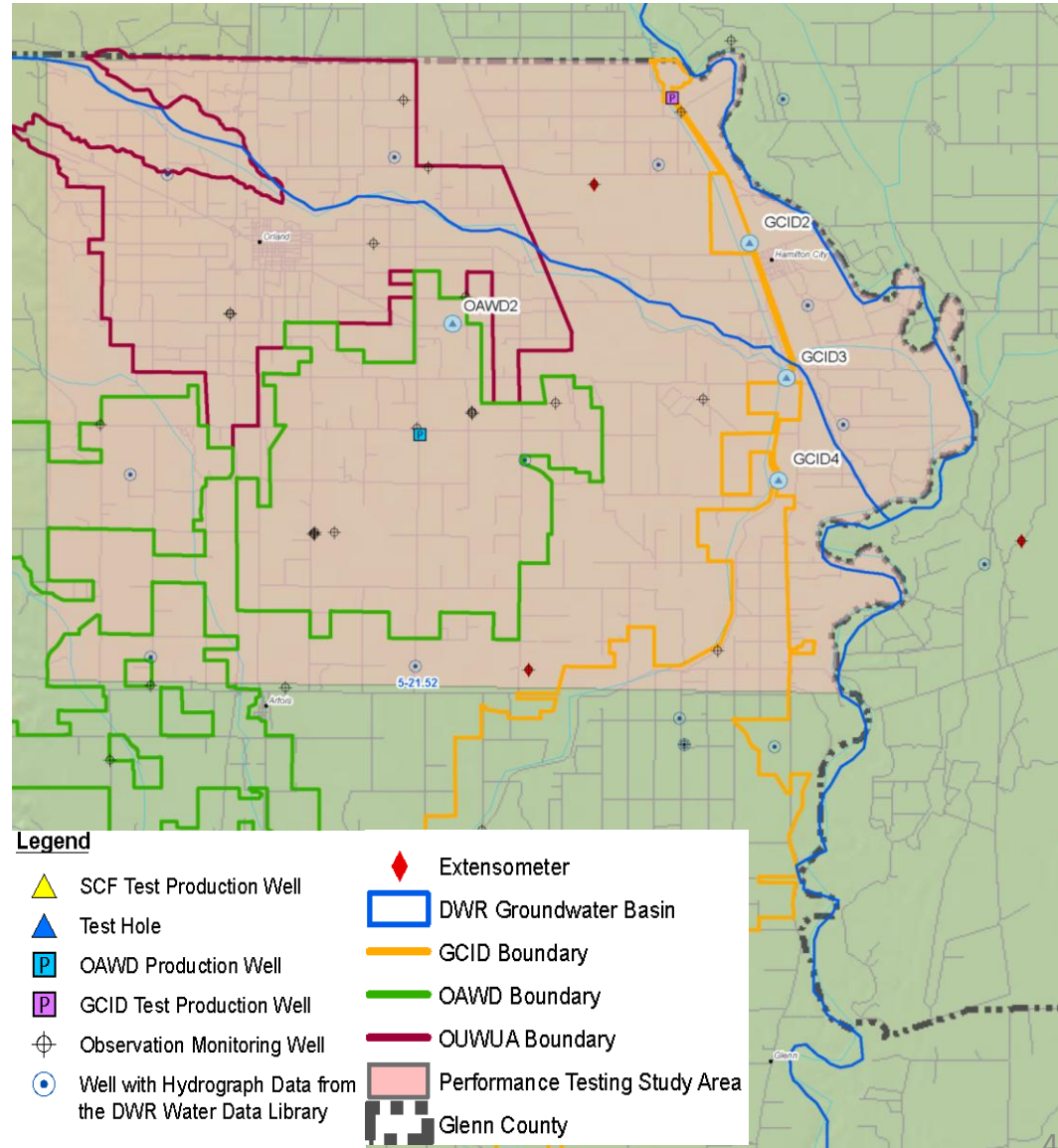
- The Stony Creek Fan (SCF) Partners
- SCF Conjunctive Water Management Program
- Challenges
 - In-Valley
 - Out-of-Valley

Stony Creek Fan Partners

The Partners are:

- Glenn-Colusa Irrigation District
- Orland Artois Water District
- Orland Unit Water Users Association

Cooperative Efforts
formalized by 2001 MOU
(Updated 2006)



Stony Creek Fan Conjunctive Water Management Program

- Guiding Principles
 - Achieve mutual benefits through cooperative, coordinated water resource management
 - Local benefits first; broader benefits if feasible
- Broad Objectives
 - Protect surface water and groundwater supplies
 - Improve water supply reliability & affordability
 - Enhance operational flexibility
 - Protect/enhance environment

Stony Creek Fan Program Activities

- Conduct GW recharge pilot testing (2002)
- Develop Glenn County Integrated Groundwater and Surface Water Model (IGSM) (2003)
- Conduct regional and local hydrology studies (2003-04)
- Prepare Feasibility Investigation (2004)
- Undertake SCF aquifer test program (2006-ongoing)

Enabled by a combination of local, State (DWR) and Federal (USBR) funding.

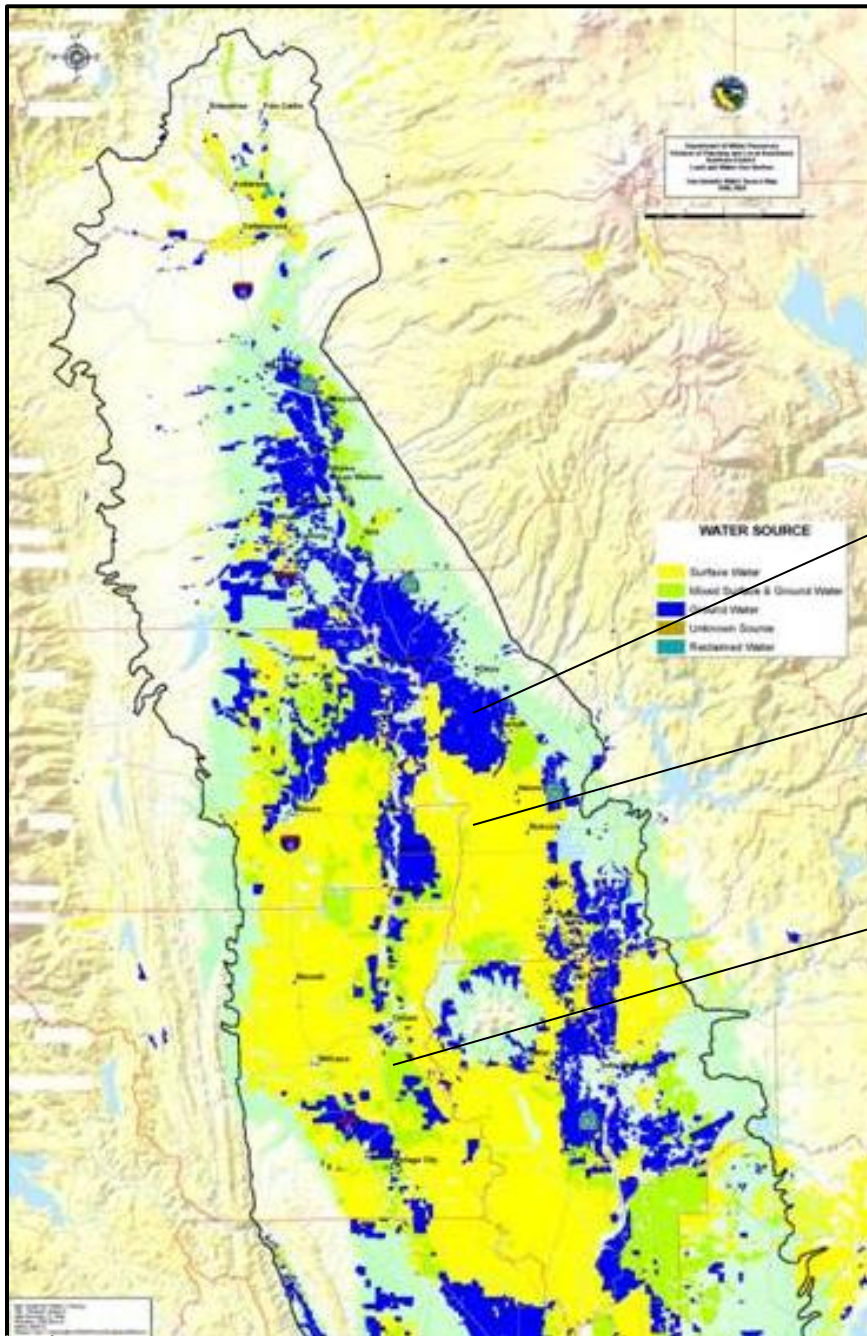
Figure SR-1 Sacramento River Hydrologic Region 2005 inflows and outflows



Sacramento River Basin

- Source of regional and statewide water supplies
- Widely regarded as the supply source for meeting the State's growing demands

The “Haves” and the “Have-nots”

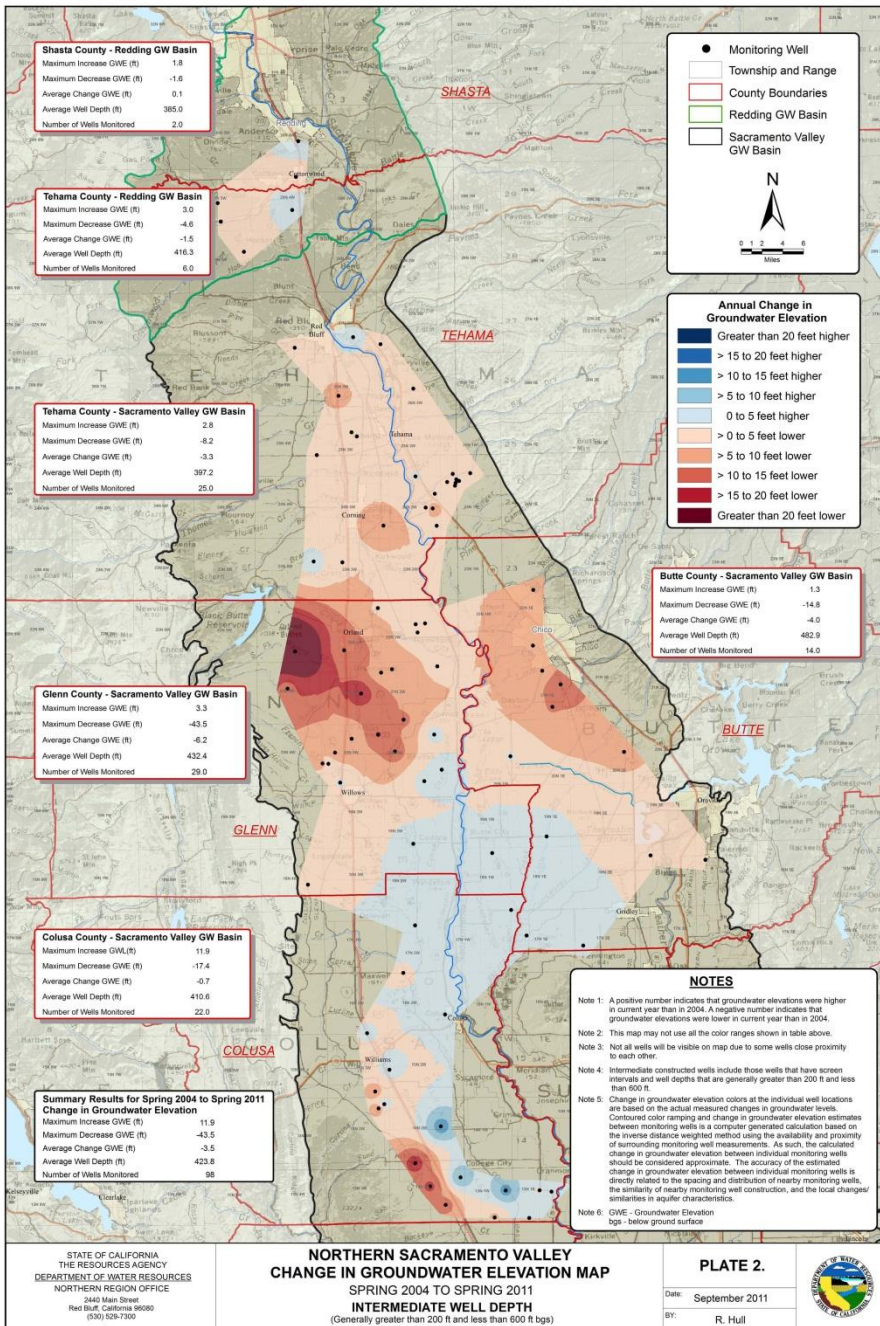


Primarily Groundwater

Primarily Surface Water

Mixed Groundwater and Surface Water

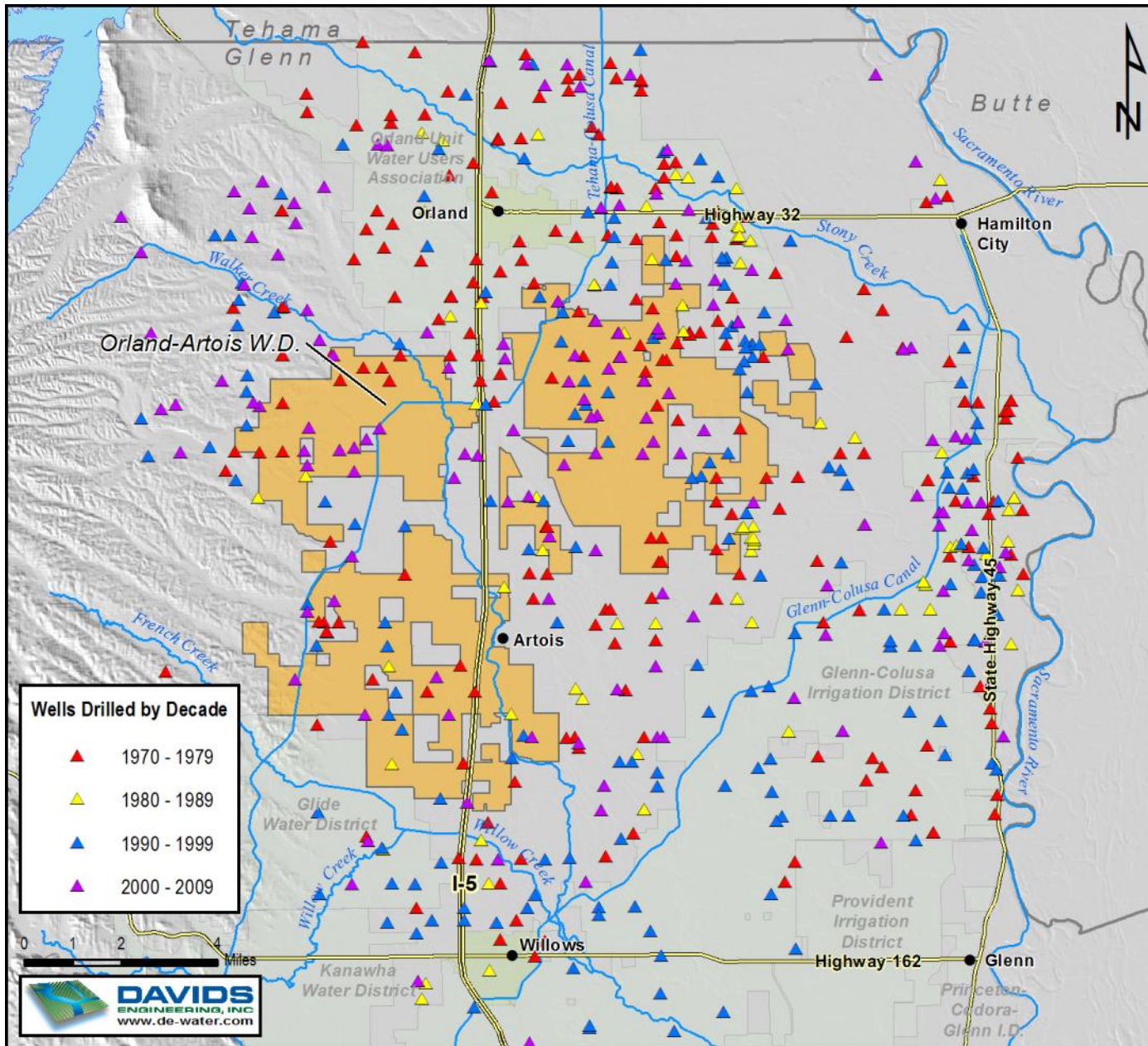
Some Areas Under Stress



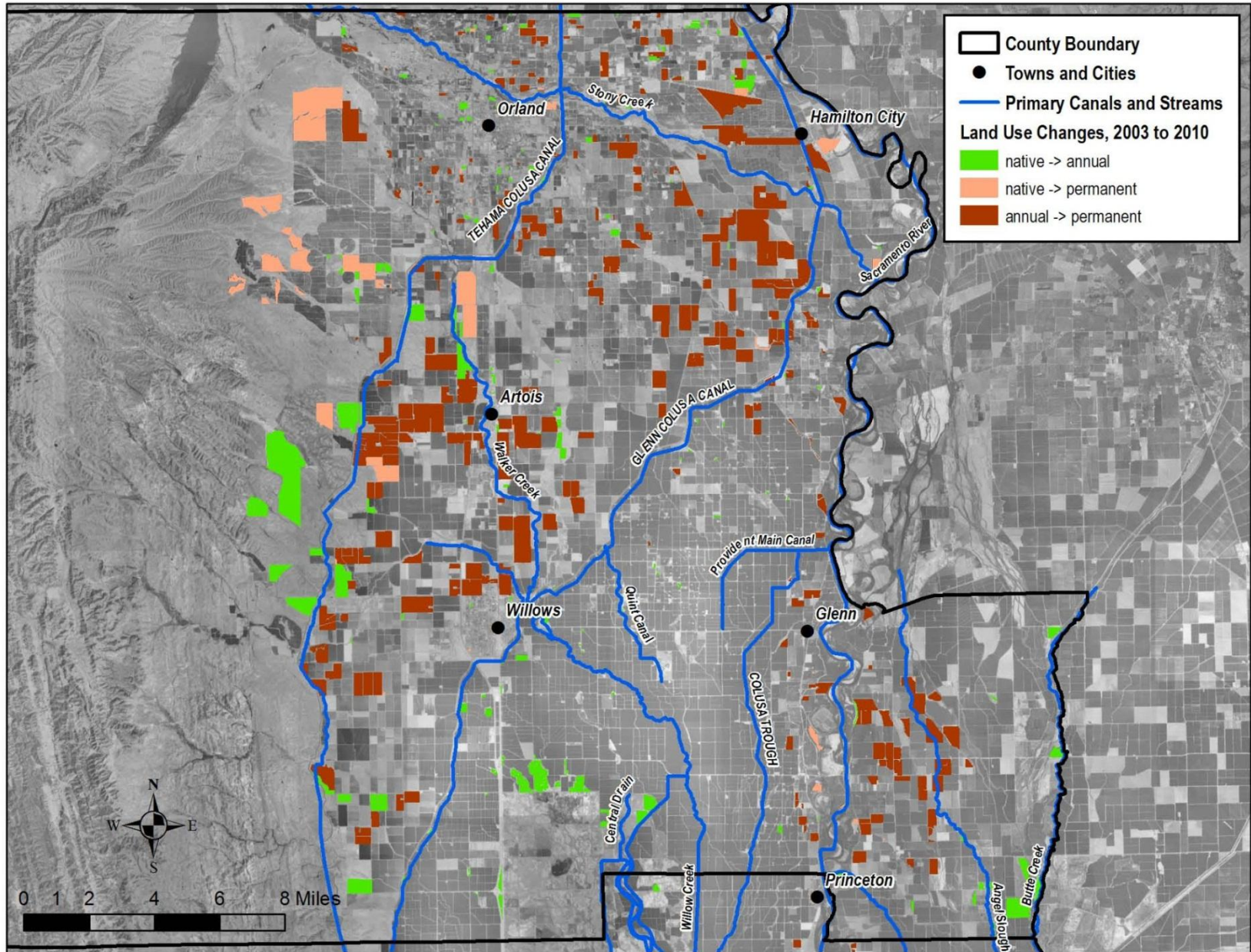
Challenges—In-Valley

- Increasing groundwater development and use
 - Growing regional population
 - Expanding irrigated acreage
- “Hardening” of water demands
 - Increasing permanent crops
- Changing irrigation practices
 - Increasing use of drip and micro-irrigation systems and associated preference for groundwater supply

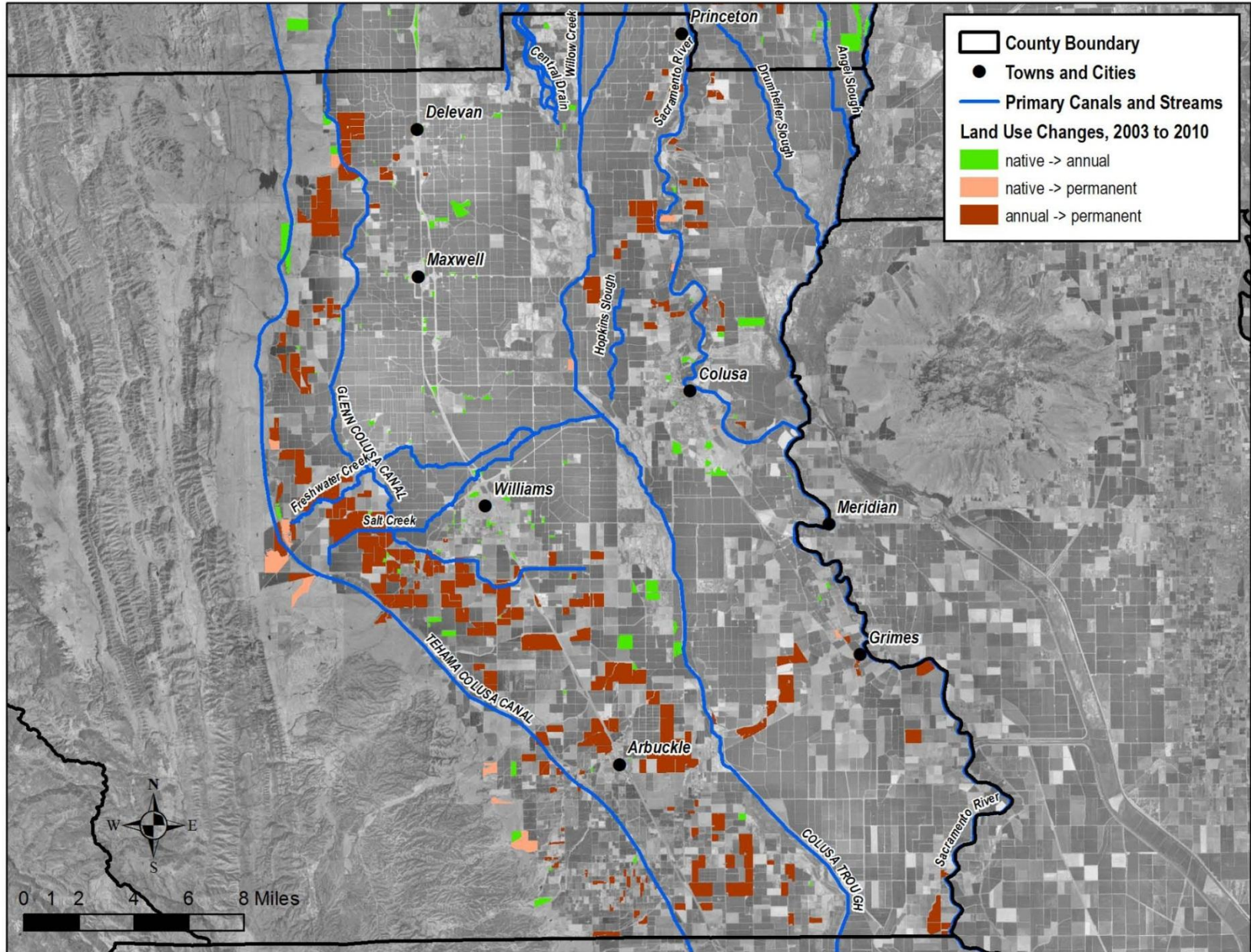
Groundwater Production Wells Drilled by Decade



Changing Land Use: Glenn County



Changing Land Use: Colusa County



Challenges—Out-of-Valley

- Increasing statewide water demands
 - Sacramento River basin widely regarded as the source
 - Bay-Delta “fixes” looking for more Delta inflow from tributaries
- Misunderstanding and misinformation regarding the potential for water use efficiency to produce additional water supplies

Implications & Conclusions

- Development and use of Sacramento Valley groundwater is and will continue to increase
- Knowledge of groundwater system is inadequate in most areas
- SCF aquifer performance test, and similar efforts, needed to build knowledge

Purpose and Scope of the APT

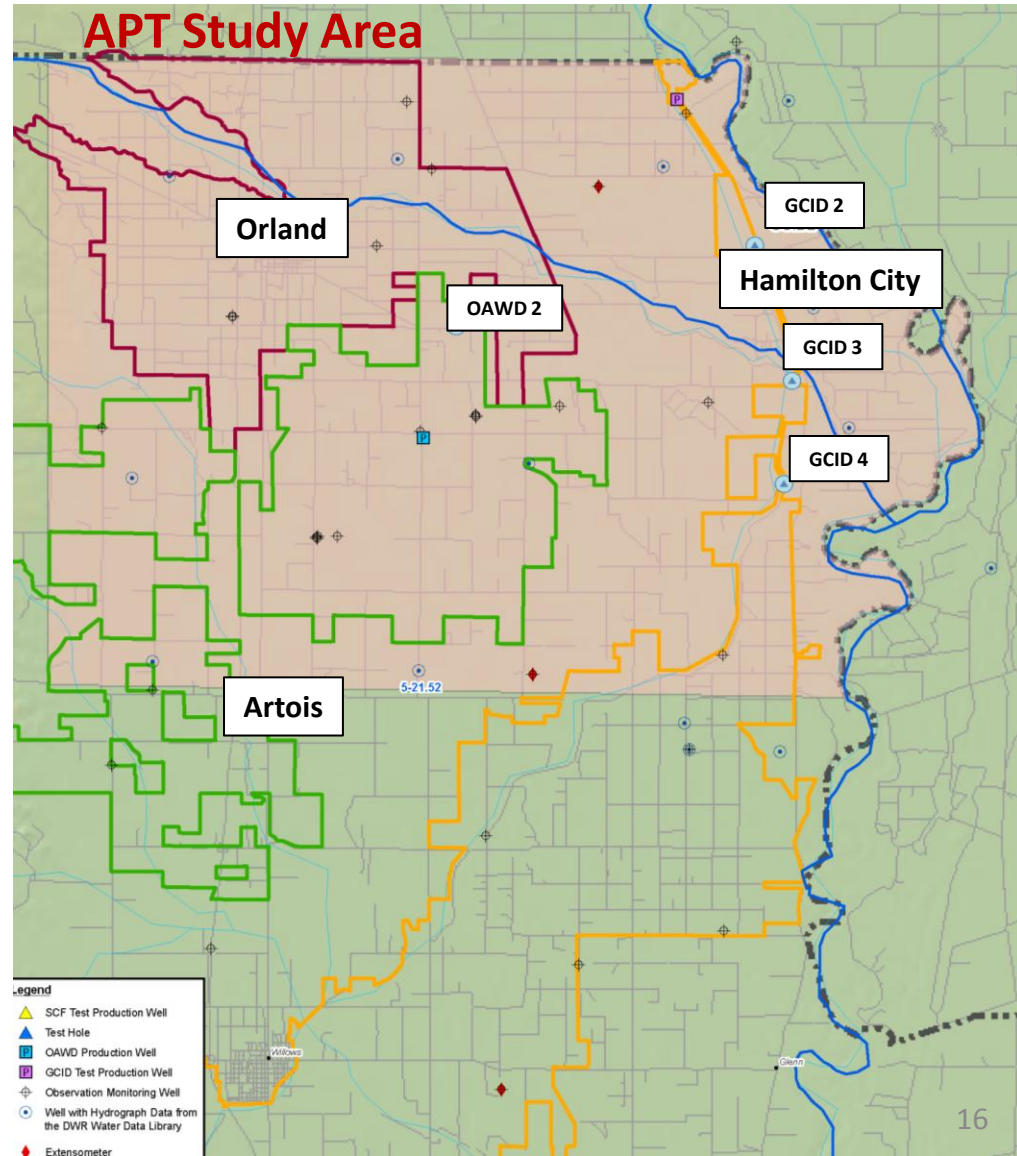
Purpose

Collect data needed to support development and management of groundwater resources in the SCFP study area

- Hydrostratigraphic data, aquifer hydraulic property data, degree, extent and timing of pumping induced drawdown, sources of recharge

Scope

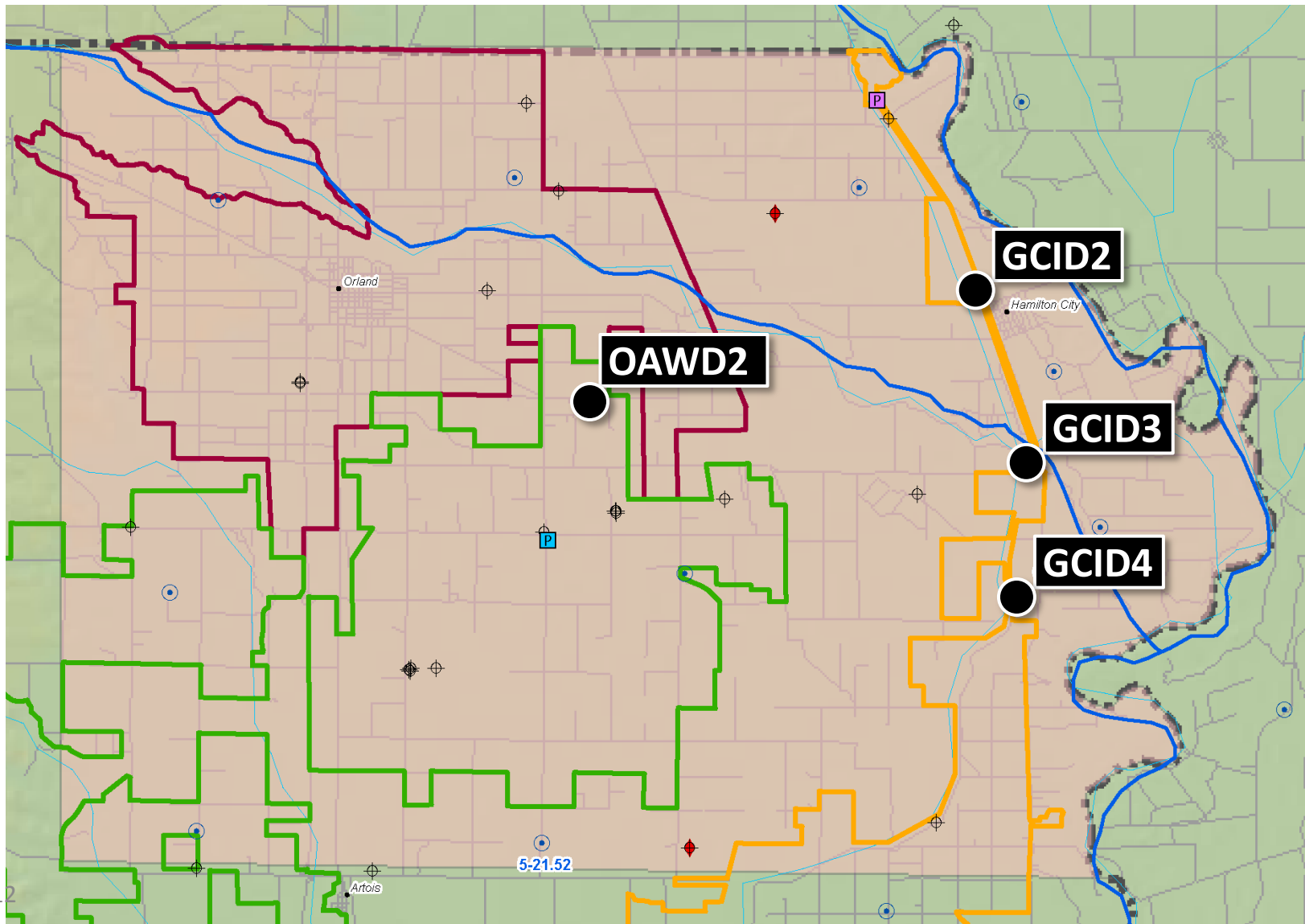
Pumping restricted to depths greater than approximately 700 feet within the SCFP study area



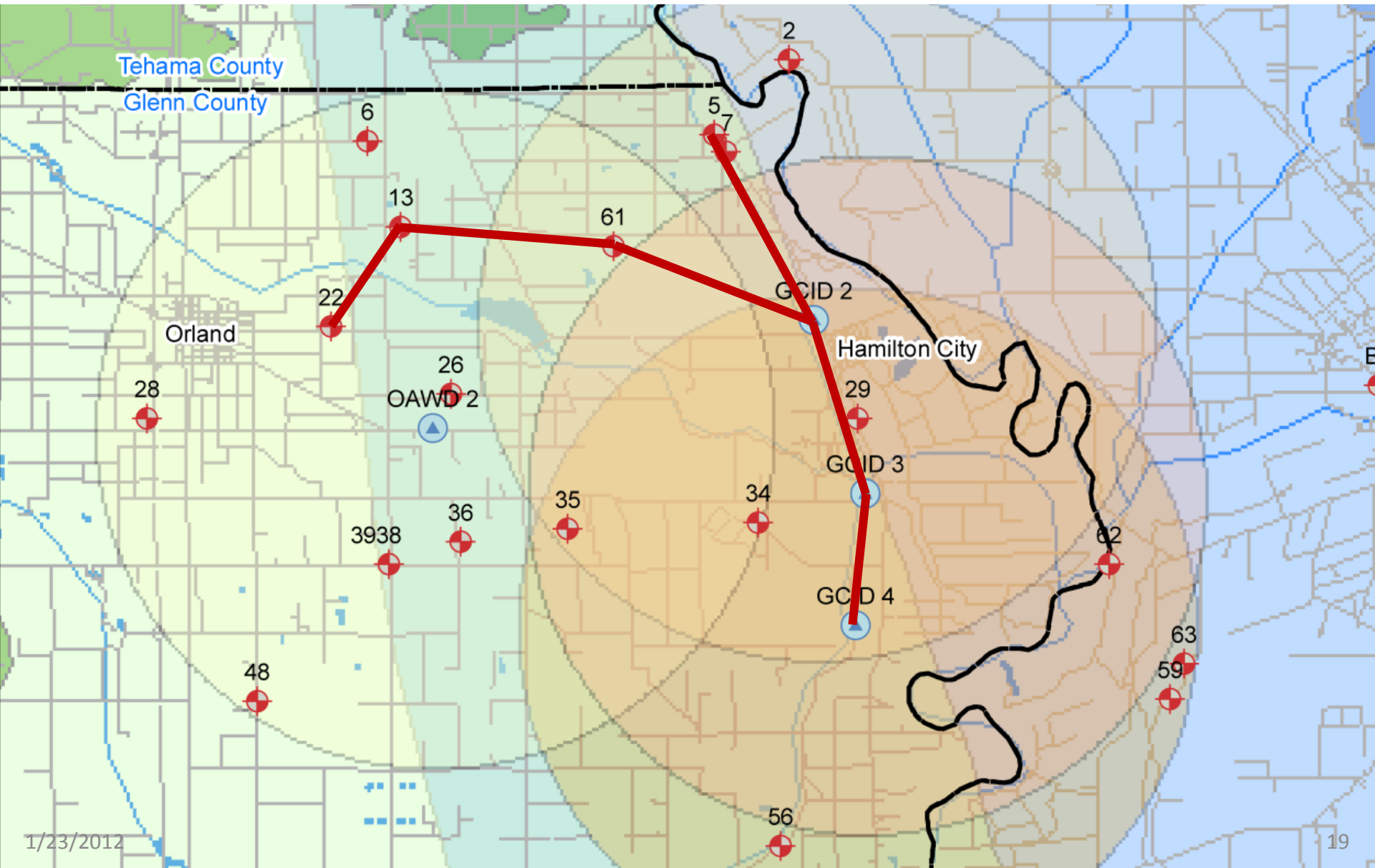
APT Work Tasks and Schedule

Task	Date
Drilled four test holes through freshwater aquifer system	2007-2008
Constructed four test-production wells	2009-2010
Conducted Phased Aquifer Testing	2009-2012
Outreach	Ongoing through 2012
Reporting	August 2012

Drilling Results and Well Construction

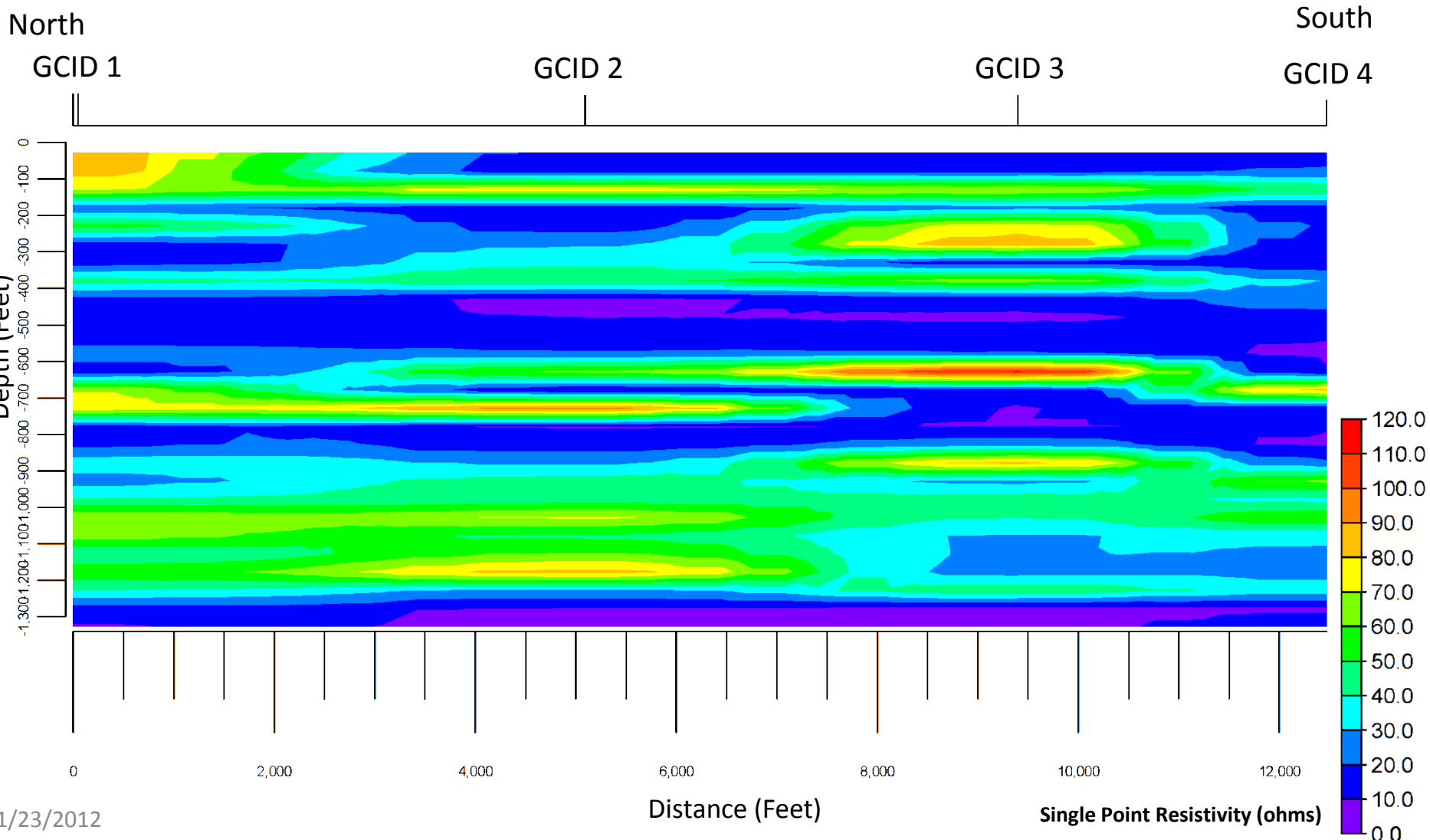


Cross Section Locations



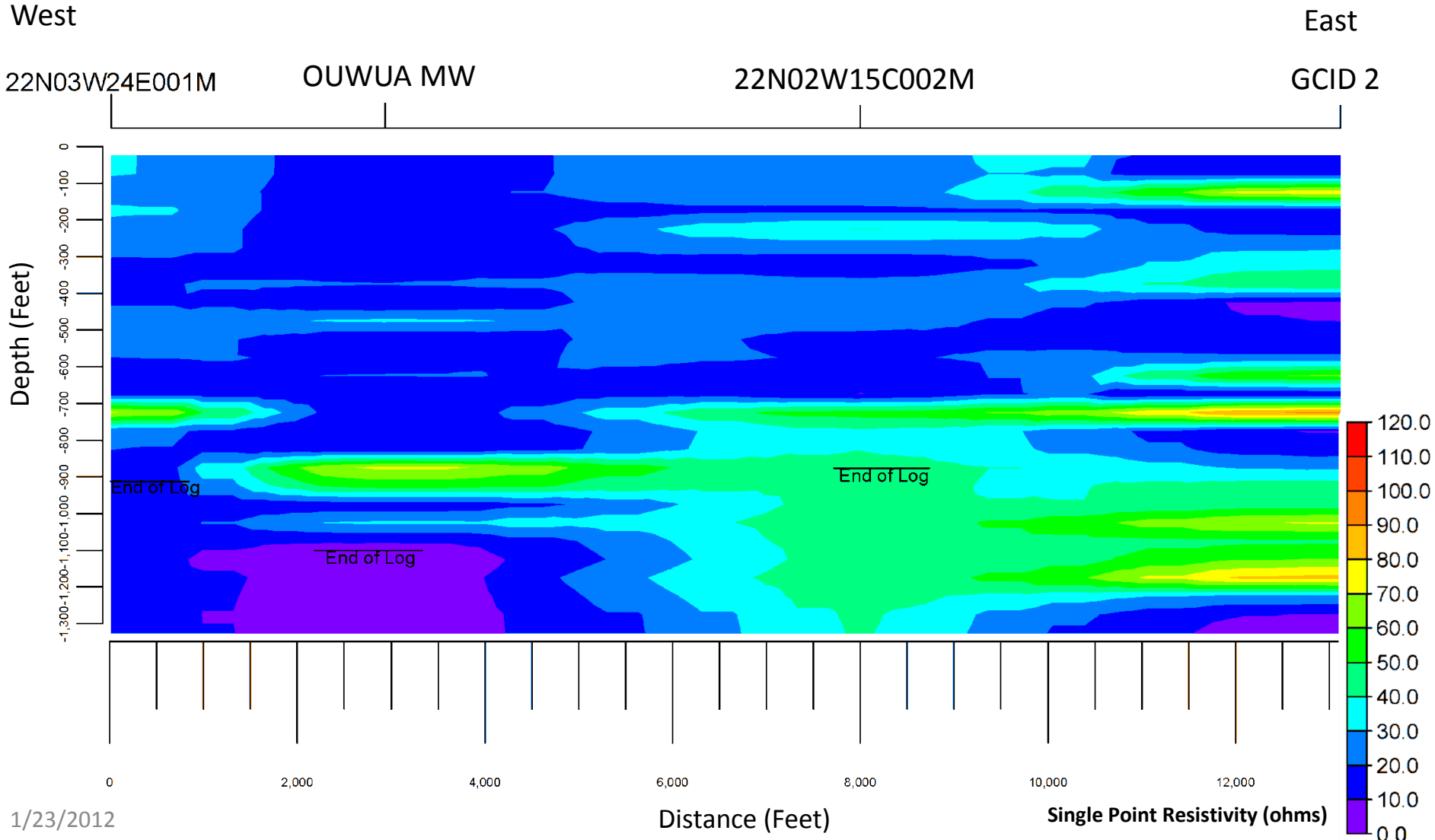
Distribution of Permeable Zones

North-South Cross Section



Distribution of Permeable Zones

West-East Cross Section



Aquifer Sediments

Medium Grained Sands



Tuscan Formation
1,010-1,020 feet bgs



Tehama Formation
330-340 feet bgs

Summary of Test Production Well Construction and Performance

- Four Test-Production Wells included in APT
- Intakes are 16-inch O.D. by 5/16-inch wall triple mill slots

Parameter	Test-Production Well			
Screened Interval (feet, bgs)	OAWD 2 712-743 842-990	GCID 2 920-1,230	GCID 3 782- 1,228	GCID 4 799- 1,241
Phase 3 Specific Capacity	12.1	11.3	17.3	14.9
Approximate Phase 3 Pumping Rate (gpm)	1,250	2,500	3,000	2,500

Test-production wells were pumped for 154 days during Phase 3 aquifer testing.

Preliminary Aquifer Test Results

Phase 1: 2009-2010

Step and Constant Rate Testing

Used to size pumping equipment and to support planning for Phase 2

Phase 2: 2011

30-day Constant Rate Testing

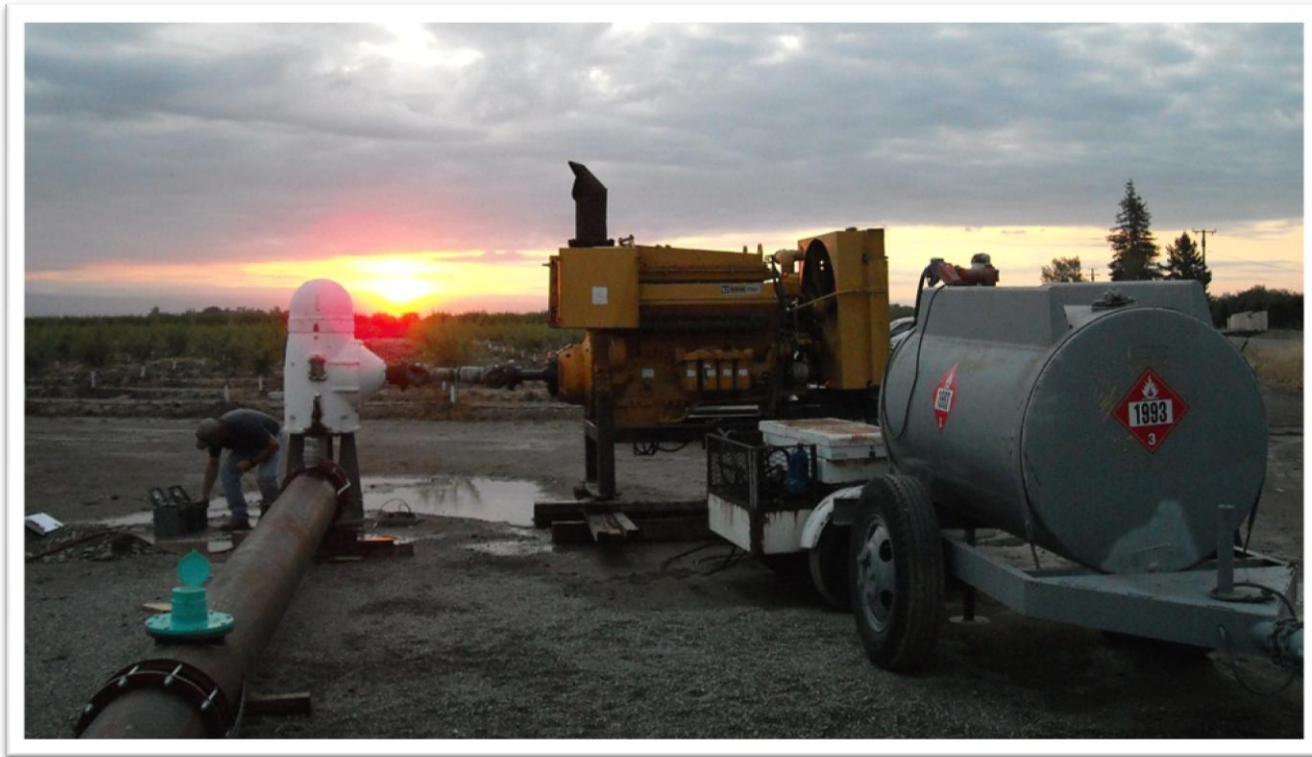
Used to estimate aquifer hydraulic properties and plan Phase 3

Phase 3: 2011-2012

Irrigation Season

Pumping in all APT wells to assess larger scale, longer term pumping impacts

Preliminary Phase 3 Aquifer Test Results



Summary of Phase 3 Pumping

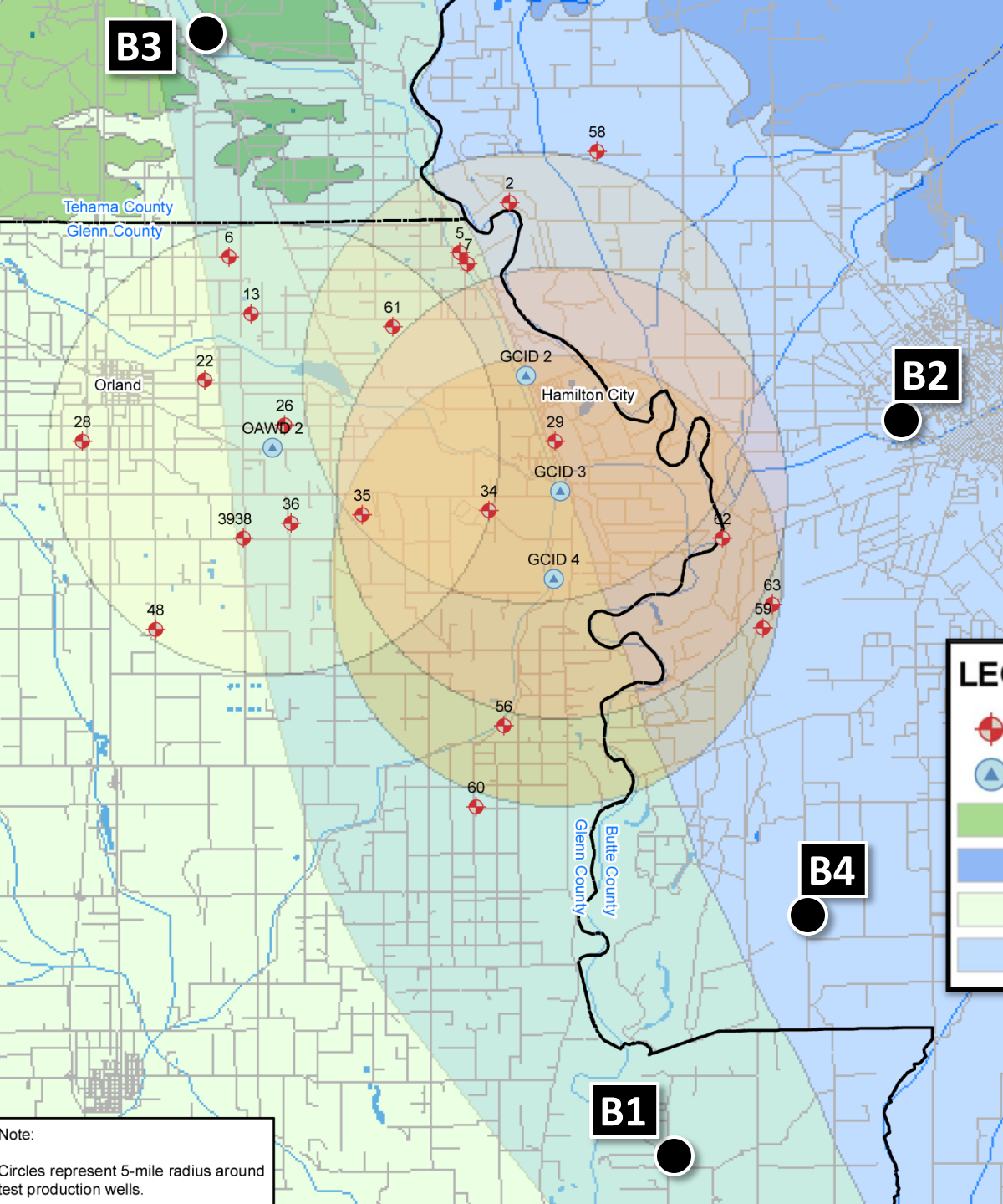
Start date: June 12, 2011

End date: November 17, 2011

Duration: 154 days

Parameter	OAWD 2	GCID 2	GCID 3	GCID 4	Total
Total (acre-feet)	390	1,694	2,015	1,690	5,789

Background Groundwater Elevation Trends

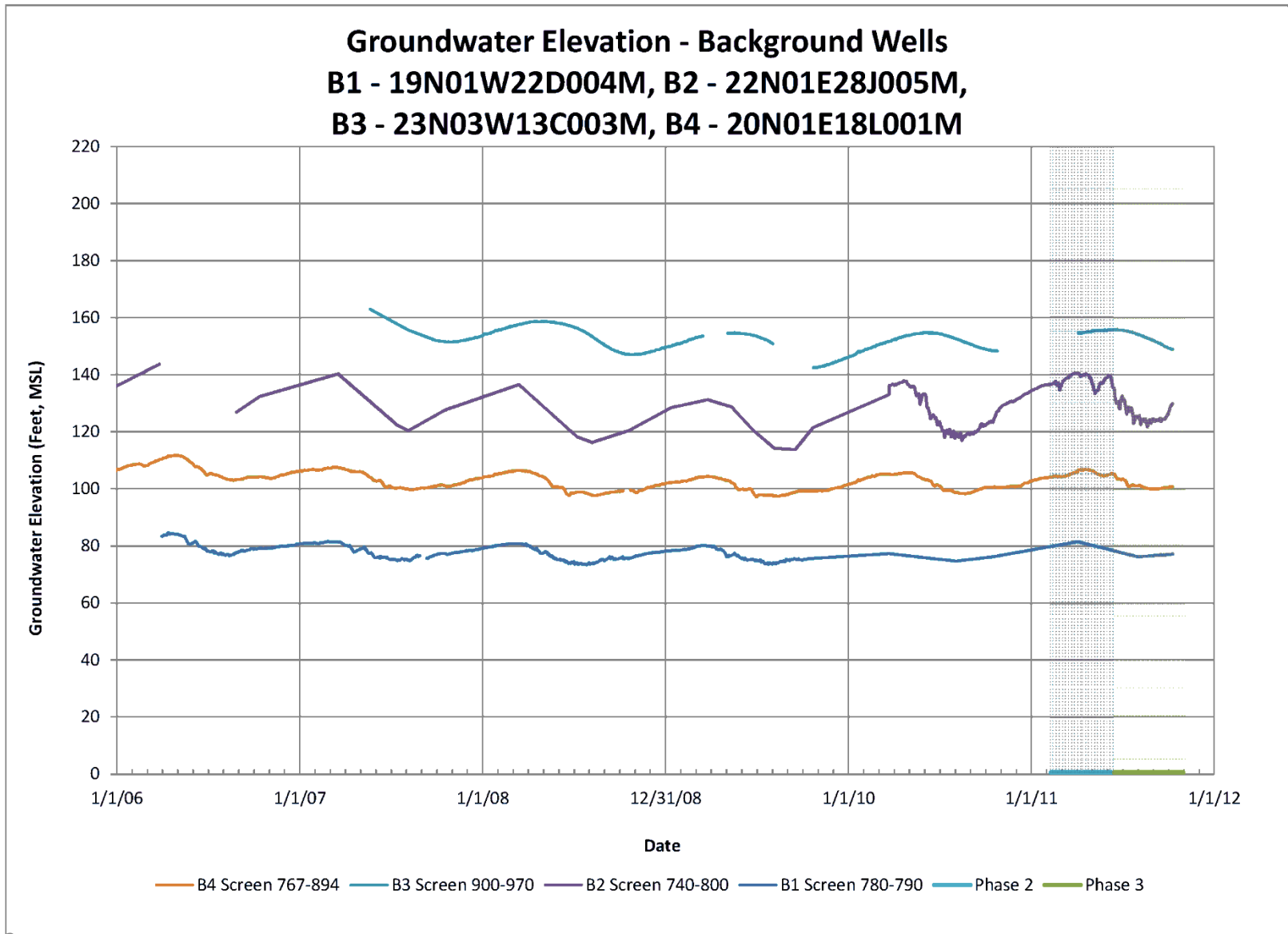


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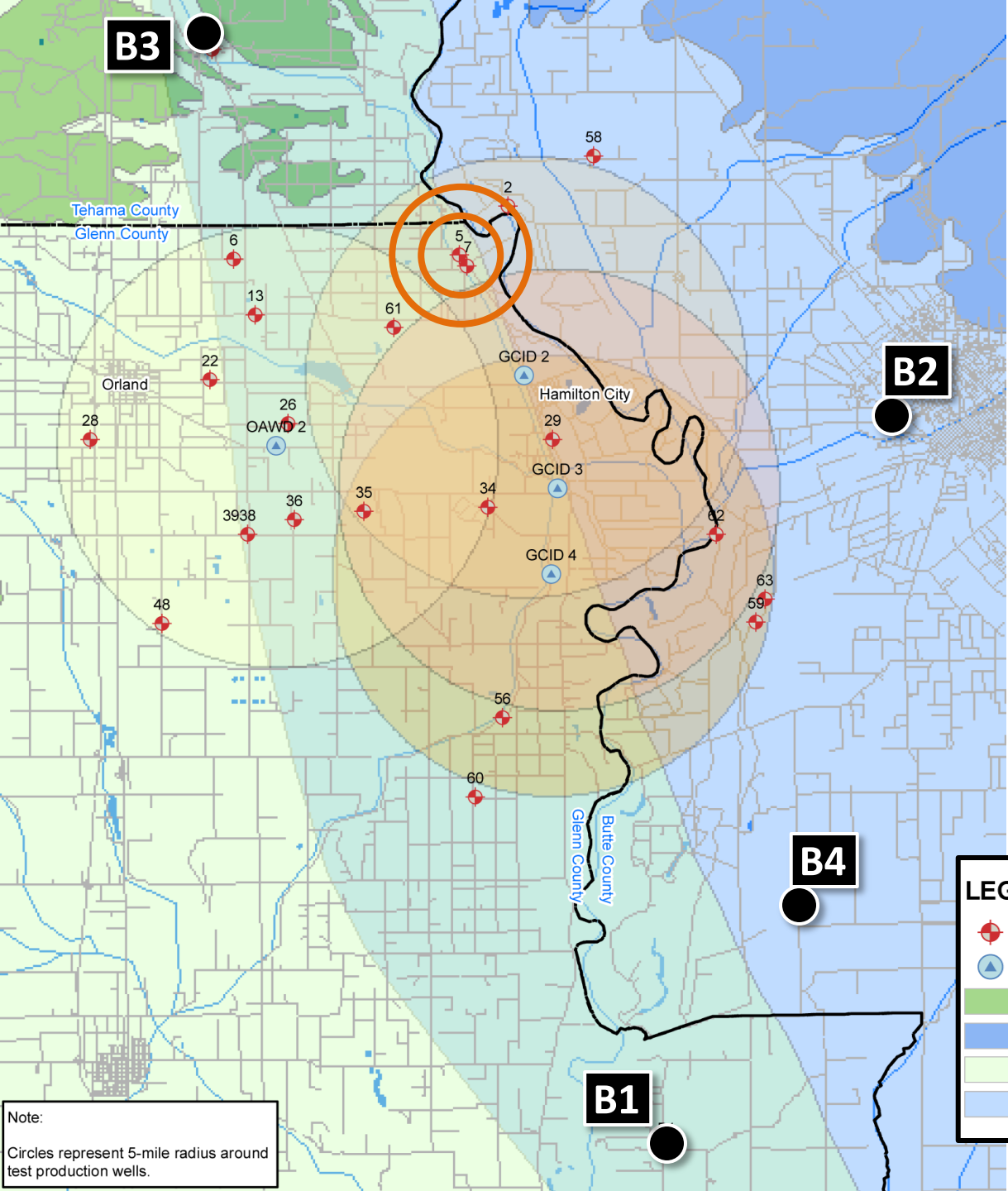
- Observation Wells
- Aquifer Test Wells
- Tehama Outcrop
- Tuscan Outcrop
- Tehama Subsurface
- Tuscan Subsurface

Note:
Circles represent 5-mile radius around
test production wells.

Background Groundwater Elevation Trends



Baseline Groundwater Elevation Trends

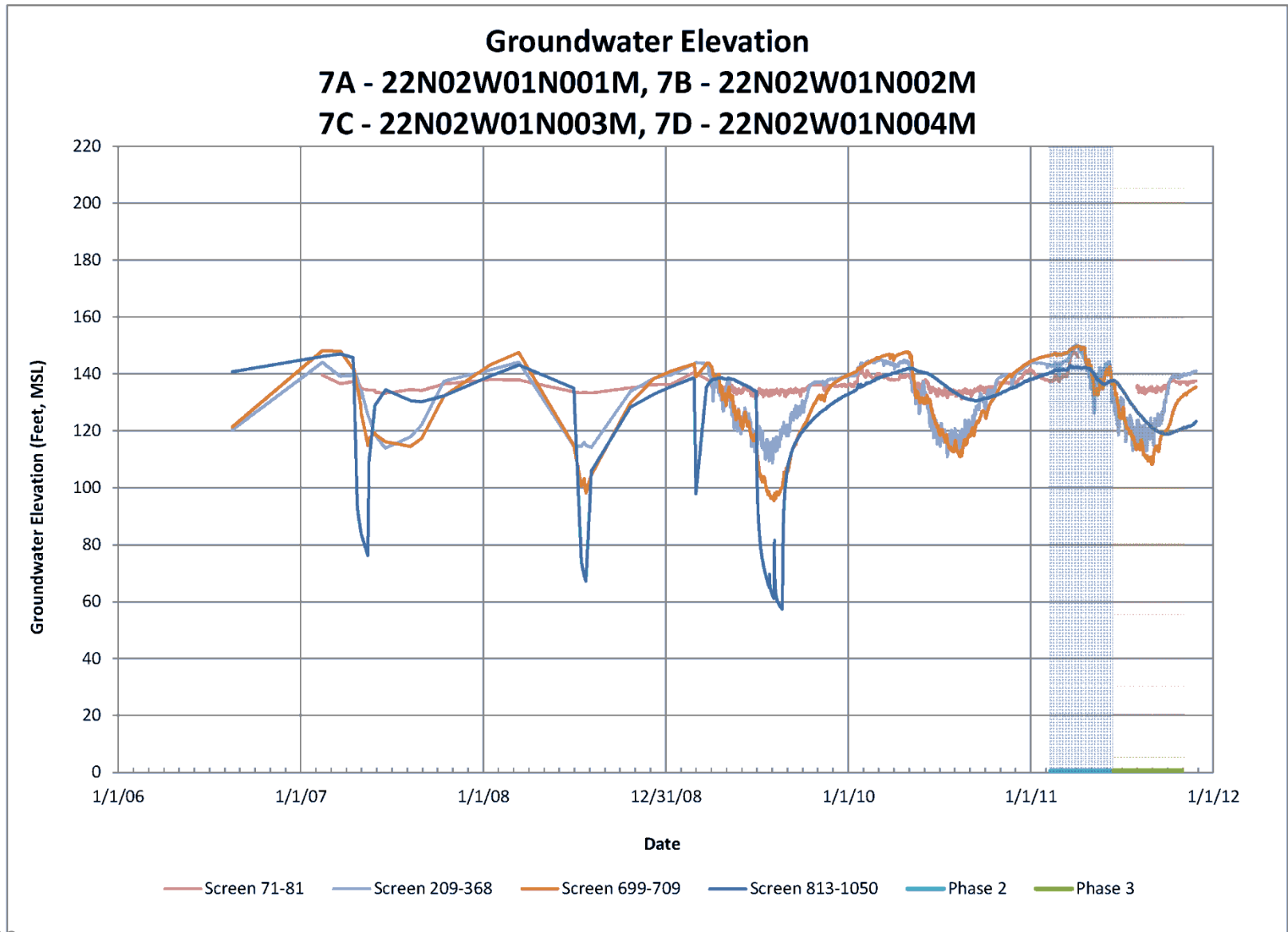


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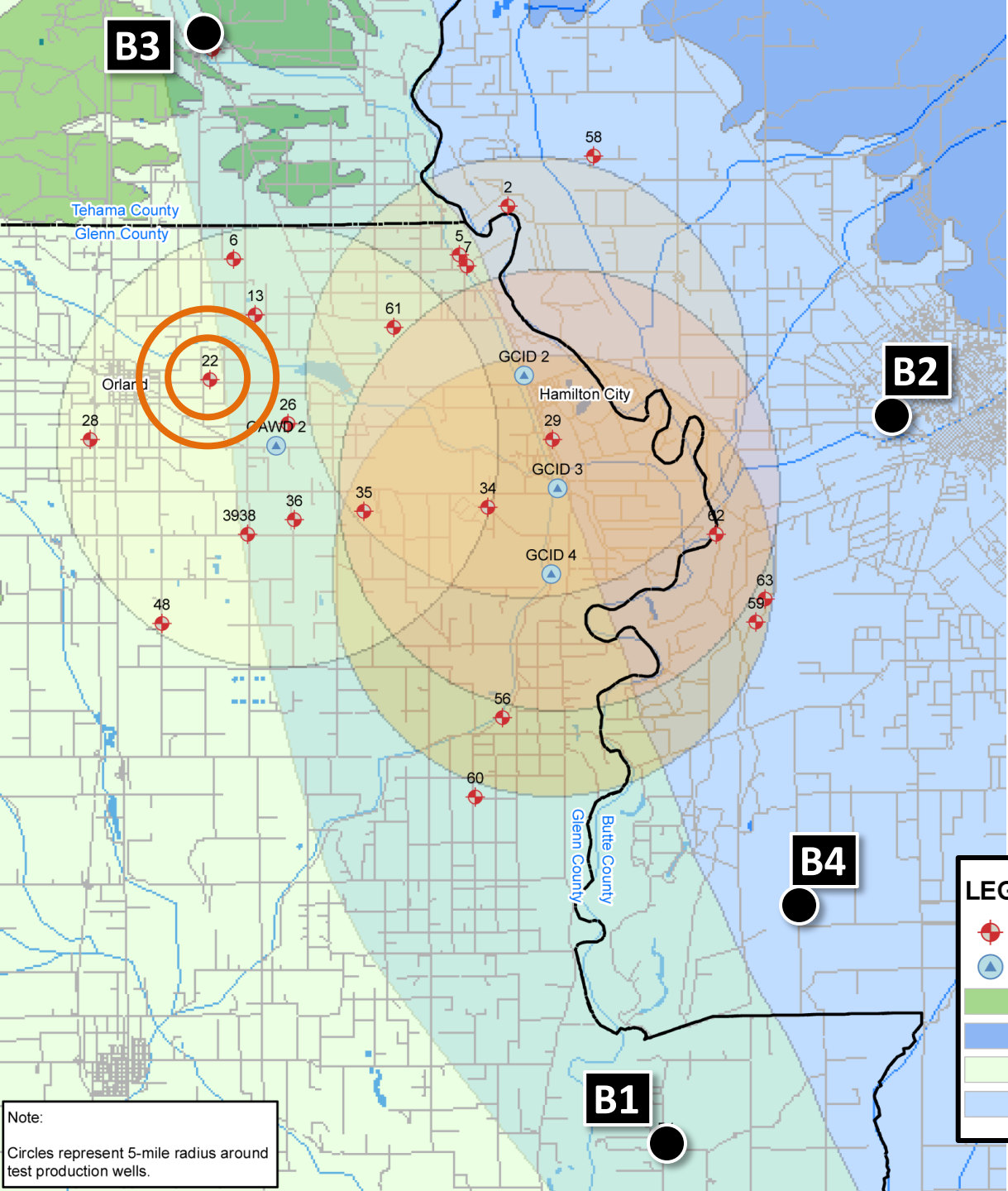
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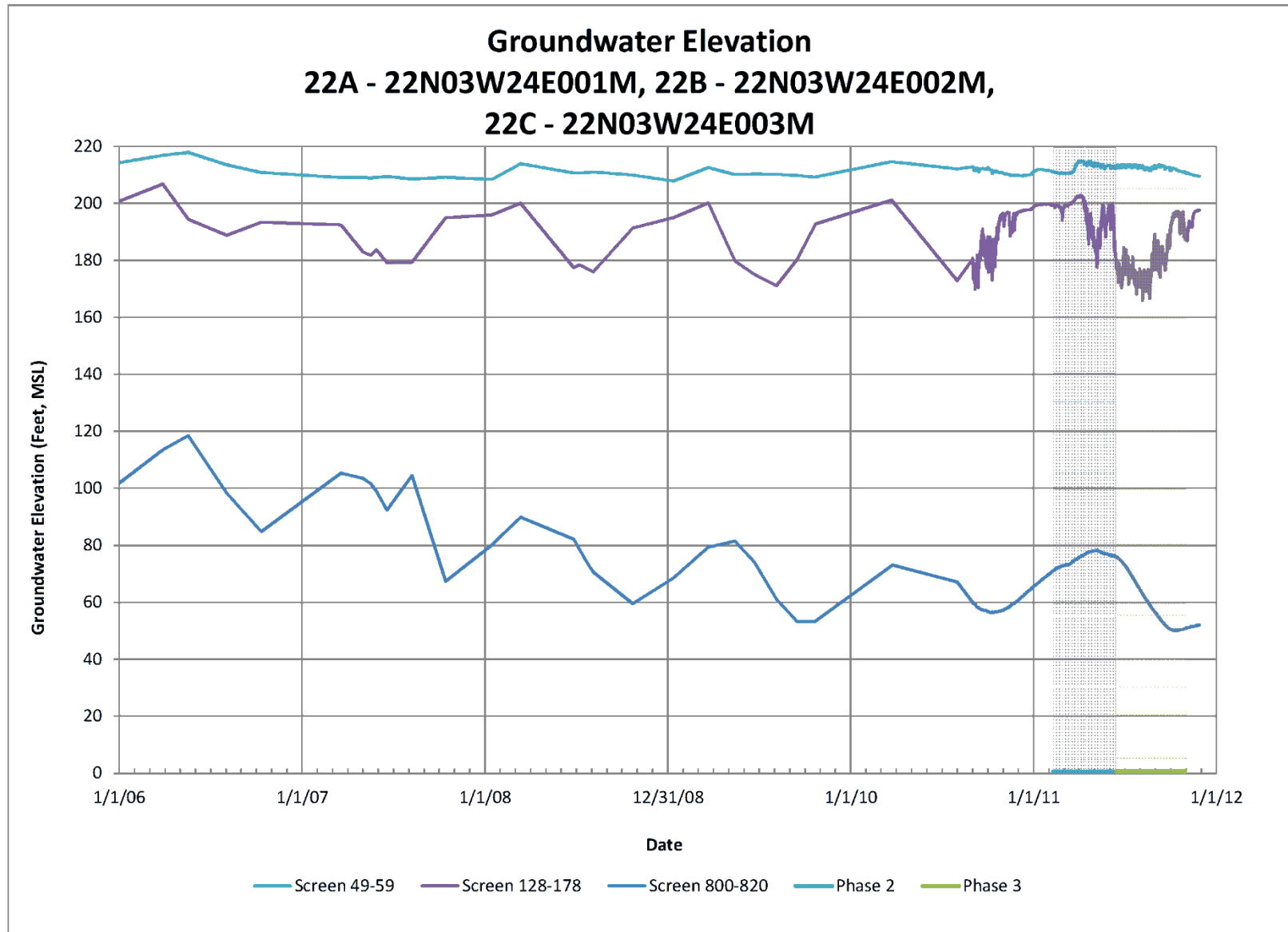


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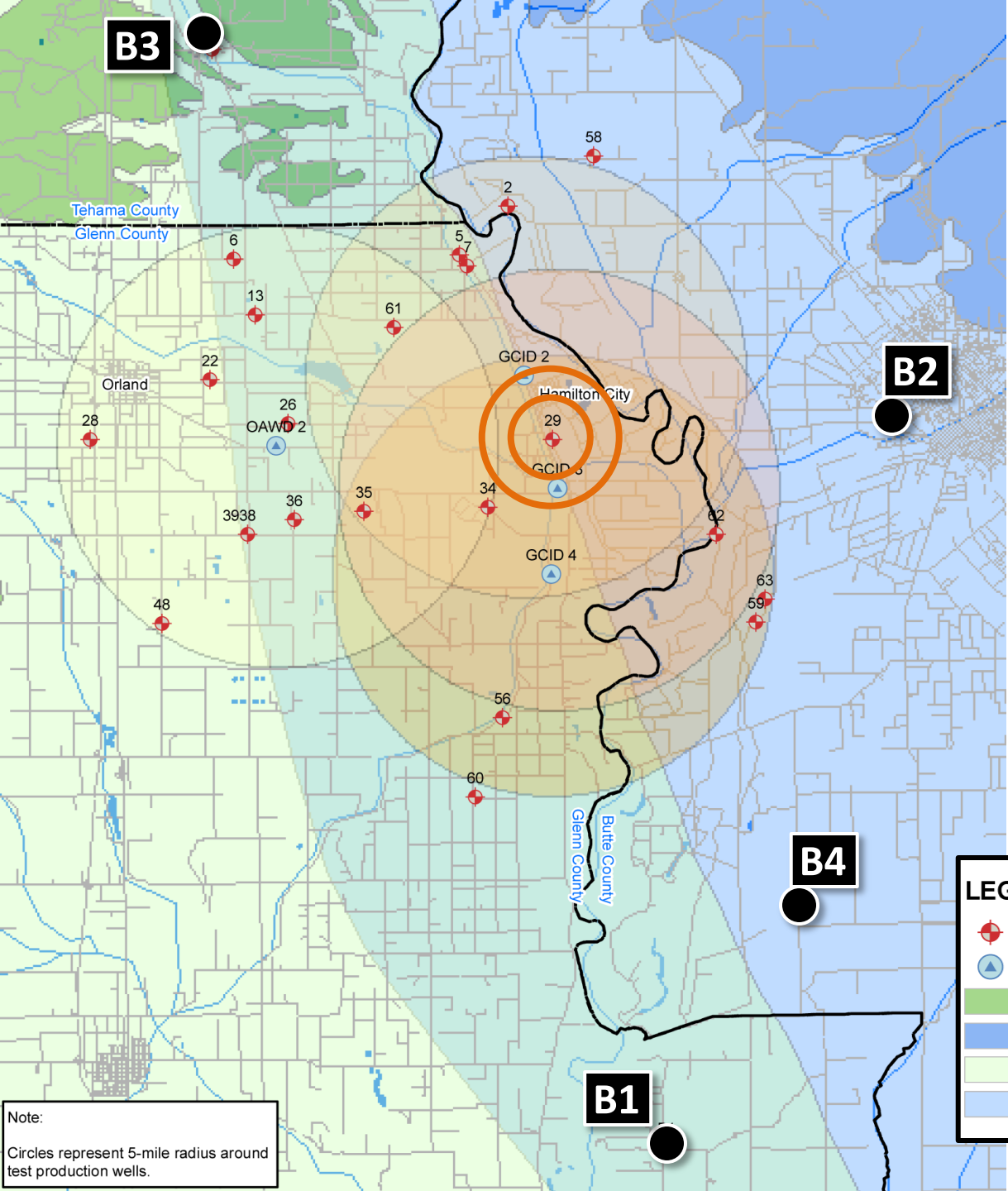
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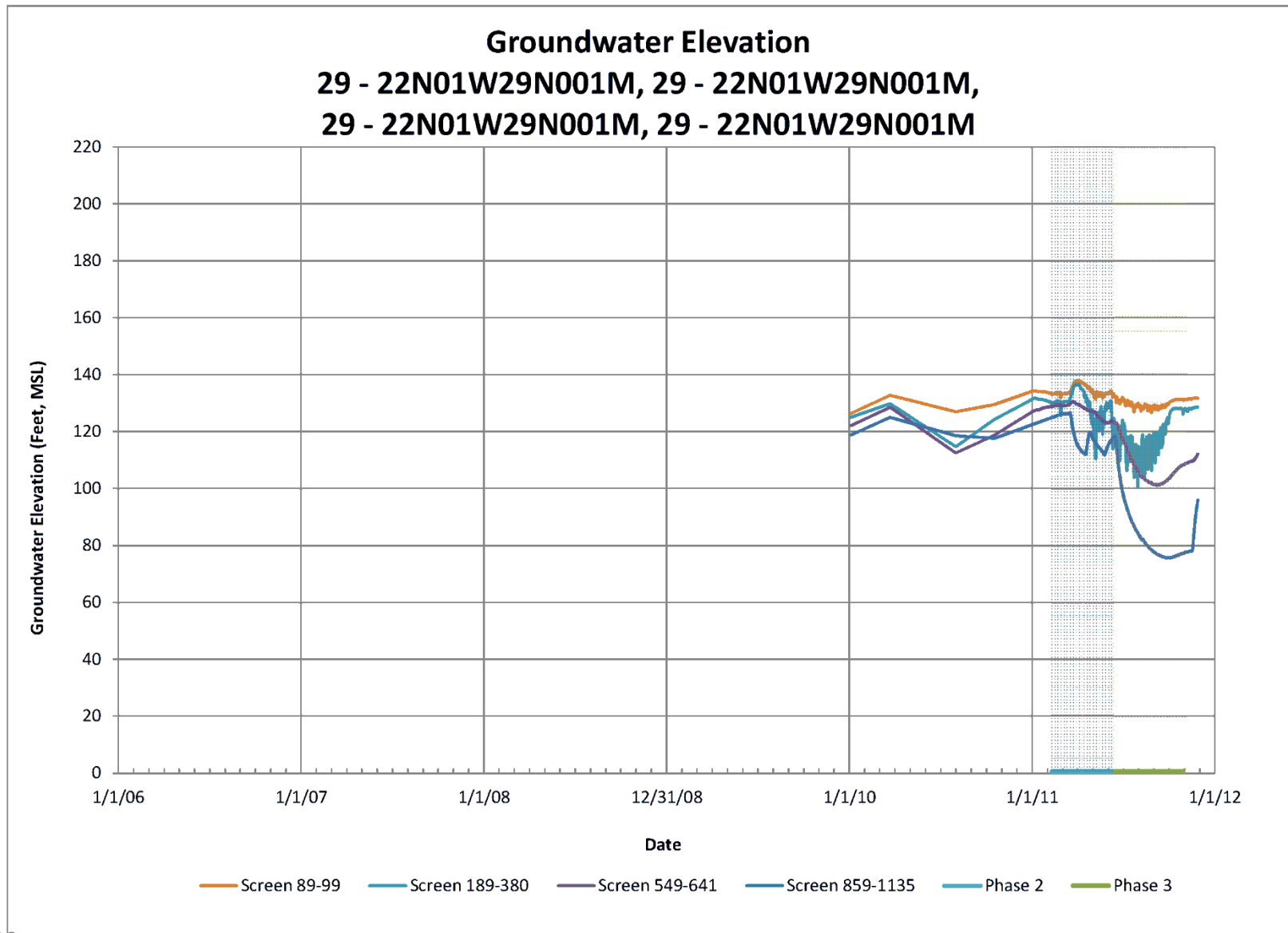


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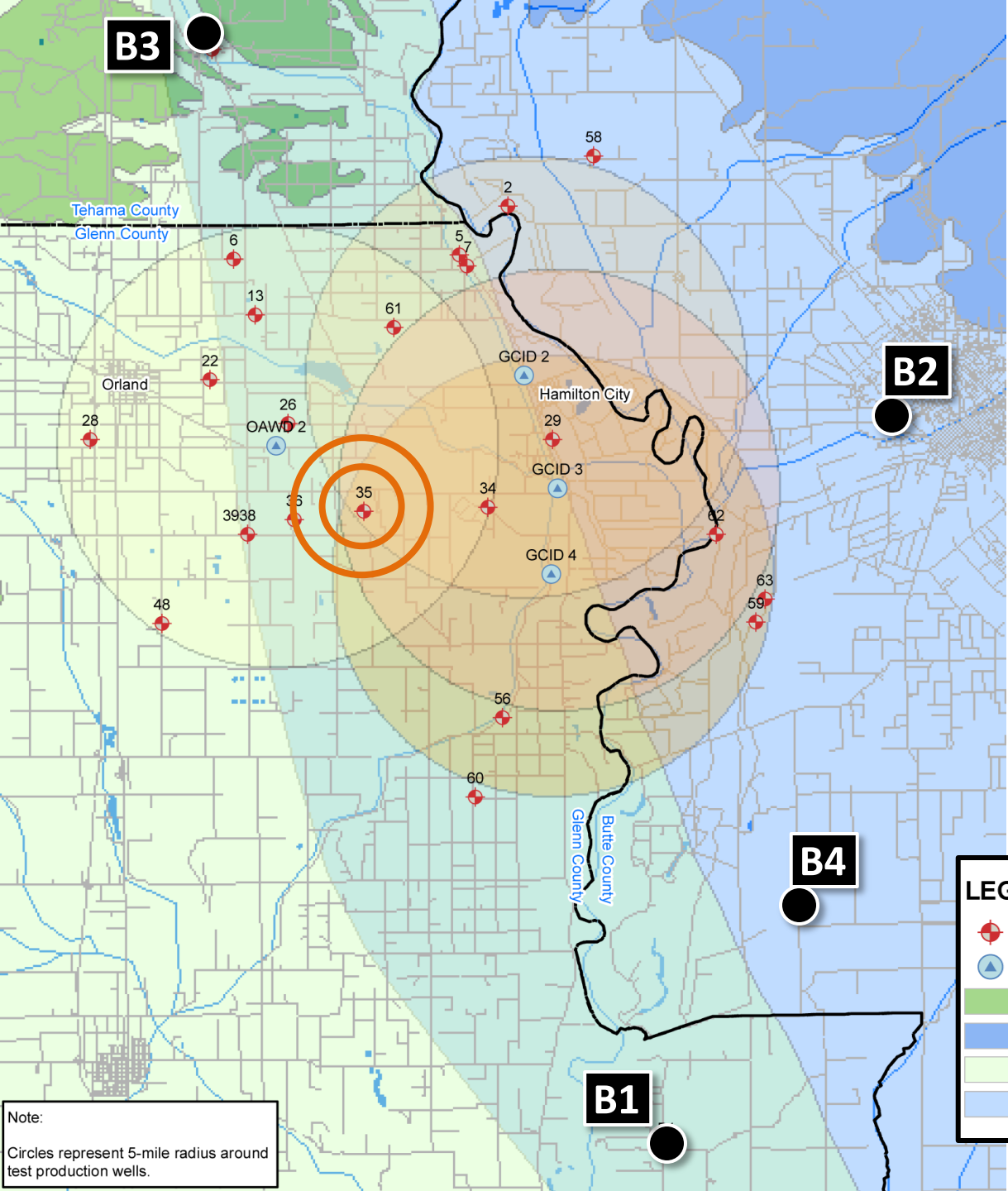
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
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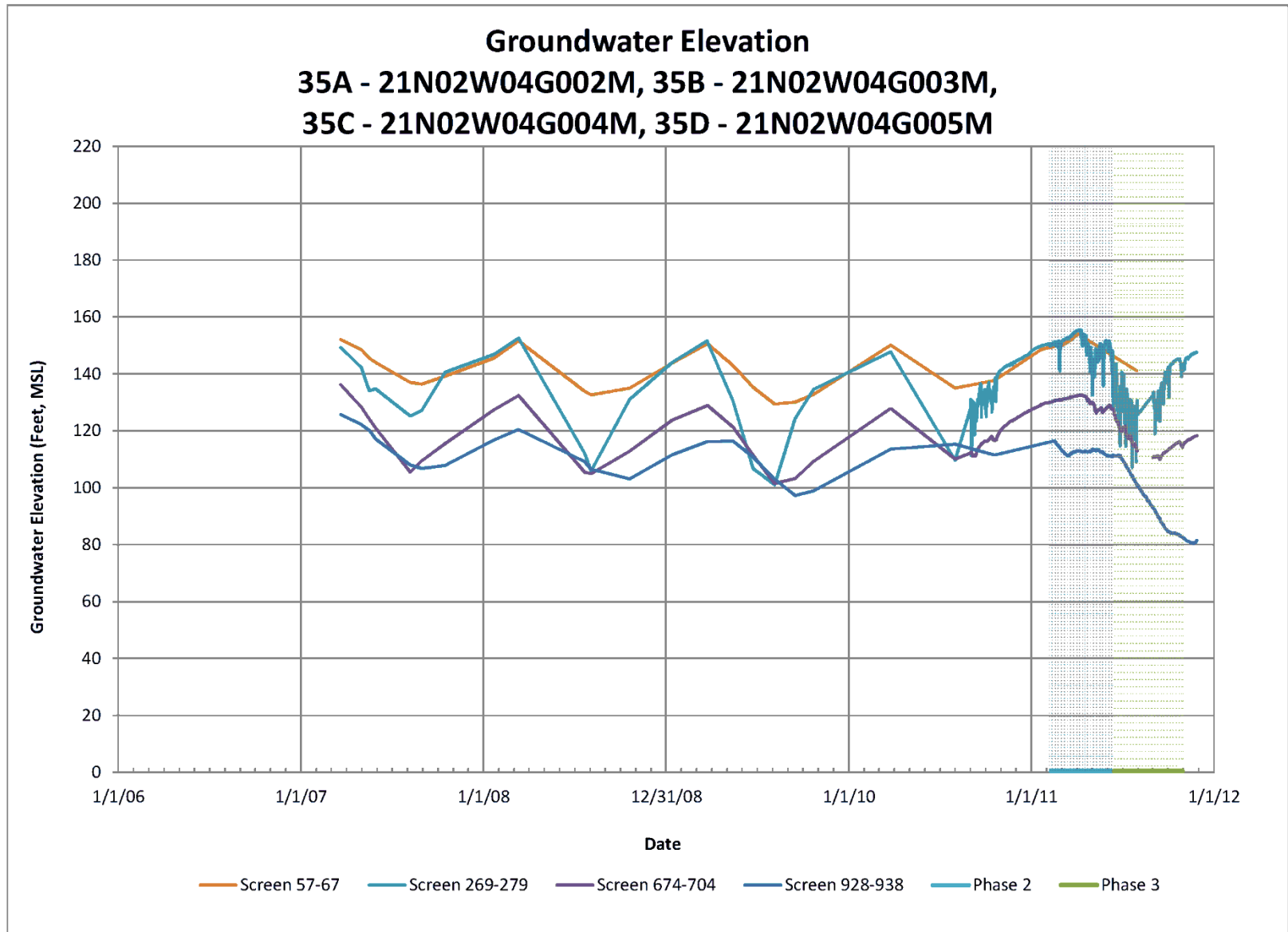


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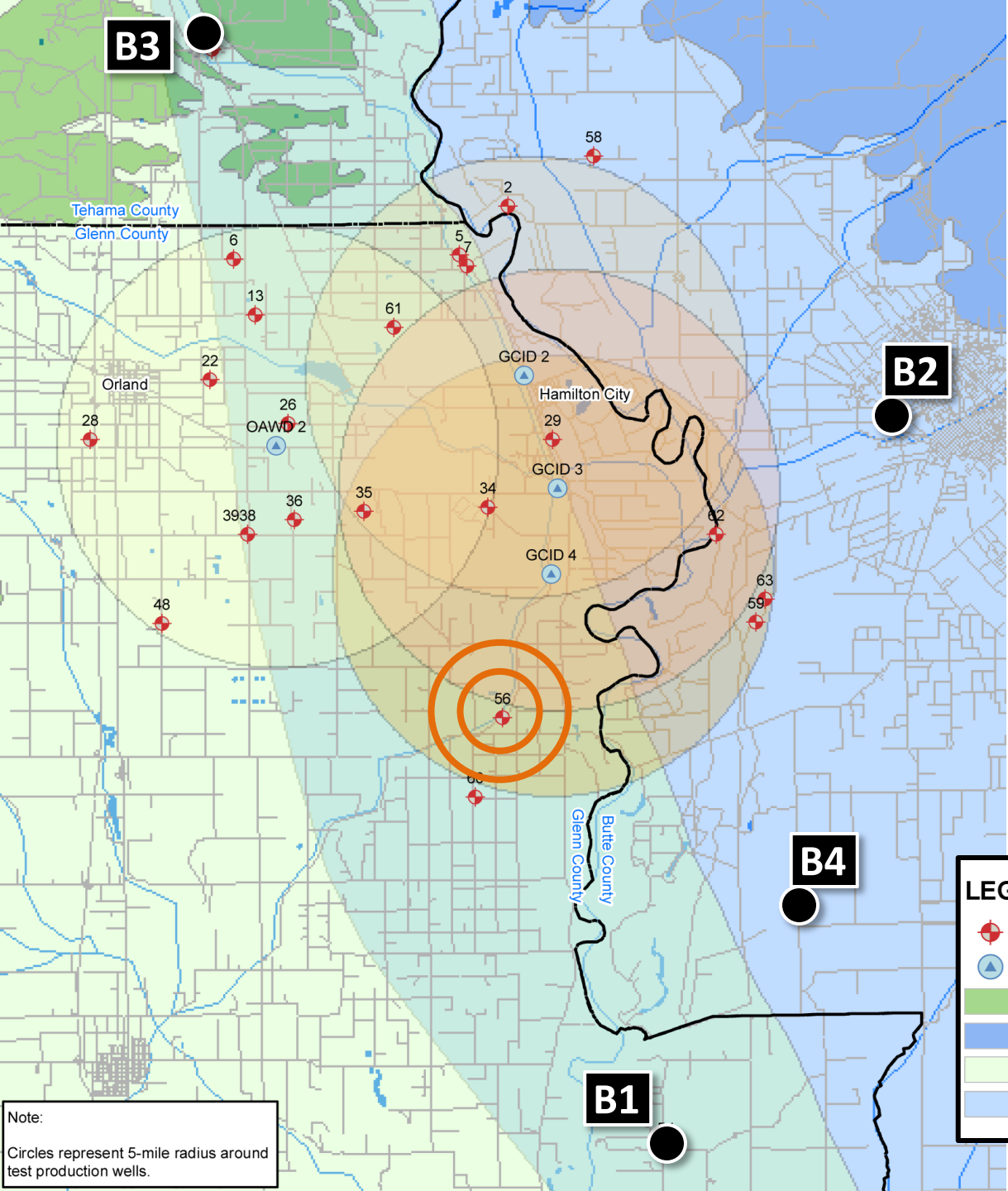
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
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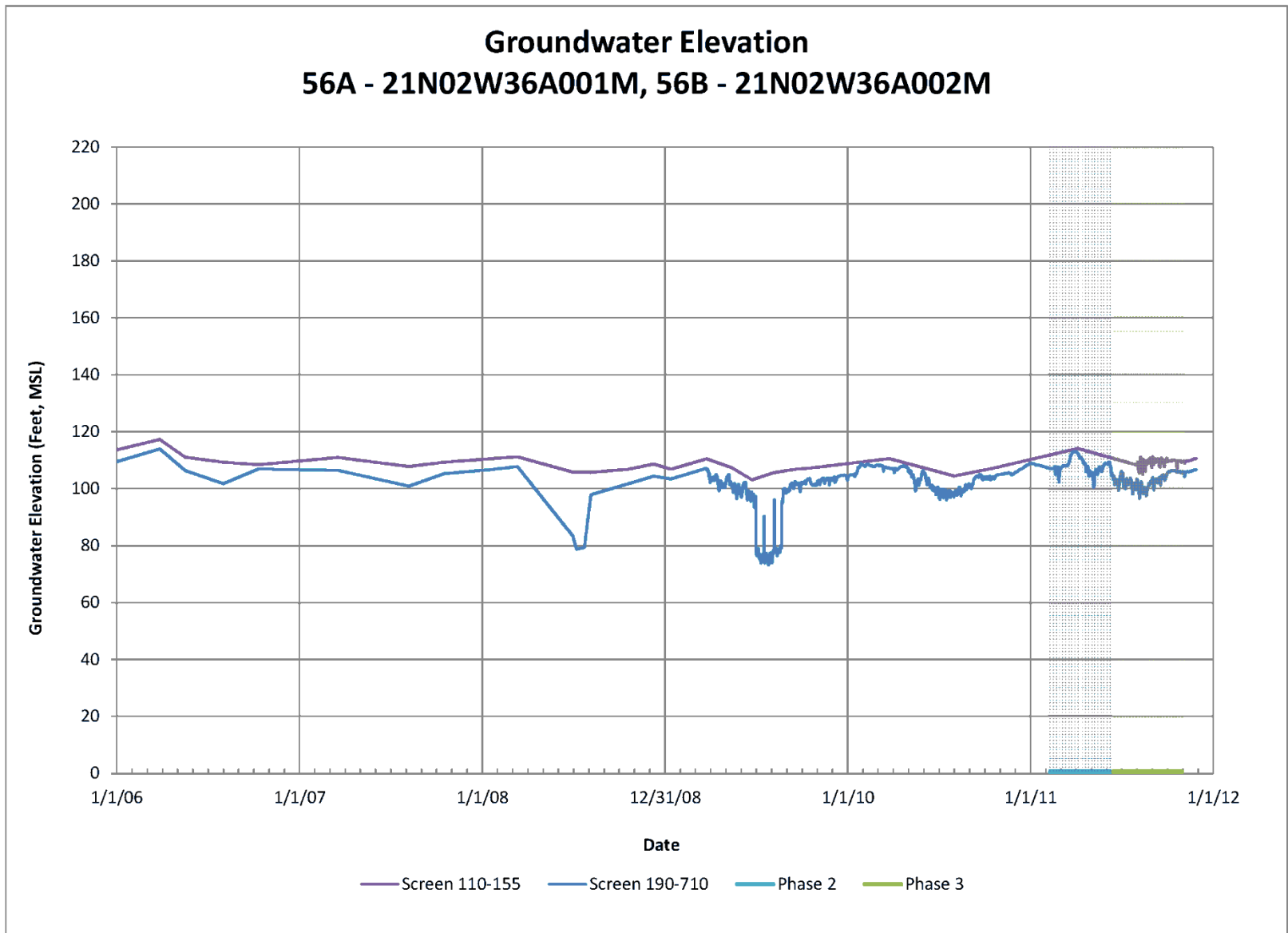


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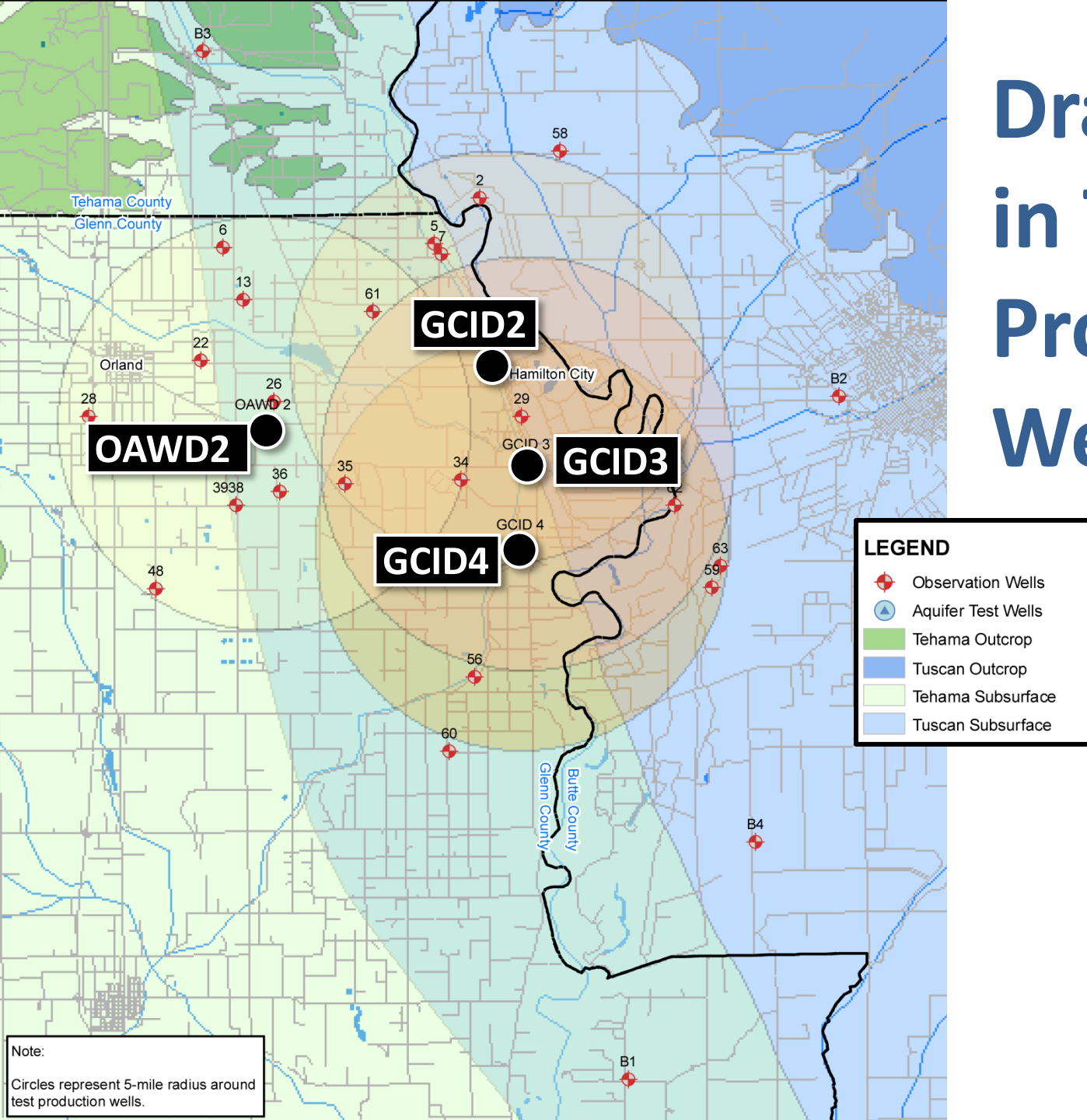
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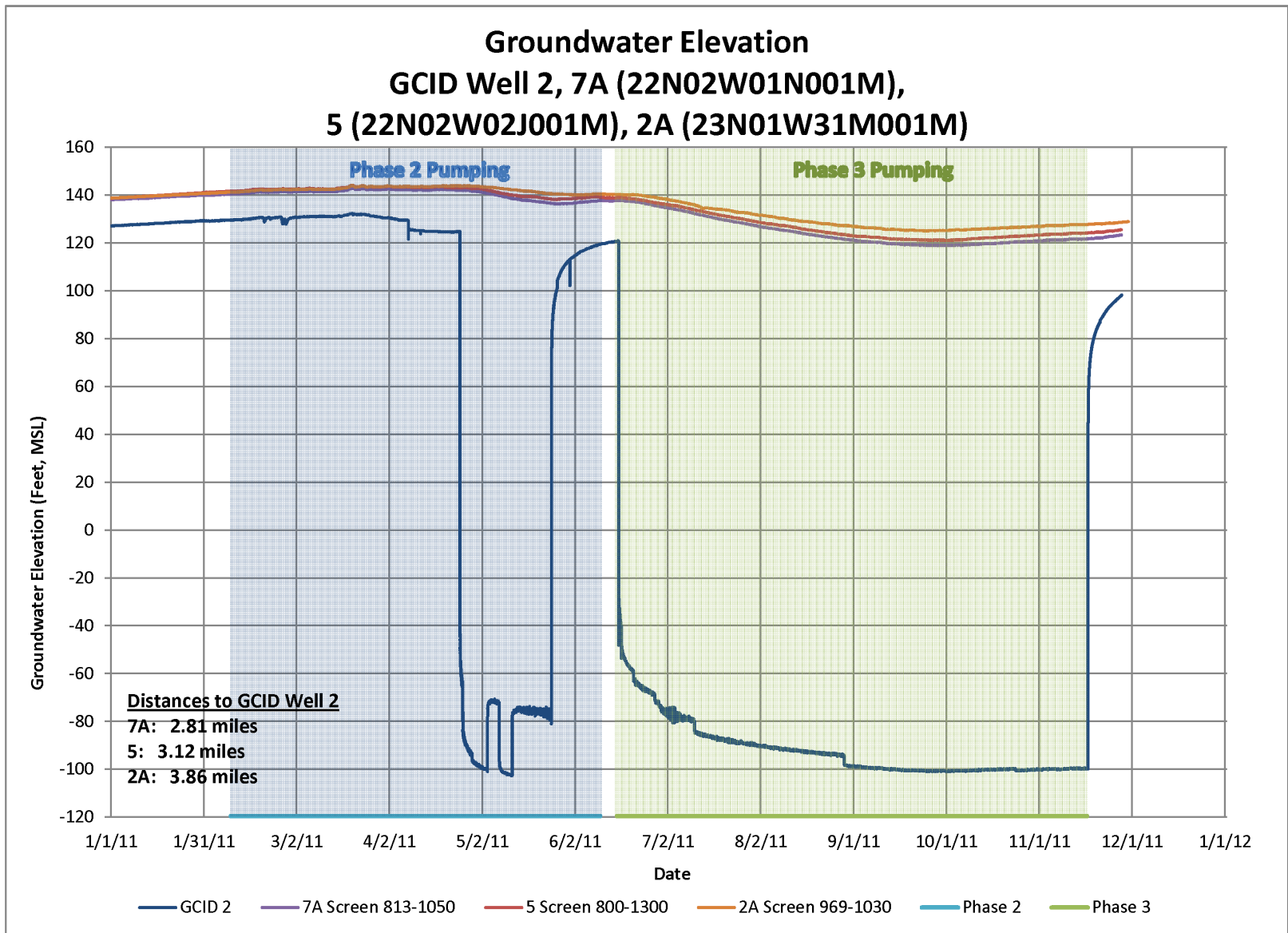


Drawdown in Test- Production Wells

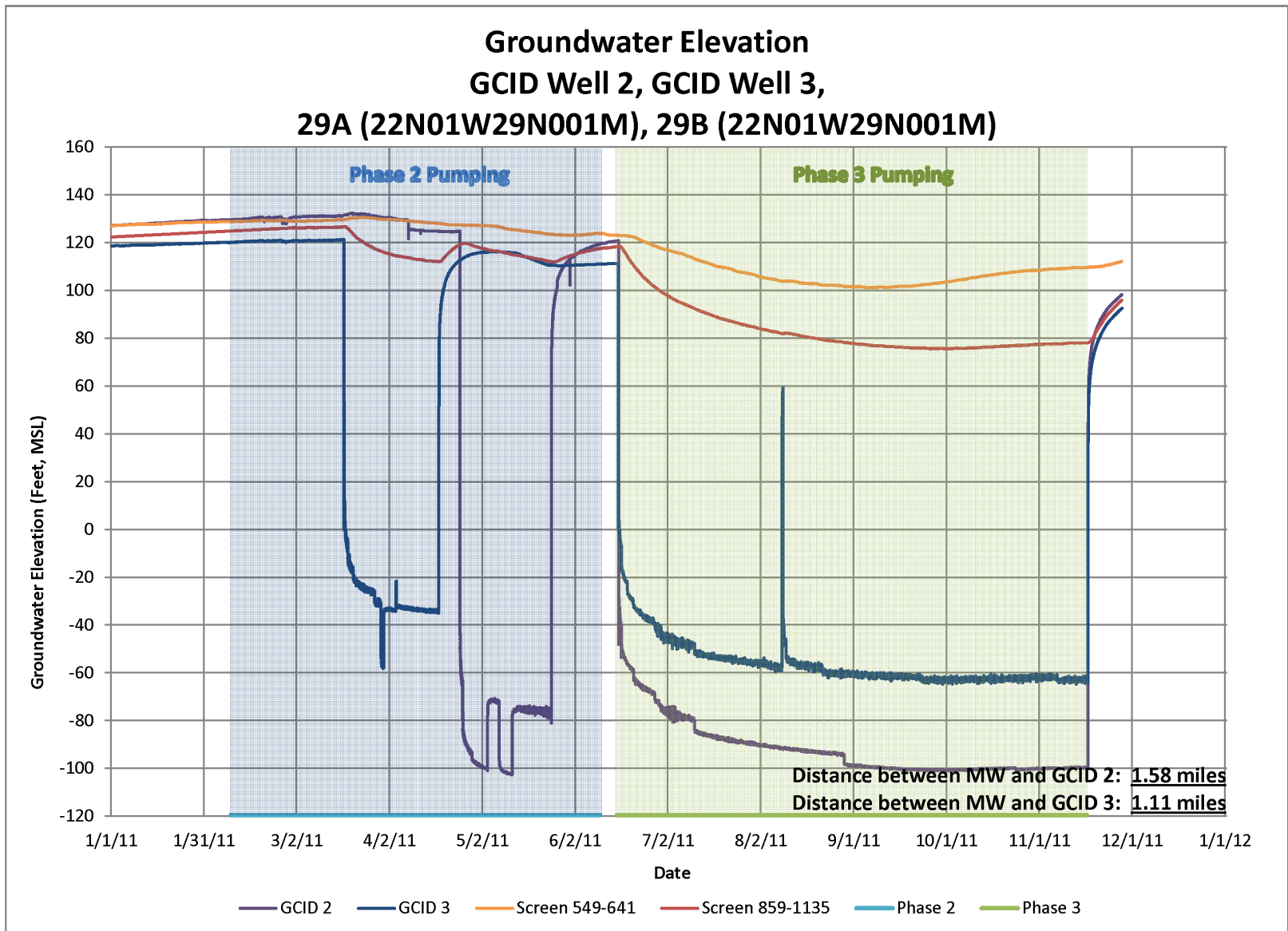


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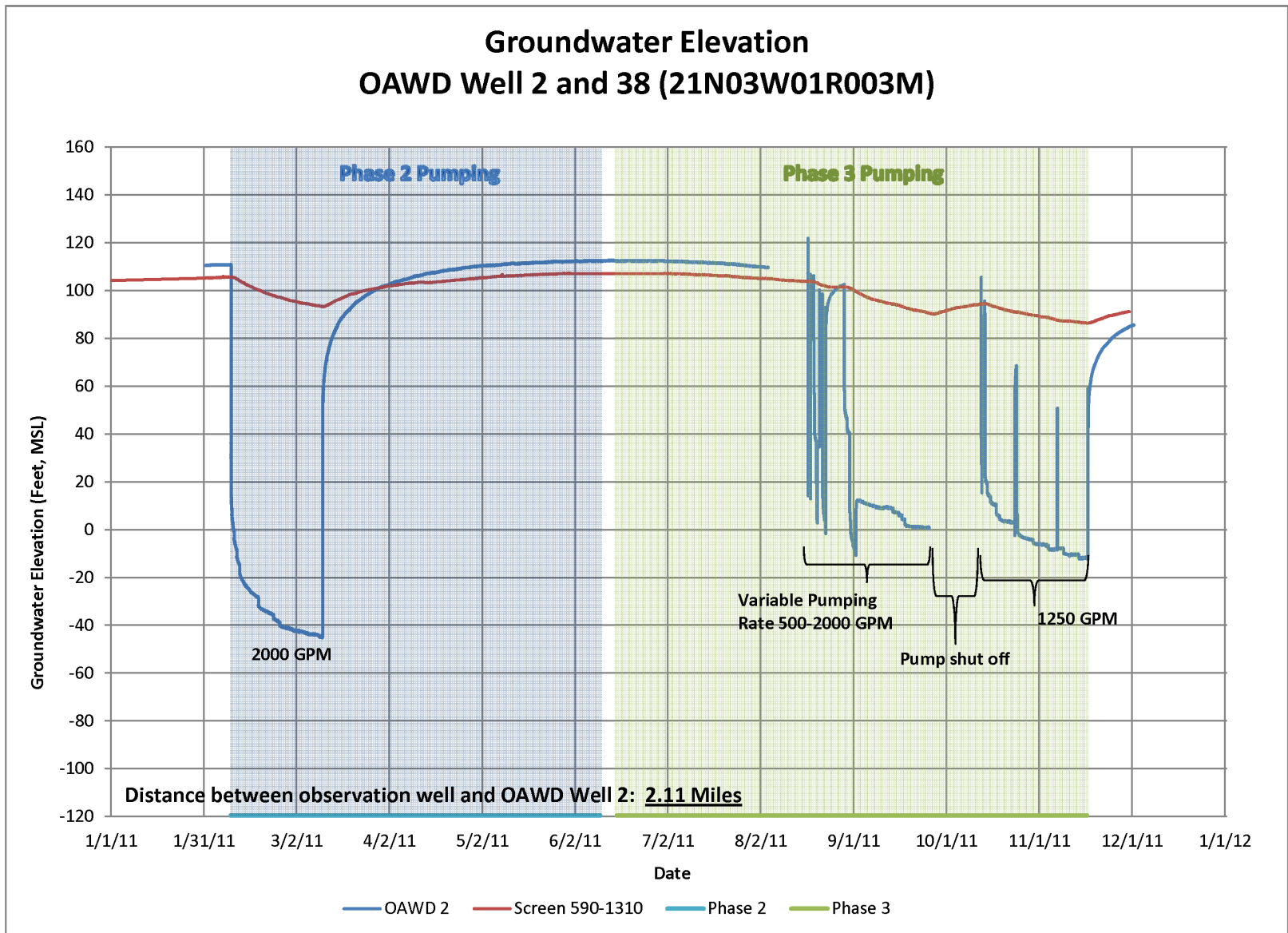
Drawdown Near GCID 2



Drawdown Near GCID 2 and GCID 3



Drawdown Near OAWD 2



Test-Production Well Groundwater Quality

- Water quality dominated by sodium and bicarbonate ions
- Essentially no change in chemical or isotopic signature in any test-production well over 30-day pumping testing intervals, consistent with previous 30-day testing conducted by DWR
- Analytical results from the end of Phase 3 are pending and may provide information on sources of flow to the Lower Tuscan Formation depth zone.

Future APT Work

- Recovery monitoring through March 2012
- Final reporting August 2012
- Ongoing outreach through December 2012
- Analysis of groundwater level trends, groundwater quality trends and aquifer test analysis through April 2012



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