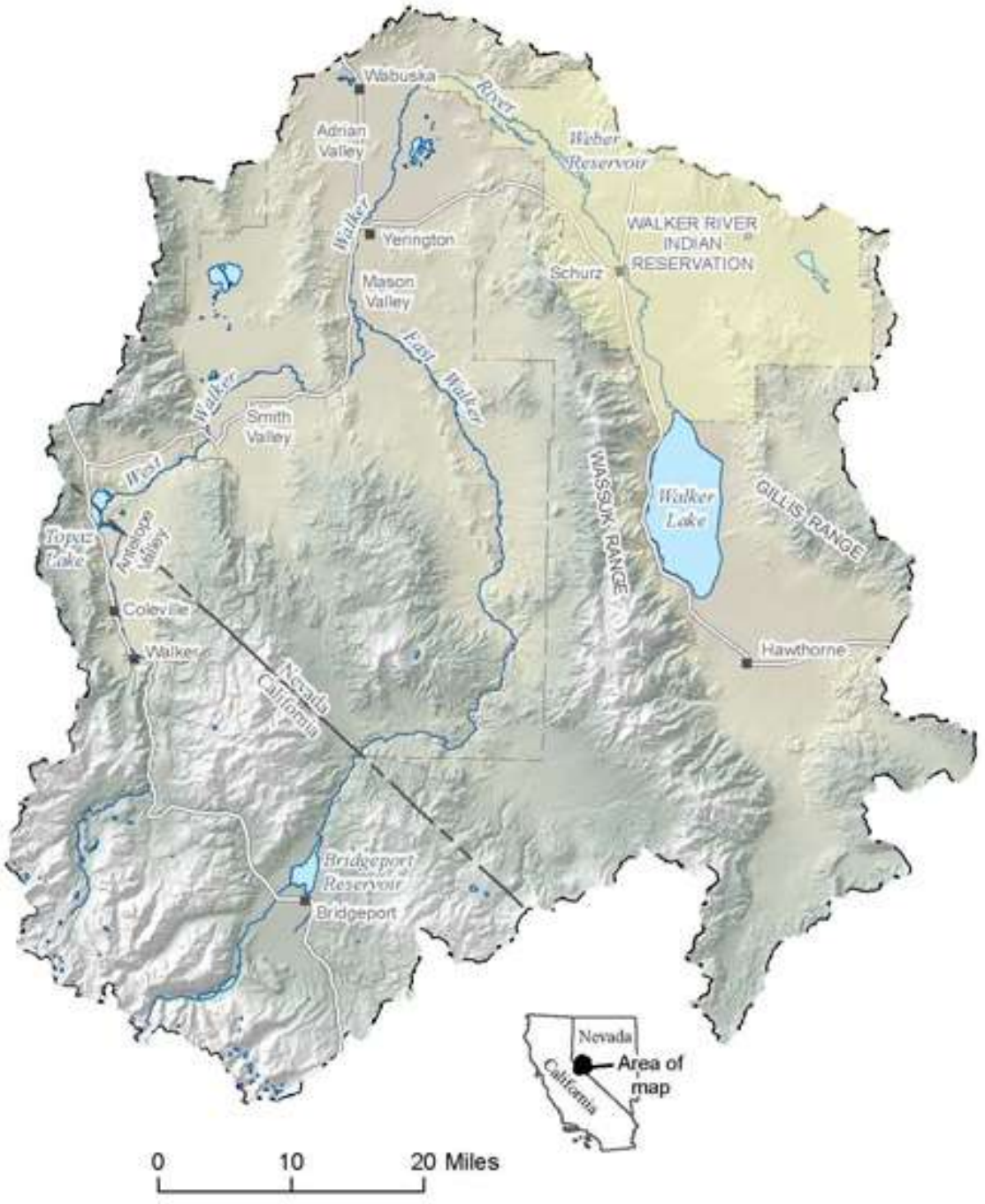
Division of
WATER RESOURCES

Walker River Workshops

Yerington July 15
and
Smith July 16, 2015

DEPARTMENT OF
CONSERVATION &
NATURAL RESOURCES



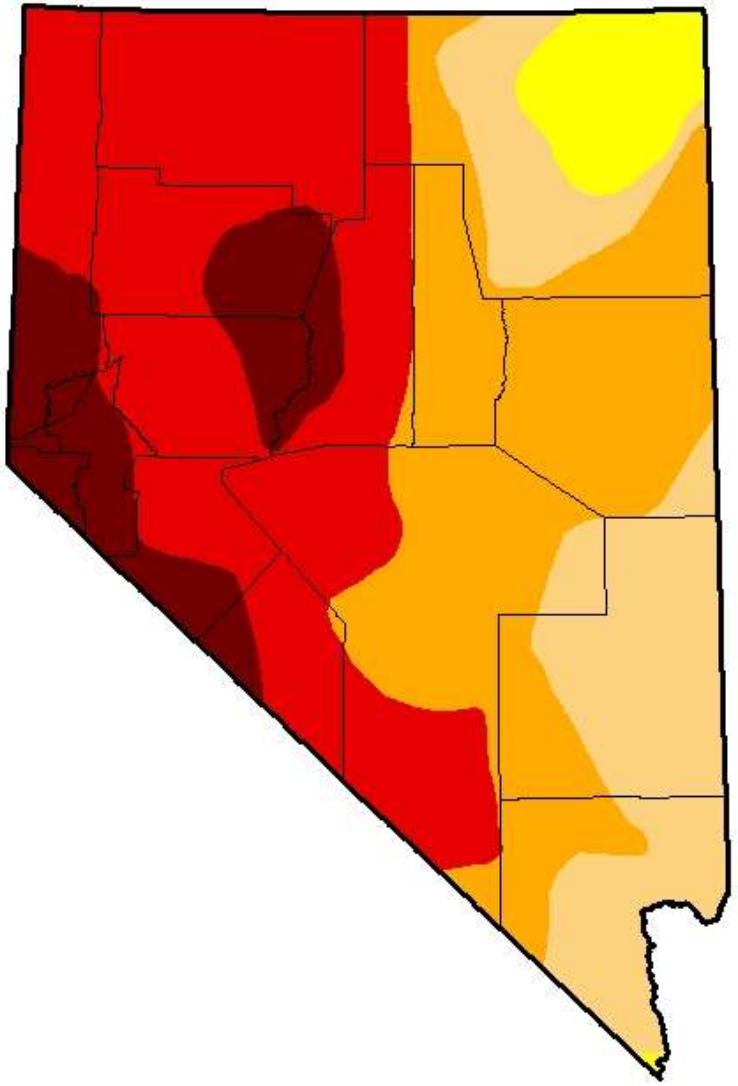
Why Are We Here?

- In the middle of our 4th year of drought
- Unprecedented groundwater pumpage
- Very little recharge to groundwater aquifers
- Unsustainable rates of water-level decline
- Protect existing water rights and domestic wells
- Protect the physical integrity of the aquifer and the long-term water supply
- Discuss future management options and actions
- Invite stakeholder input
- Q & A

Recent Actions

- Public meetings held January 22, 2015
- Issued Order 1250 on February 3, 2015
  - Called for 50% curtailment of pumping of groundwater rights that are supplemental to a surface water source
  - Required properly installed and accurate meters
- Order appealed by FACO
- Hearing on March 27, 2015 in Yerington District Court
- Preliminary injunction ordered
  - State Engineer did not curtail by priority
  - Irreparable harm
- Court case is pending

U.S. Drought Monitor
Nevada



July 7, 2015

(Released Thursday, Jul. 9, 2015)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	95.13	76.08	47.52	11.08
Last Week 6/30/2015	0.00	100.00	95.13	76.10	47.52	11.08
3 Months Ago 4/7/2015	0.00	100.00	99.93	85.72	47.96	18.38
Start of Calendar Year 12/30/2014	0.00	100.00	96.98	68.25	48.38	11.89
Start of Water Year 9/30/2014	0.00	100.00	97.04	69.89	48.38	11.89
One Year Ago 7/8/2014	0.00	100.00	100.00	86.92	54.99	11.08

Intensity:

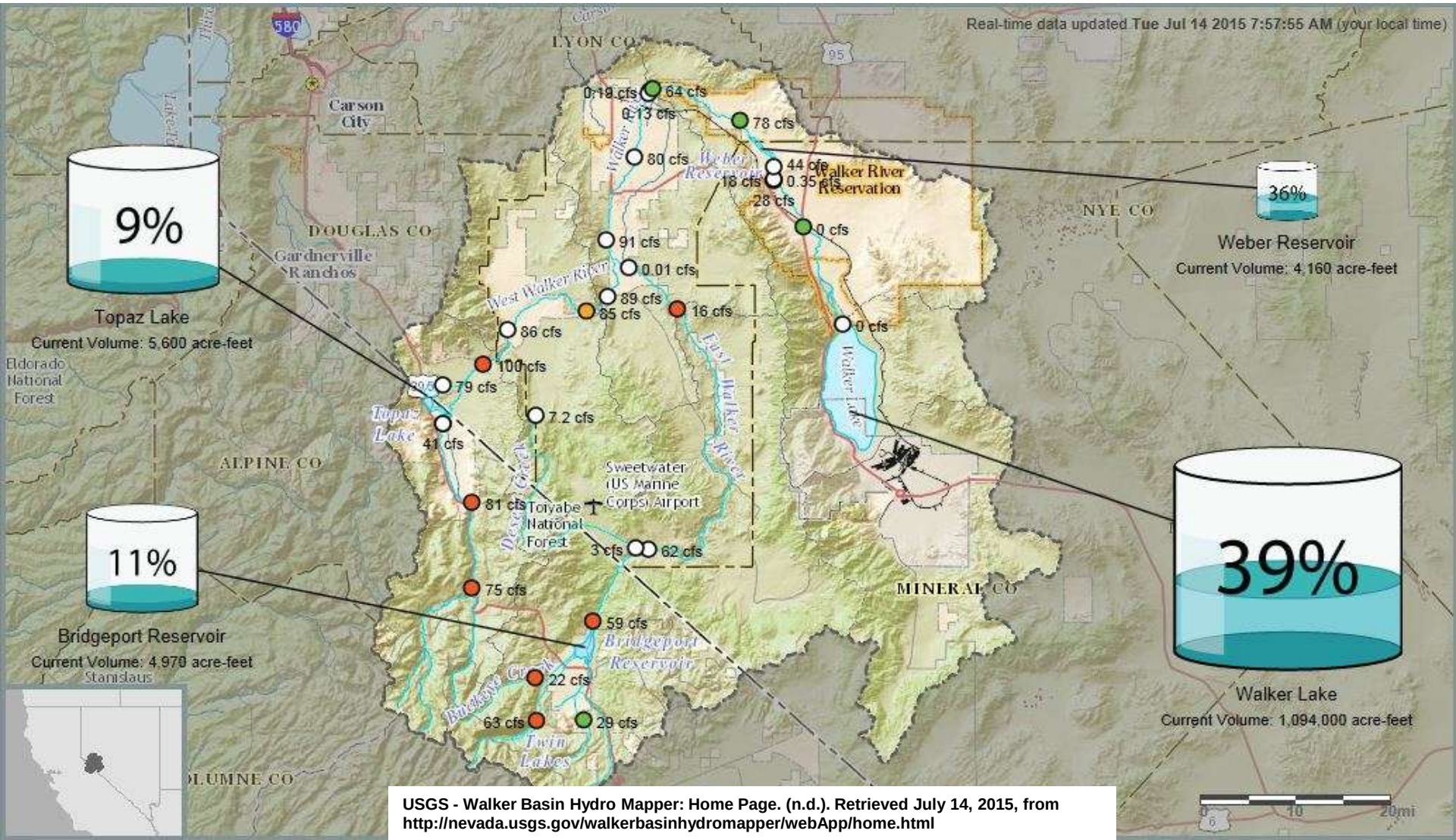
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Brian Fuchs
National Drought Mitigation Center

http://droughtmonitor.unl.edu/

Walker Basin Reservoir Storage
July 14, 2015



USGS - Walker Basin Hydro Mapper: Home Page. (n.d.). Retrieved July 14, 2015, from http://nevada.usgs.gov/walkerbasinhydromapper/webApp/home.html

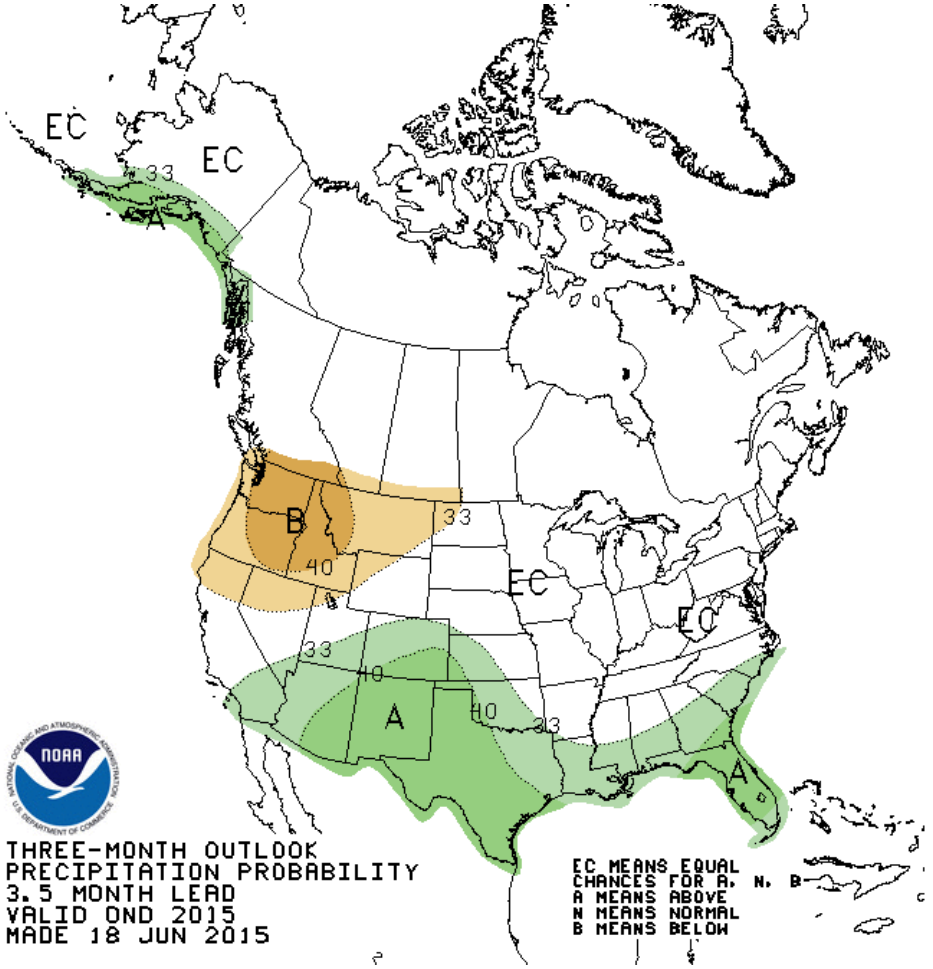
Current Stream Flows

USGS (http://waterdata.usgs.gov/nv/nwis/current/?type=flow)

	Long Term Mean (CFS)	Current Discharge 7/14/2015 (CFS)
USGS East Walker Near Bridgeport (10293050)	319	59
USGS West Walker Near Coleville (10296500)	679	81
USGS West Walker at Hoye Bridge (10297500)	604	100
USGS Walker River Near Wabuska (10301500)	372	64

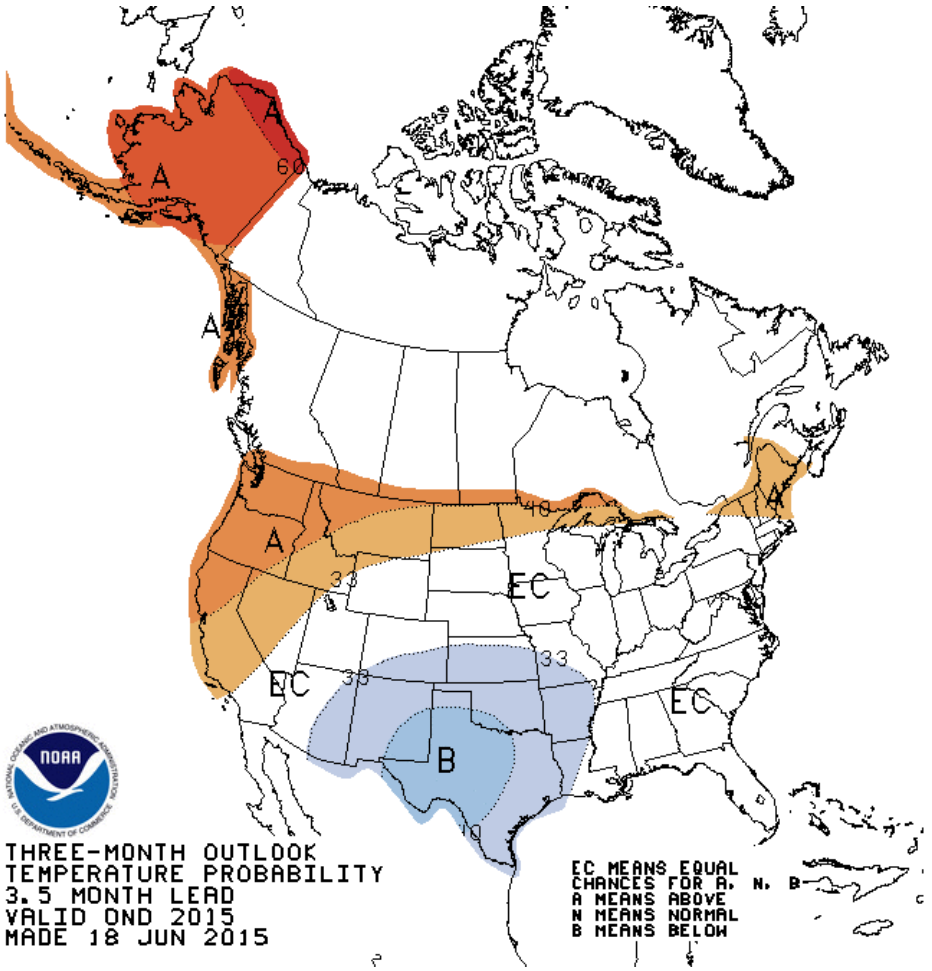
Fall 2015 (Oct-Dec) Precipitation Outlook

Outlook – El Nino conditions. Equal likelihood for wet vs. dry conditions.



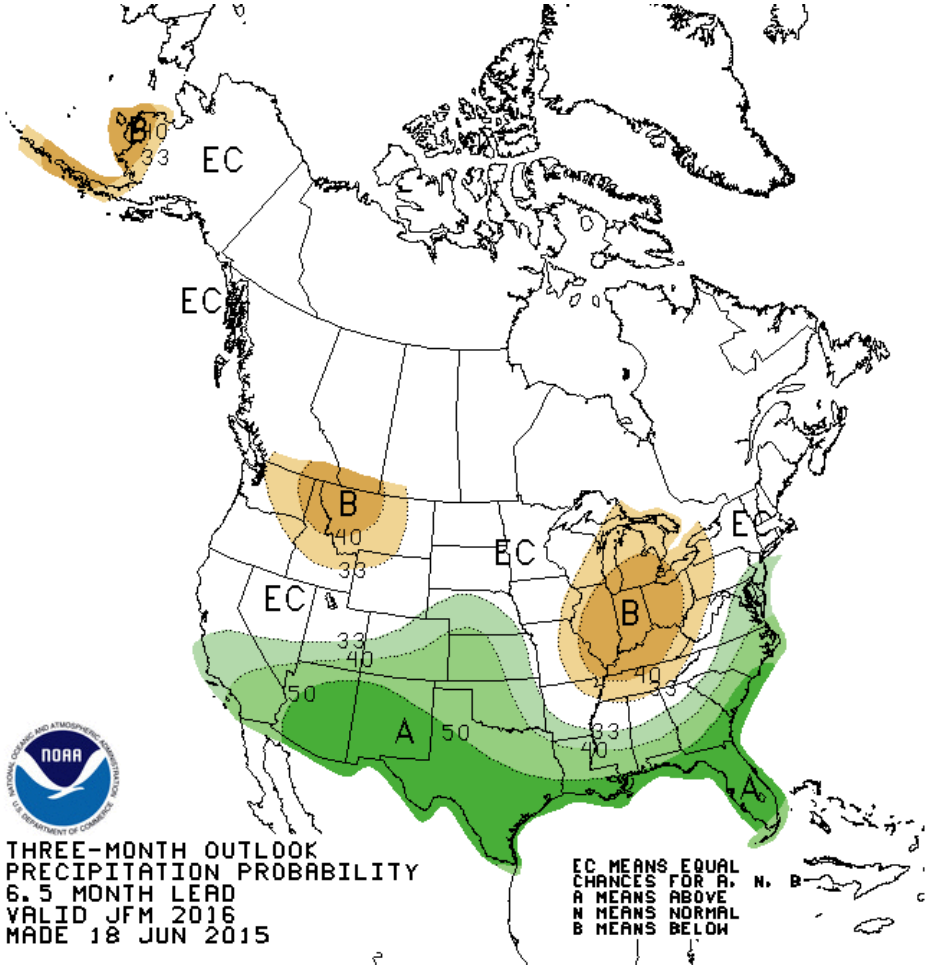
Fall 2015 (Oct-Dec) Temperature Outlook

Outlook – warmer than normal



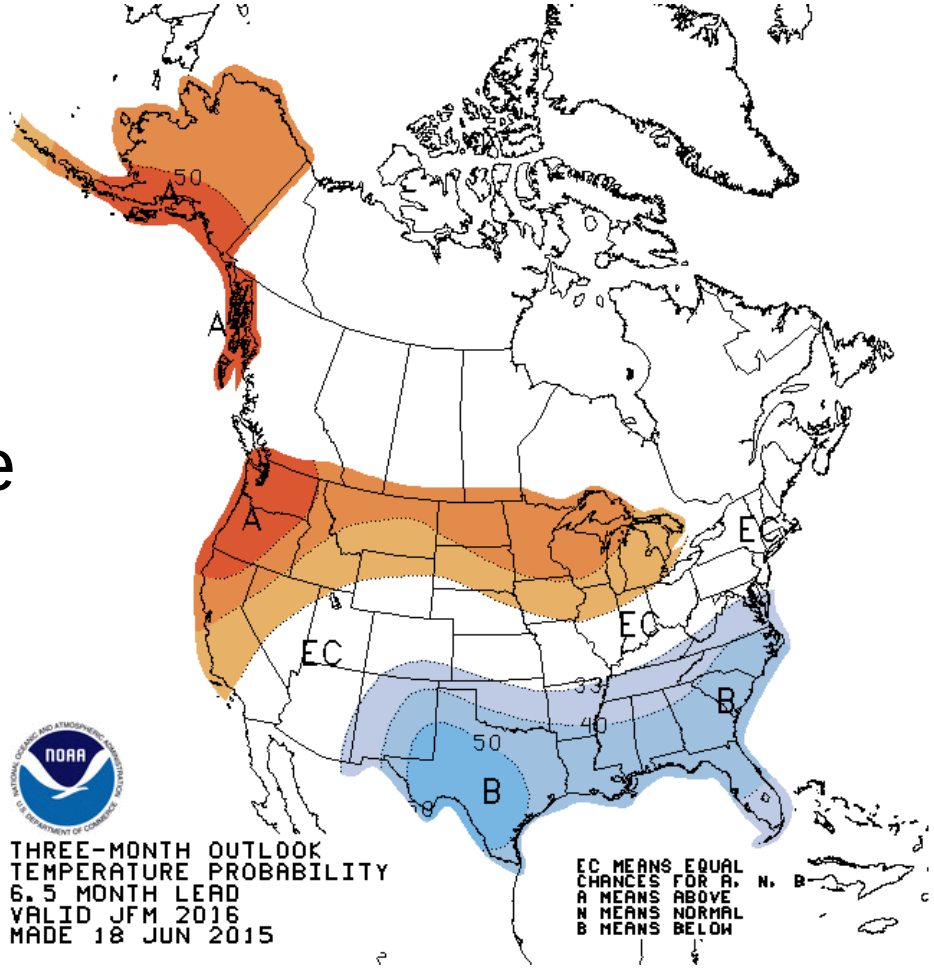
Winter 2016 (Jan-Mar) Precipitation Outlook

Outlook – Diminishing El Nino, Equal likelihood for wet vs. dry conditions.



Winter 2016 (Jan-Mar) Temperature Outlook

Outlook - favors continued above normal temps (higher than average snow levels).



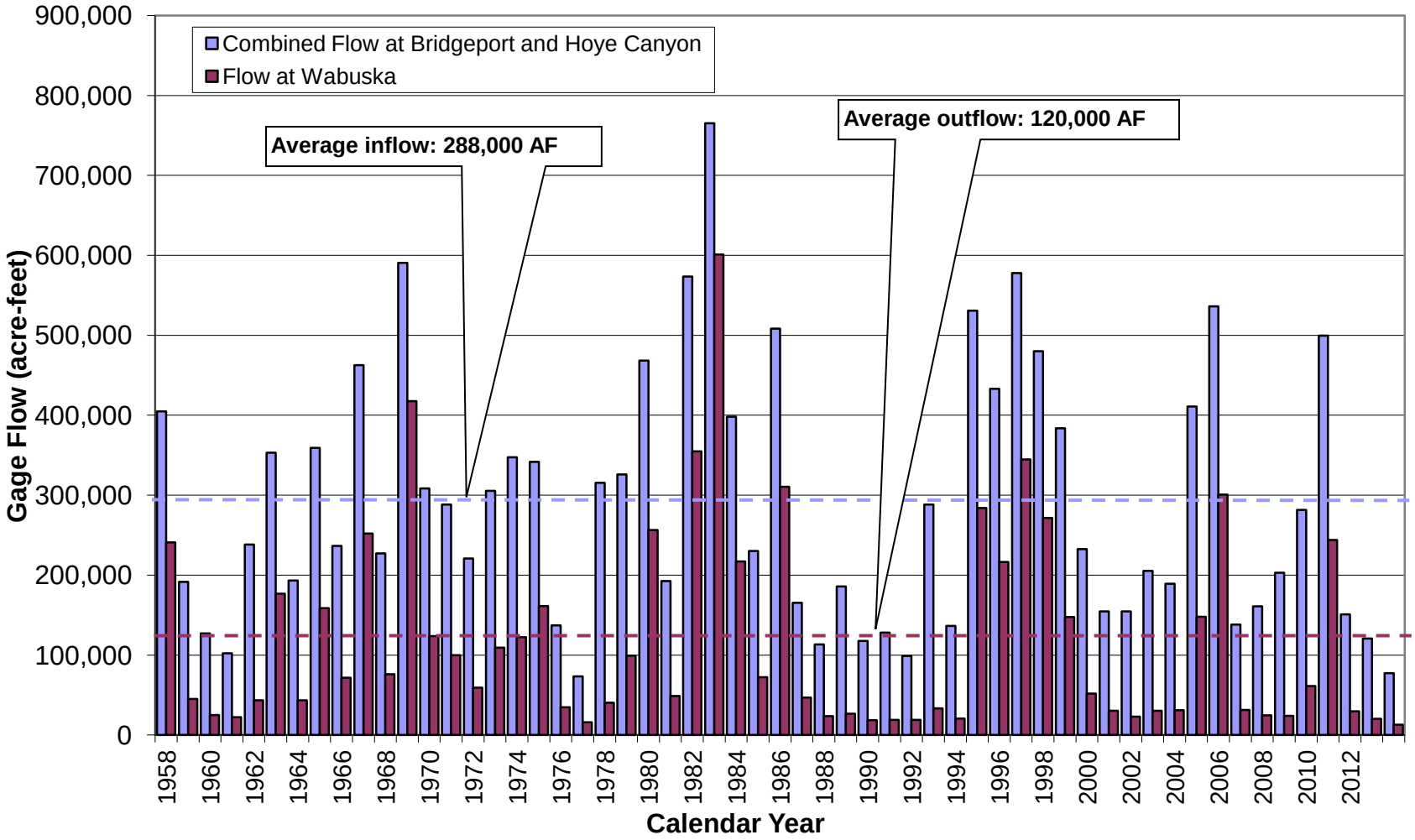
Water Budgets – Water Supply

- Mason Valley
  - Perennial yield of 25,000 af
    - Recharge from precipitation ~2,000 afa
    - All other recharge derived from Walker River and irrigation
    - Perennial yield assumes additional capture of ET by conversion of new acreage to cropland
  - System yield of 100,000 af (consumptive)
    - Includes surface water and groundwater (1948-1965)
    - Appropriation of supplemental groundwater allows for full system yield use in all years
  - Groundwater appropriations = 148,000 af
    - 91,000 af supplemental to surface water rights

Water Budgets – Water Supply

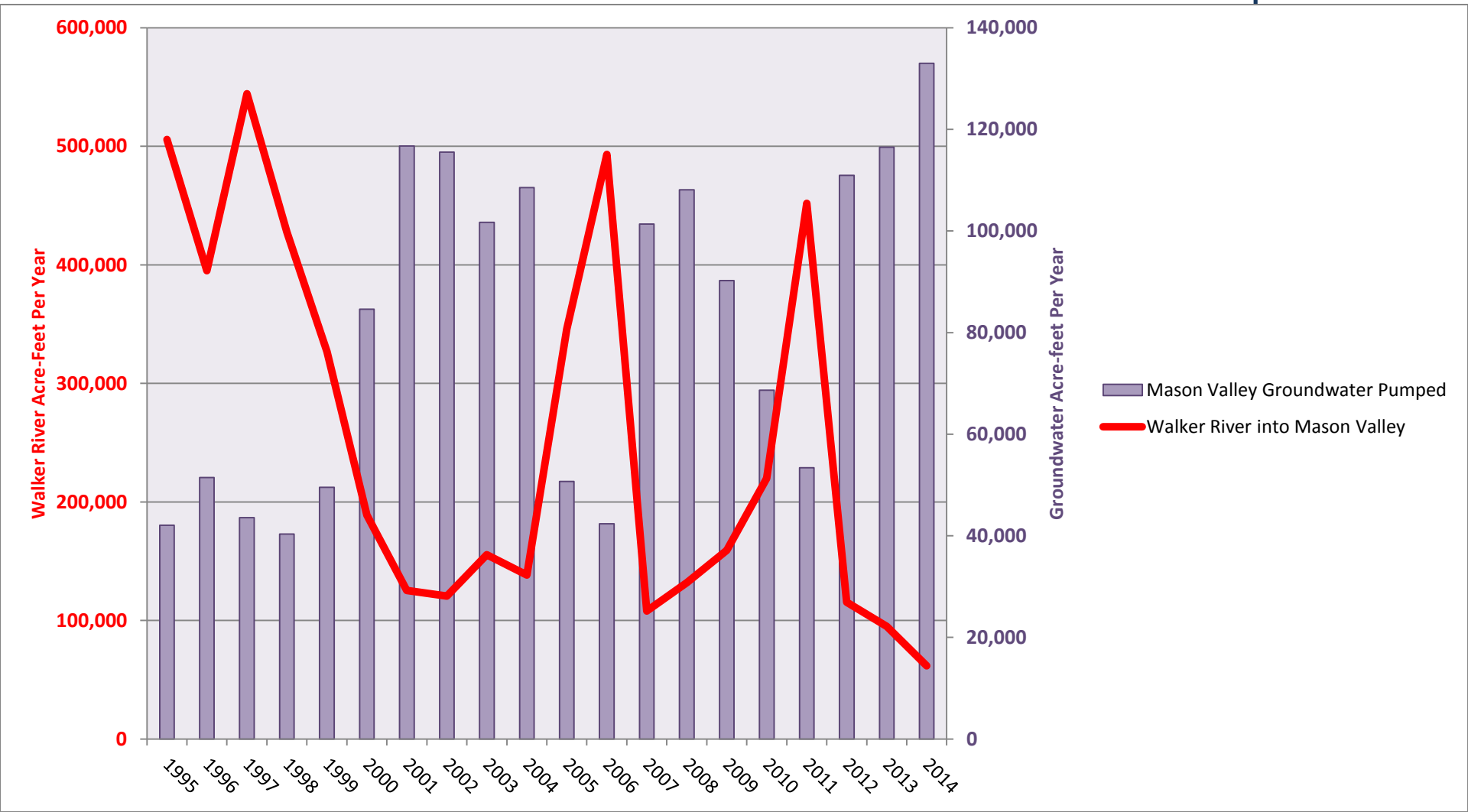
- Smith Valley
  - Perennial yield of 17,000 af
    - Recharge from precipitation = 17,000 afa
  - System yield of 62,000 af (consumptive)
    - Includes surface water and groundwater (1958-1972)
    - 17,000 afa recharge
    - 75,000 afa diversions
    - (-)30,000 afa return flow
  - Groundwater appropriations = 55,000 af
    - 34,000 af supplemental to surface water rights

Walker River Flows in Smith, Mason and East Walker Basins



Mason Valley Groundwater & Surface Water History

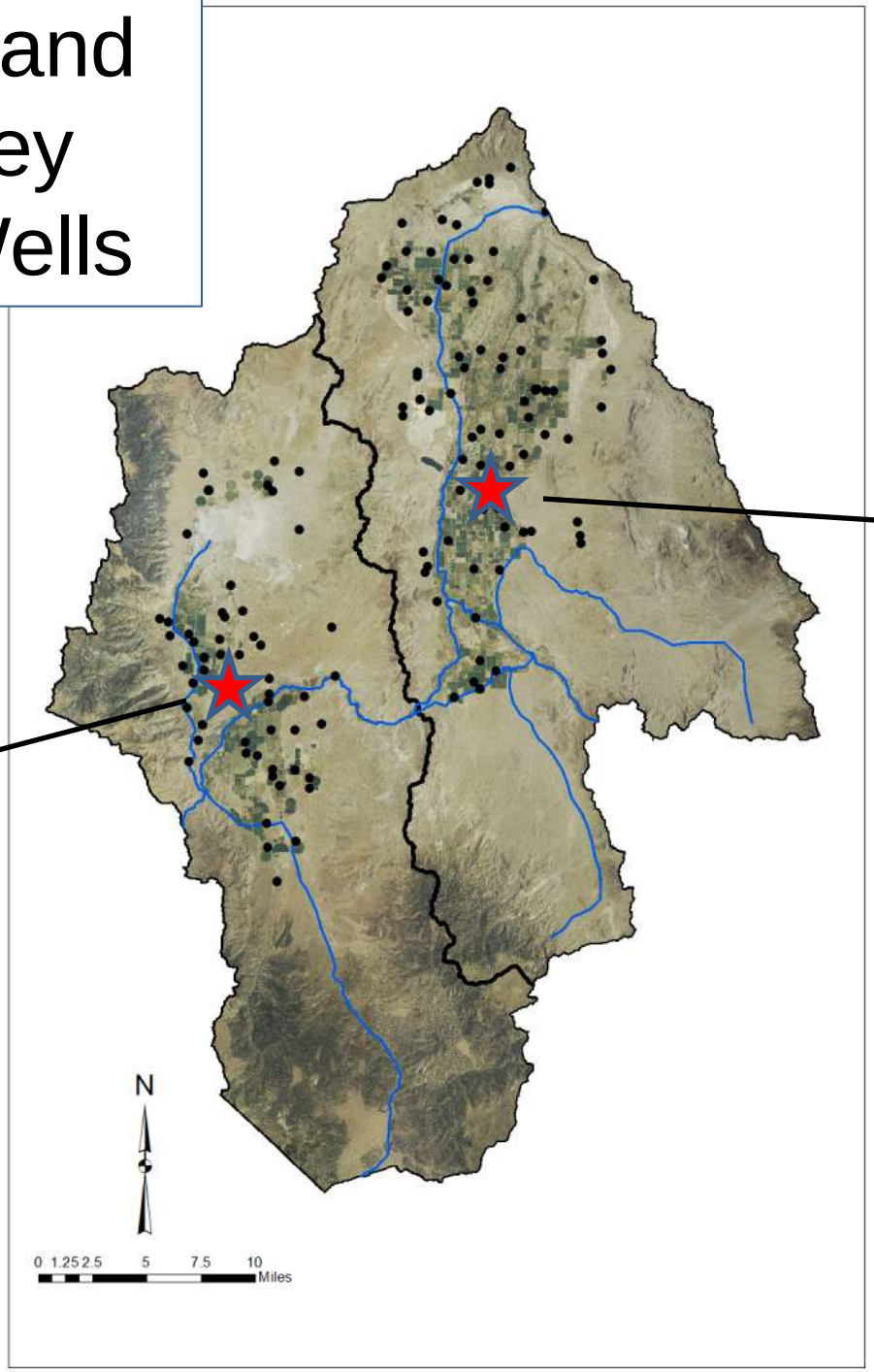
Less Surface Water Available = More Groundwater Pumped



Smith Valley and Mason Valley Monitoring Wells

NDWR currently monitors groundwater levels at 32 sites in Smith Valley

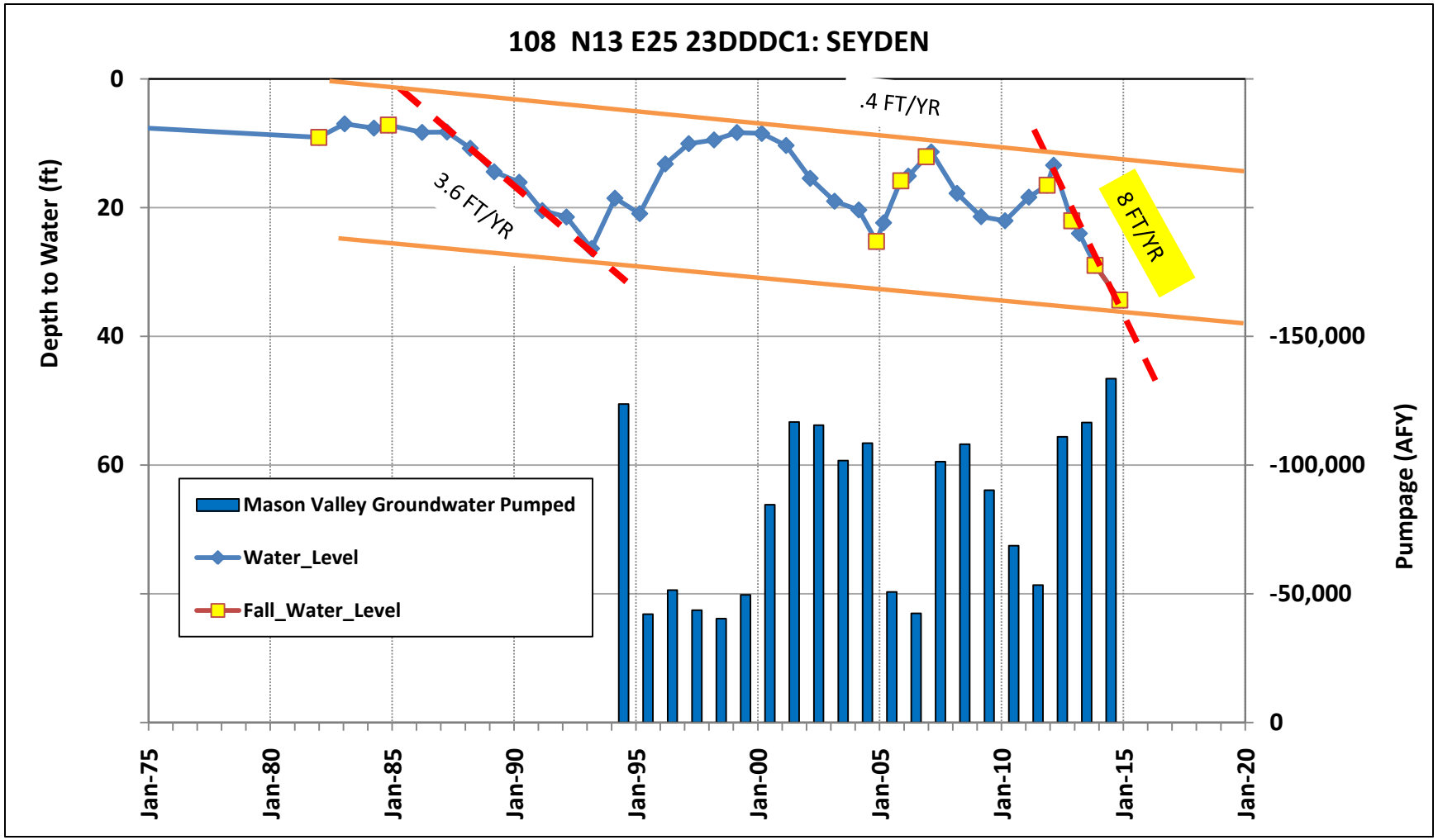
Smith Valley Hydrograph



Mason Valley Hydrograph

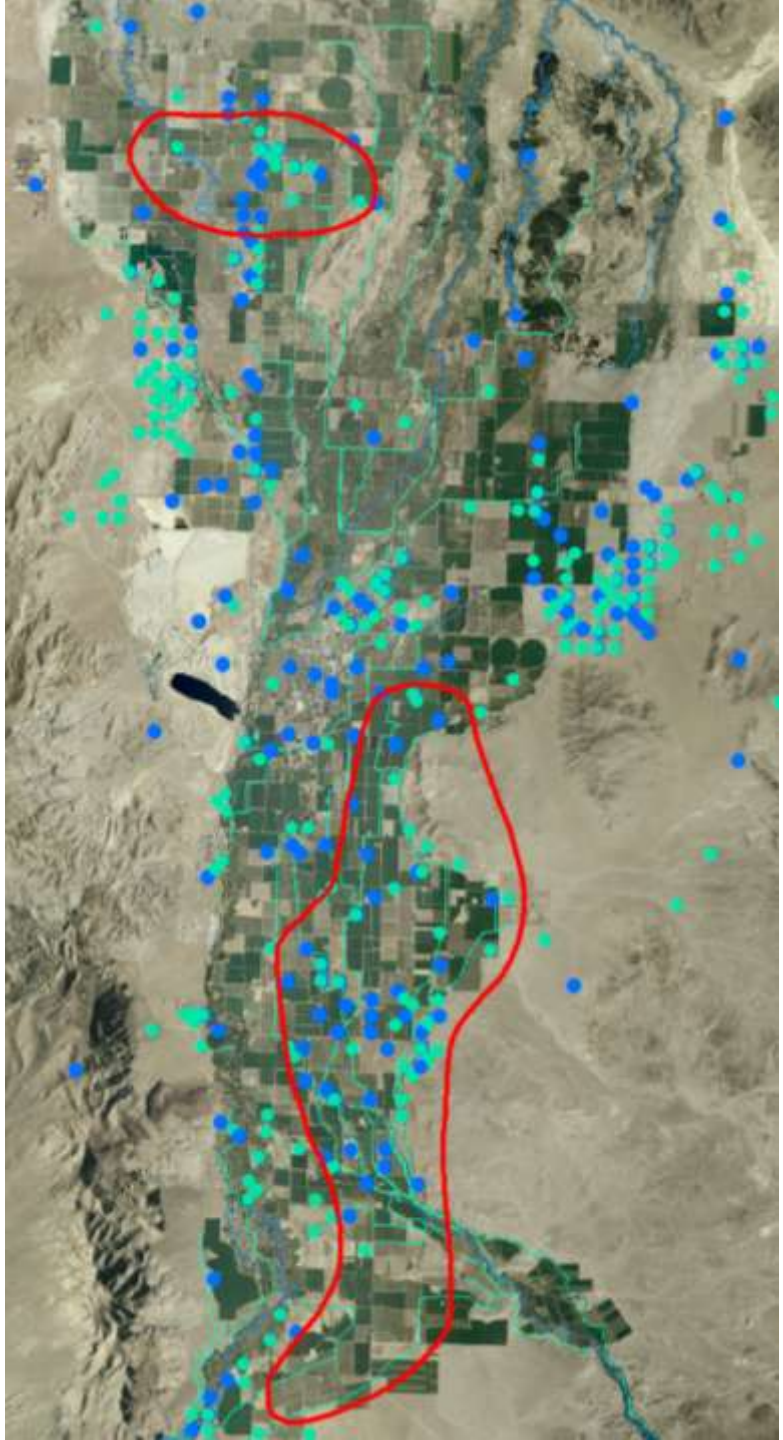
NDWR currently monitors groundwater levels at 60 sites in Mason Valley

Mason Valley
Water Levels vs. Pumping



Mason Valley
Water Level Decline from Nov 2011 to Nov 2014

20 - 30 ft



Well Depth

≤ 100 ft

100 – 150 ft

In Mason Valley there are 279 wells that are less than or equal to 100 feet of these 139 are domestic.

Mason Valley
Water Level Decline from Mar 2014 to Mar 2015

Measured well

Water Level Decline Rates

> 8 feet/year

> 4 feet/year

Pumped 2014 AF/Y

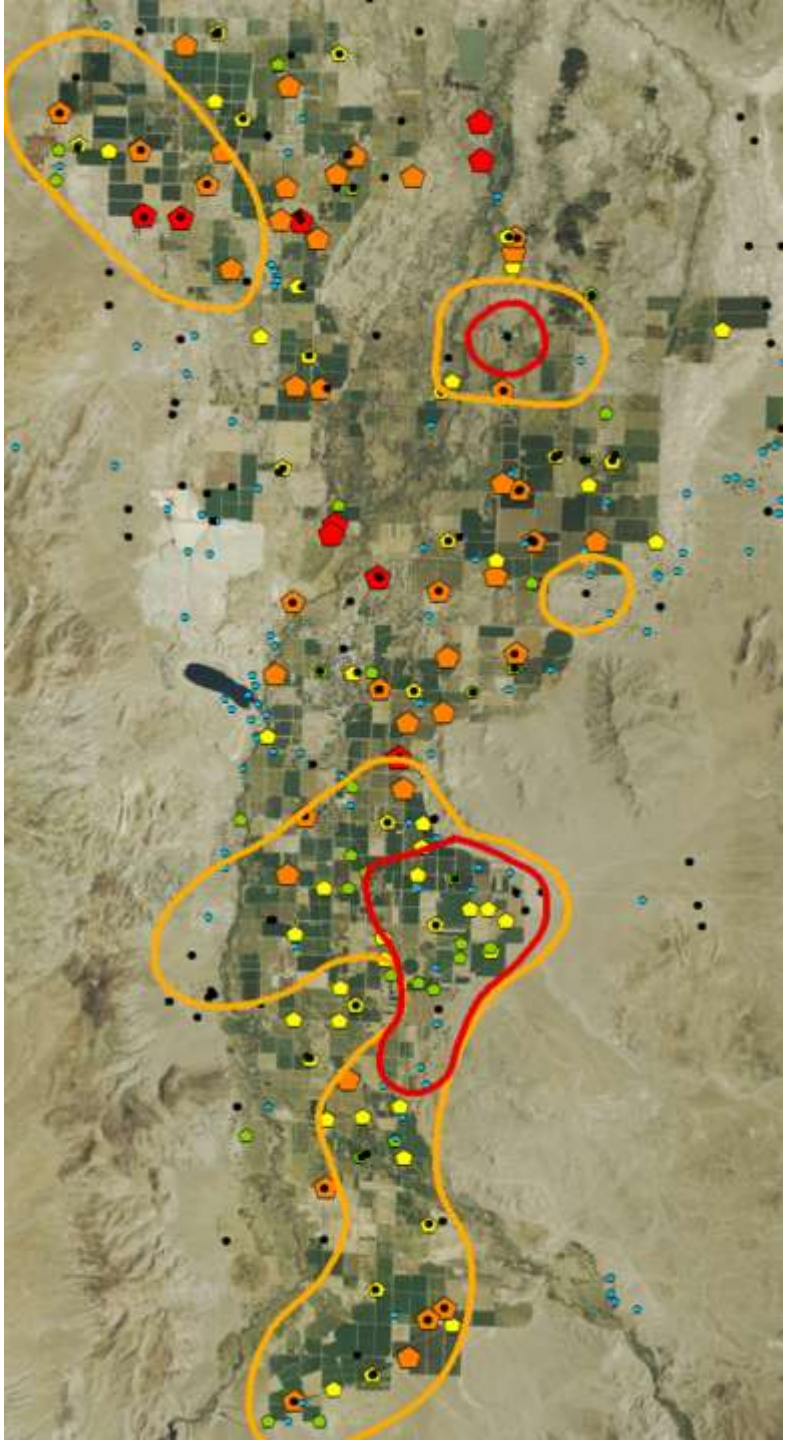
2000 - 3270

1000 - 2000

500 - 1000

200 - 500

0 - 200

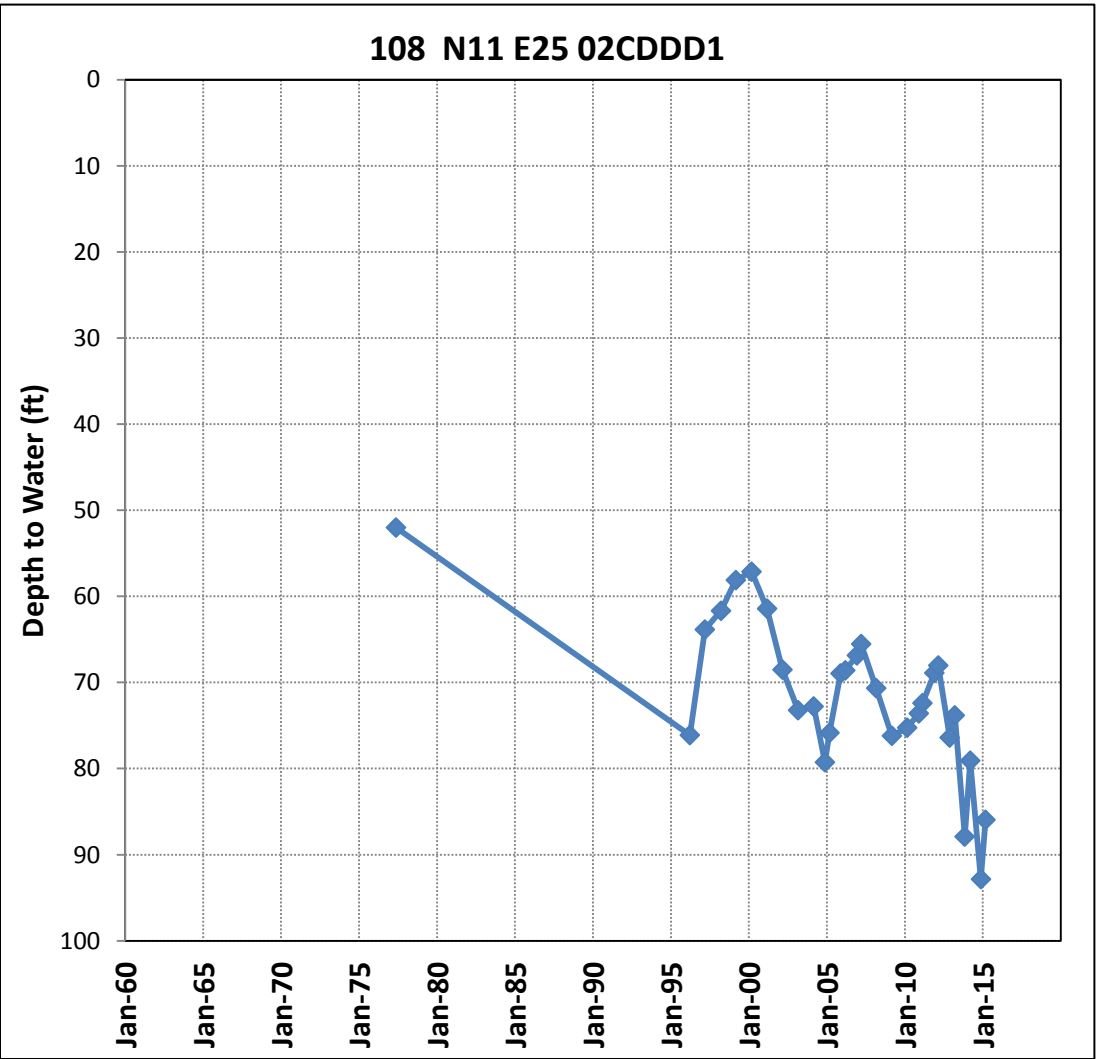


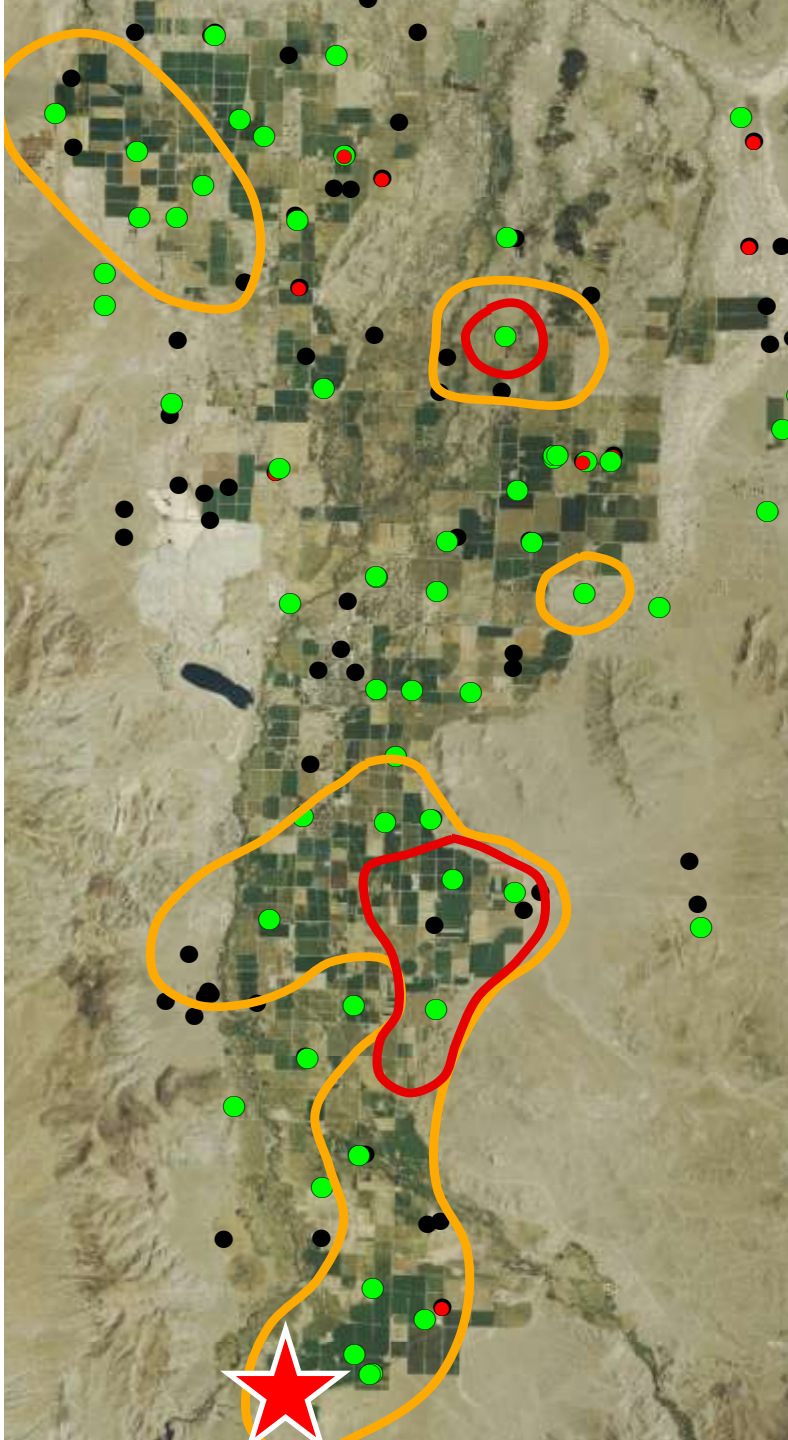
Mason Valley Hydrographs

NDWR Active

NDWR Inactive

Measured well



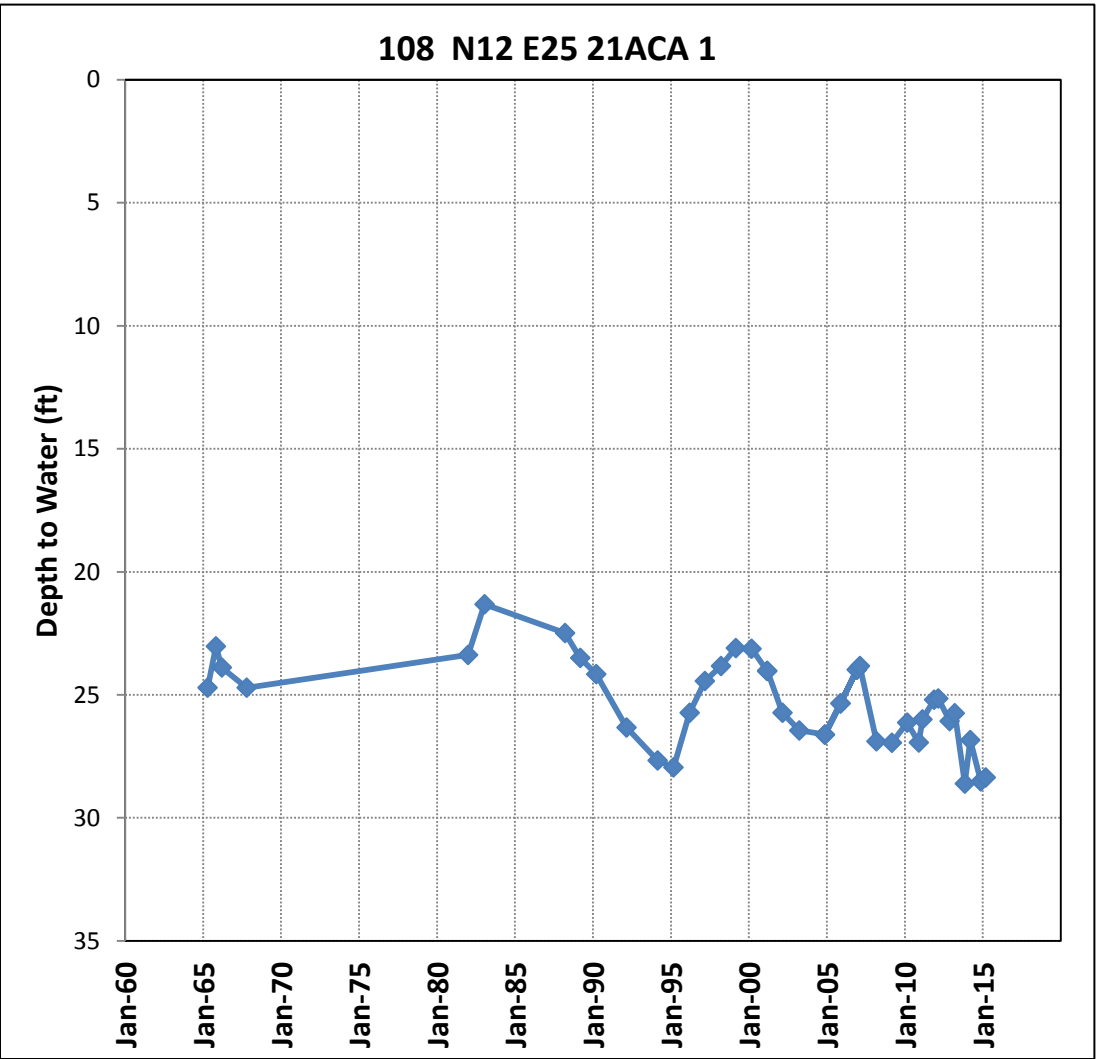


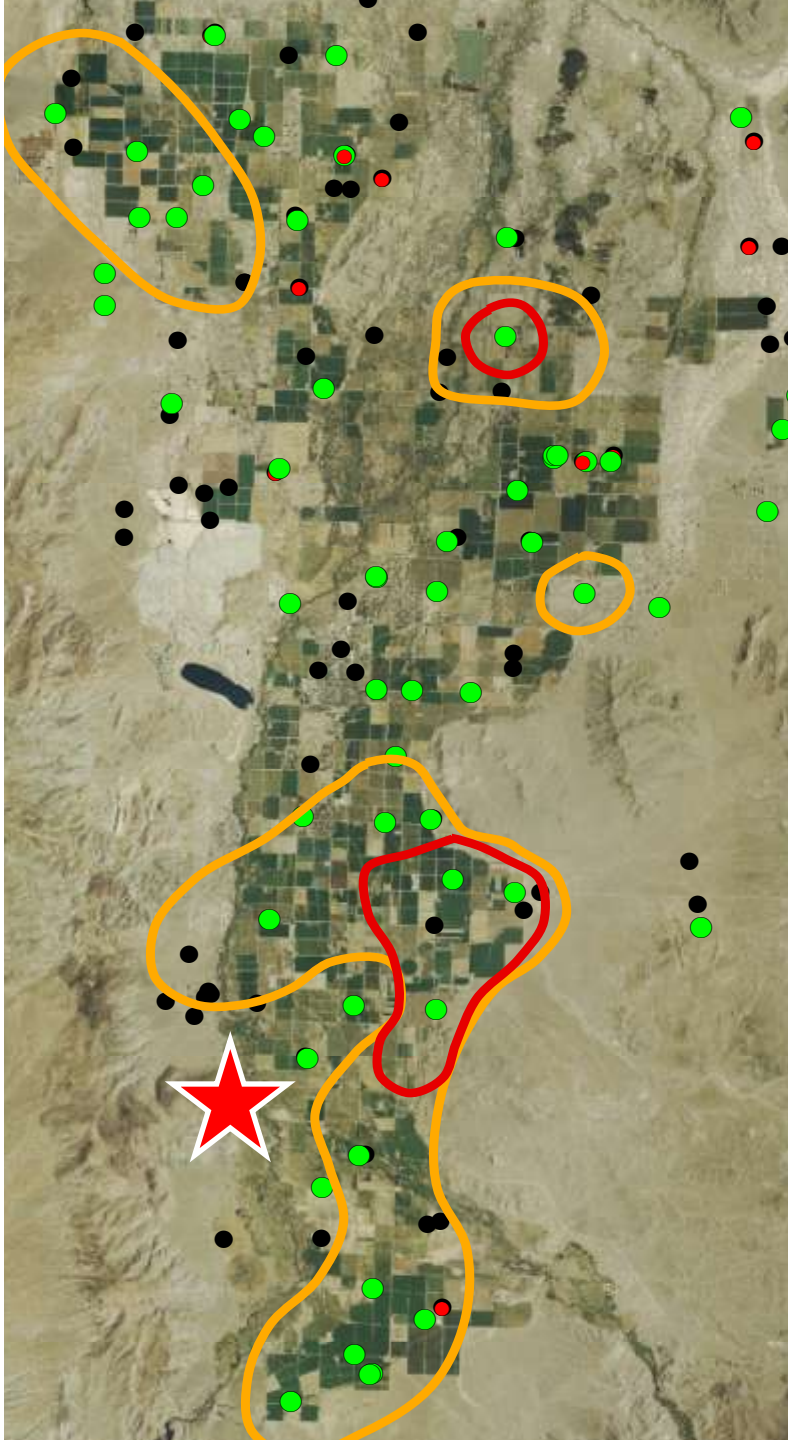
Mason Valley Hydrographs

NDWR Active

NDWR Inactive

Measured well



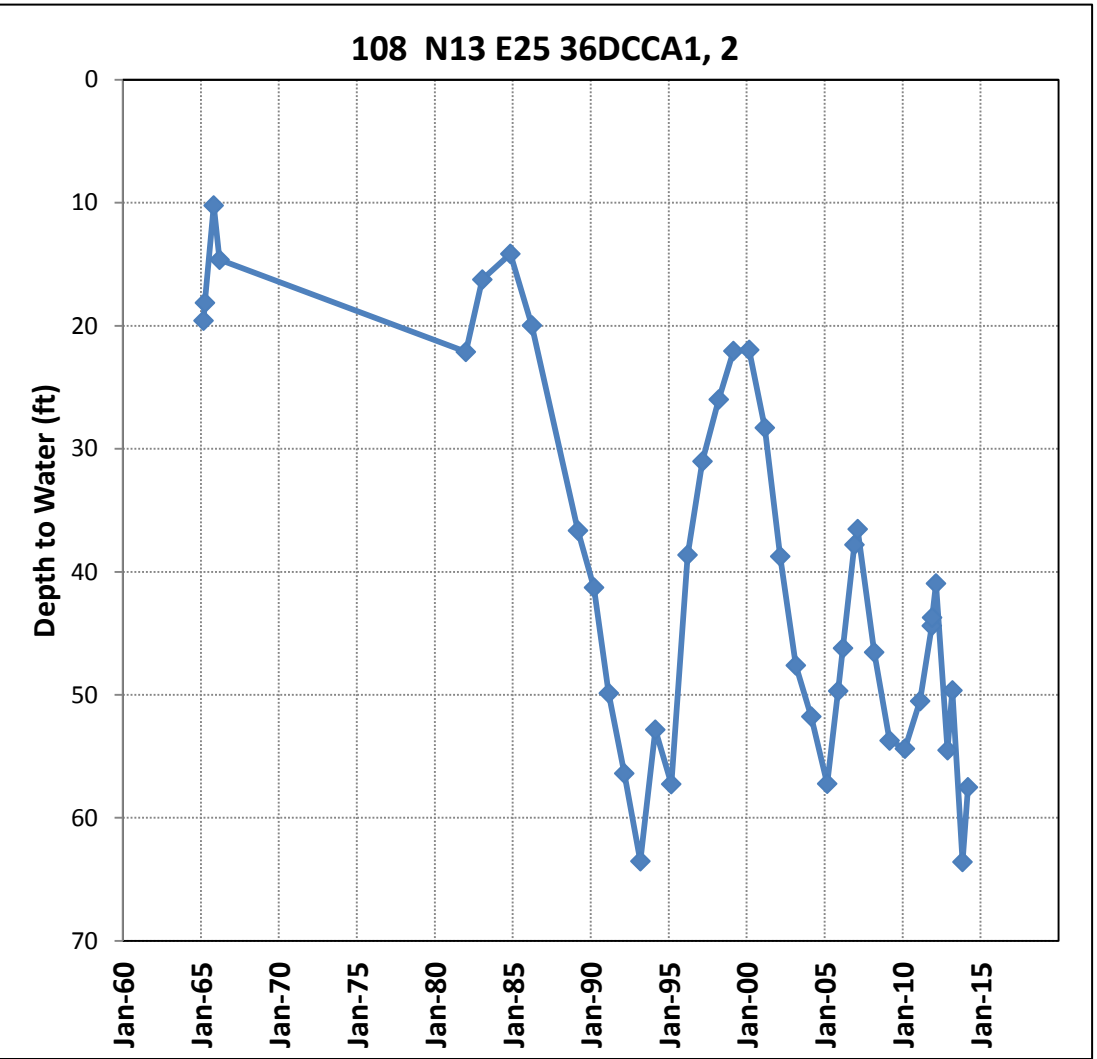


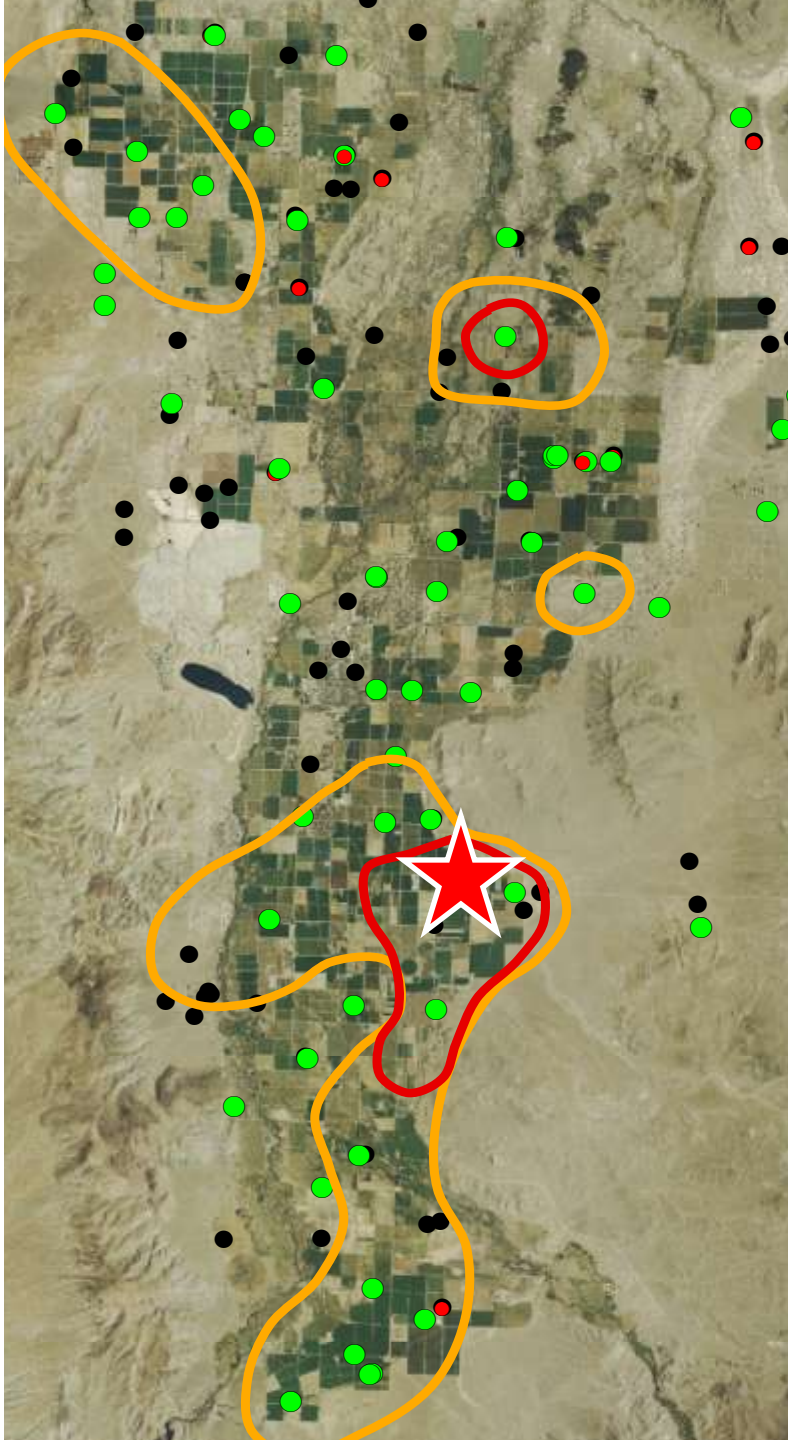
Mason Valley Hydrographs

NDWR Active

NDWR Inactive

Measured well





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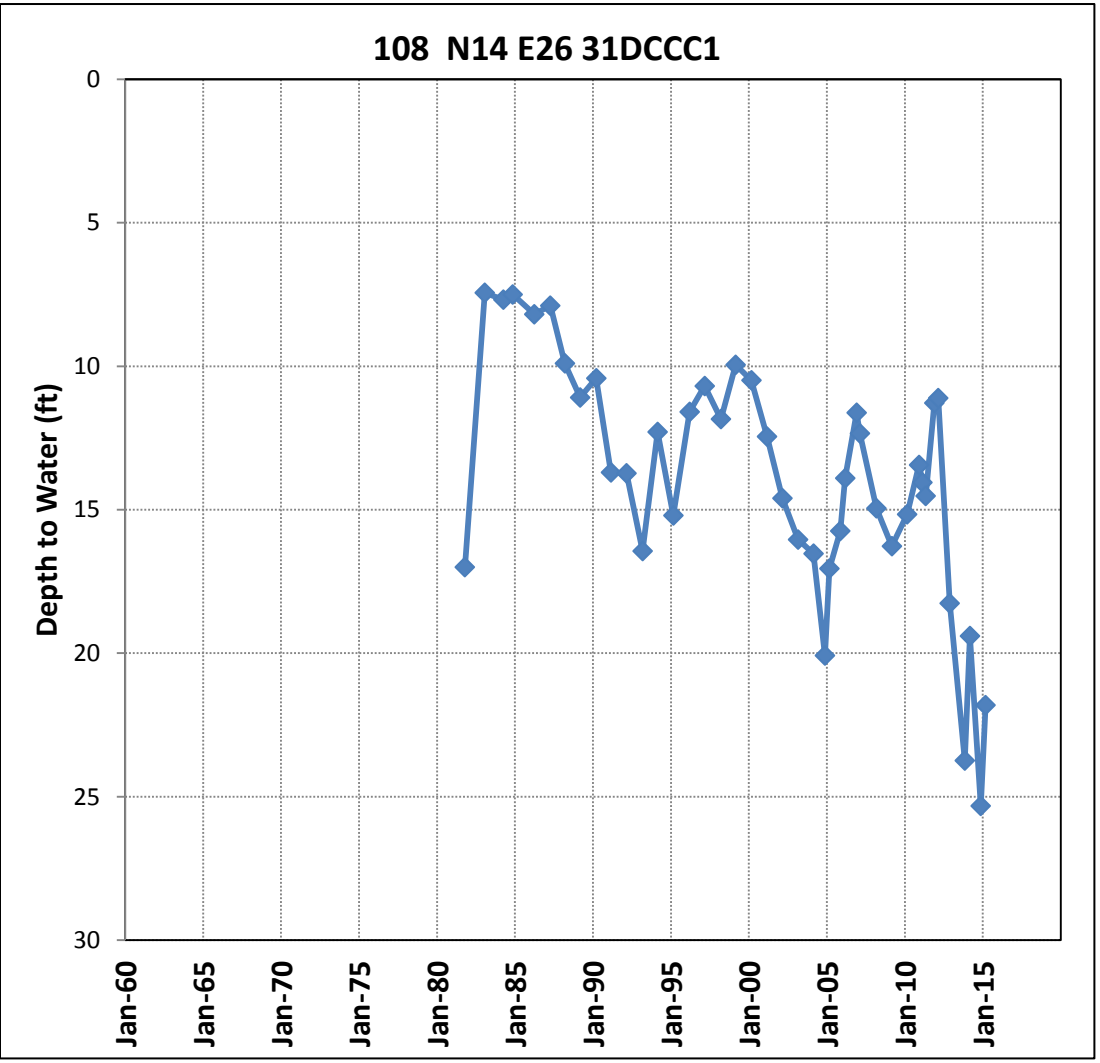

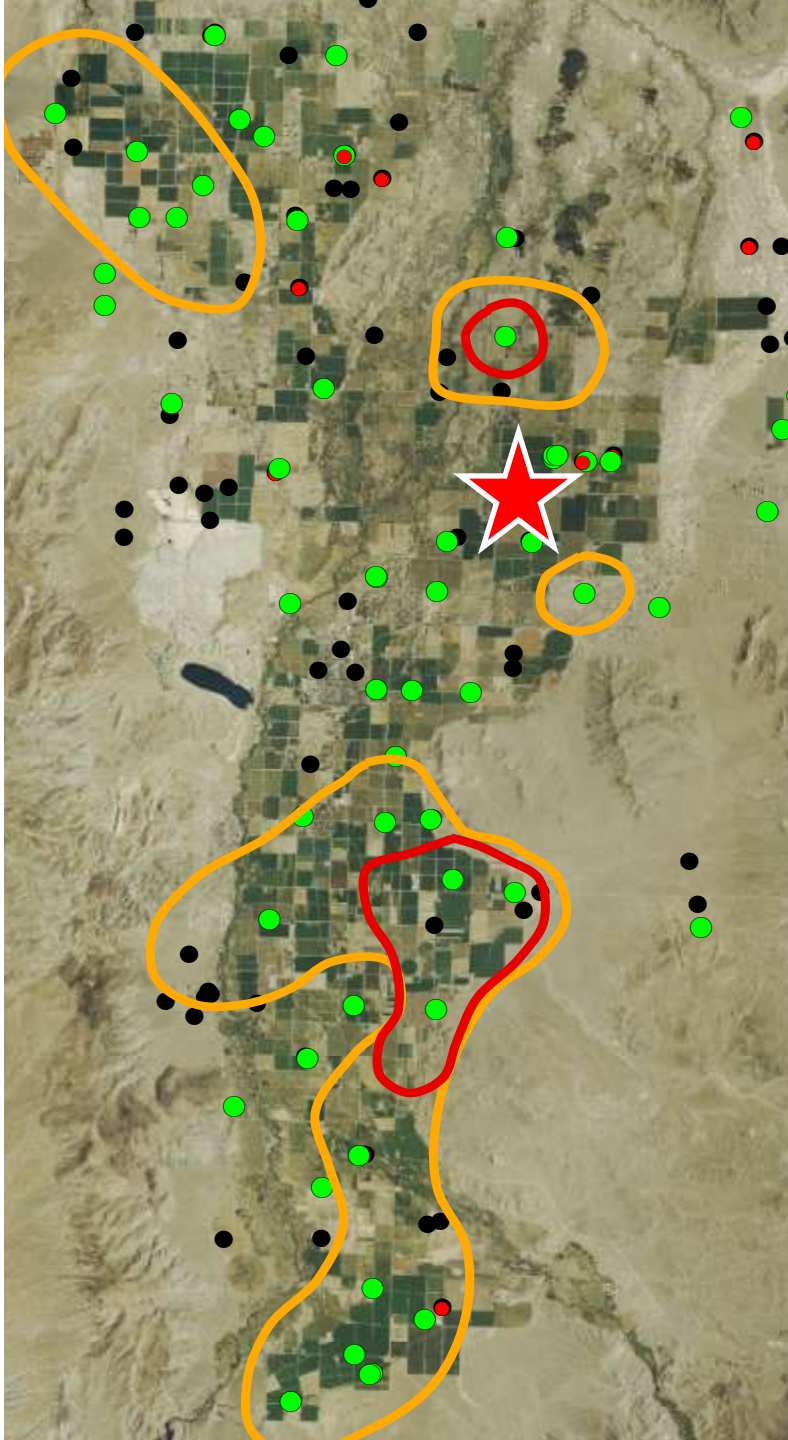

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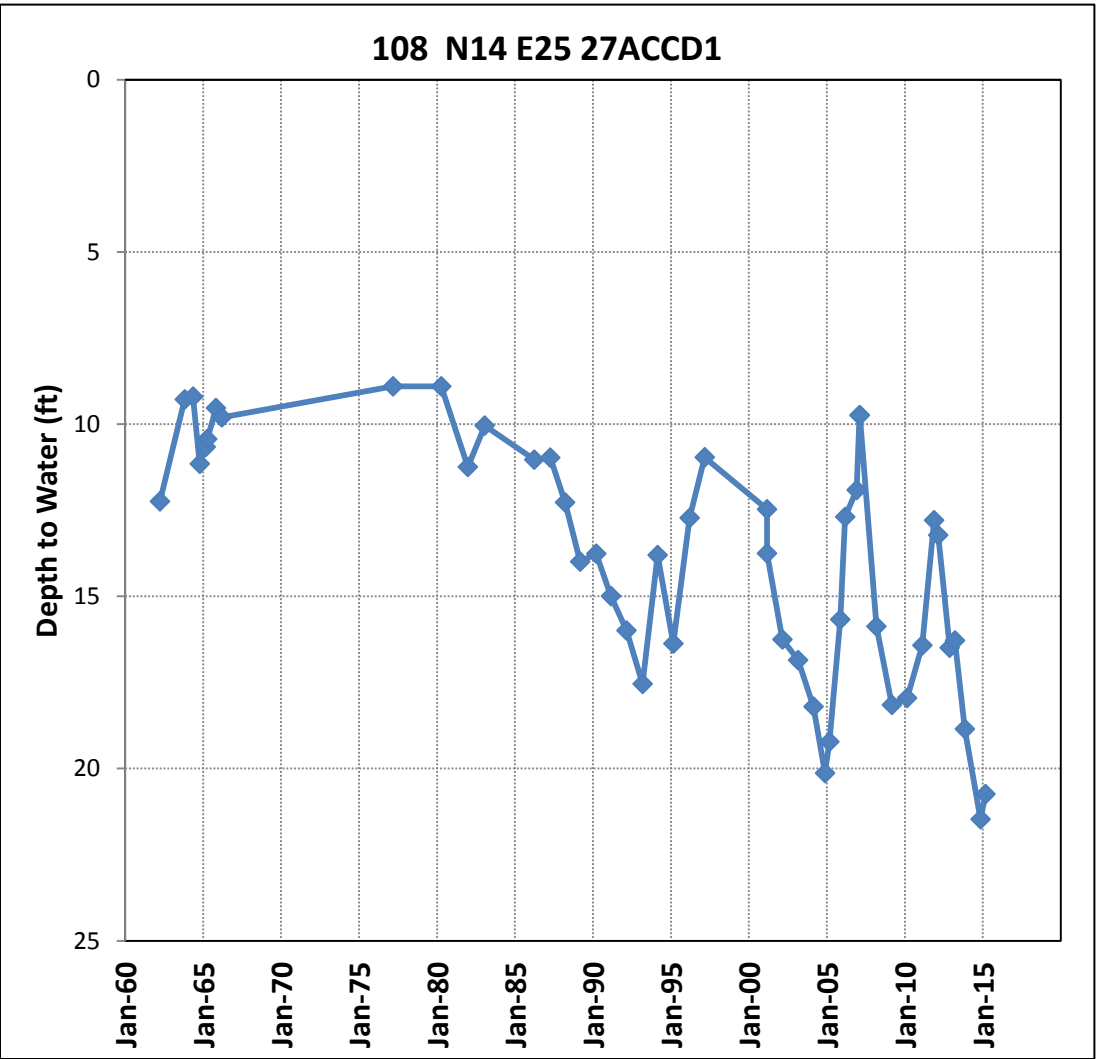

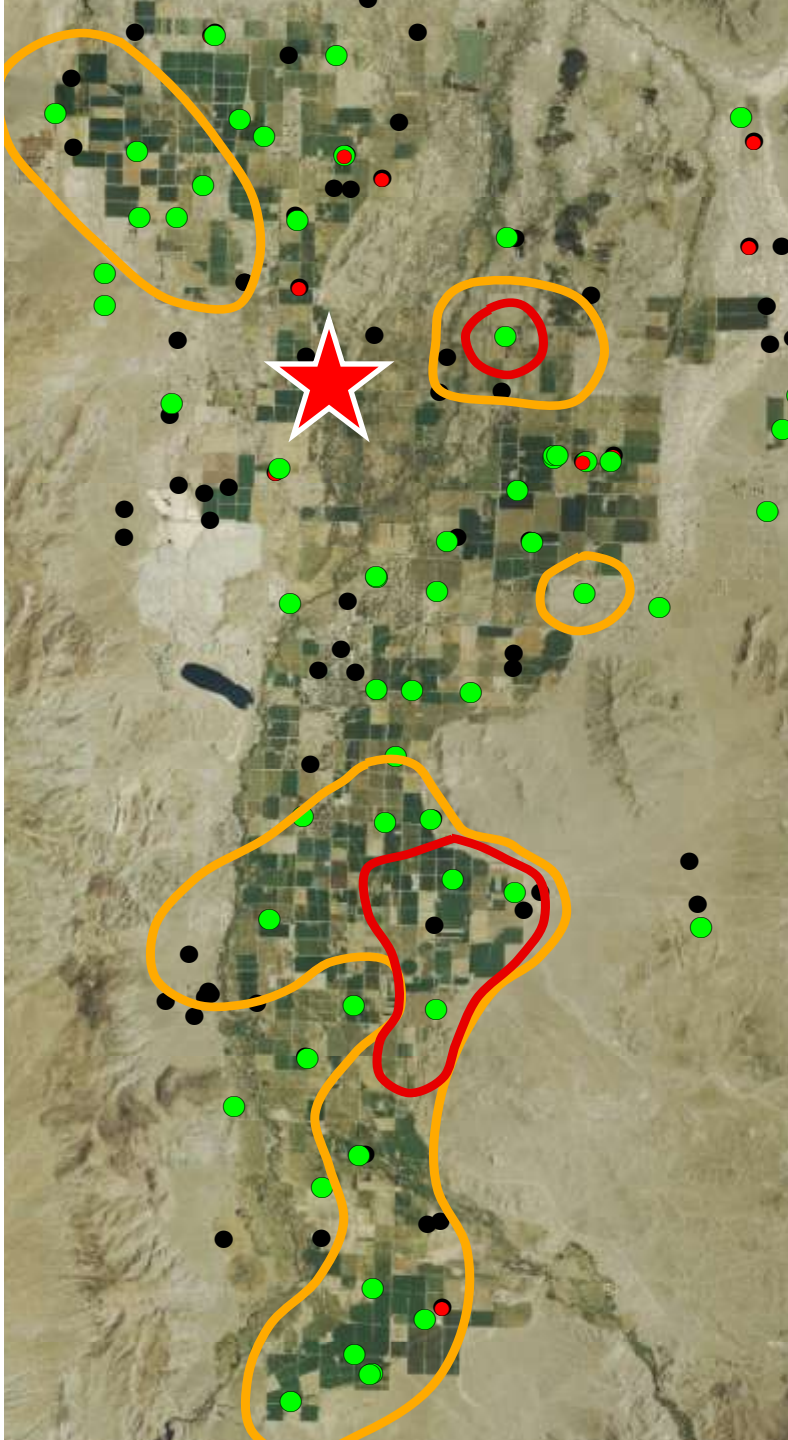

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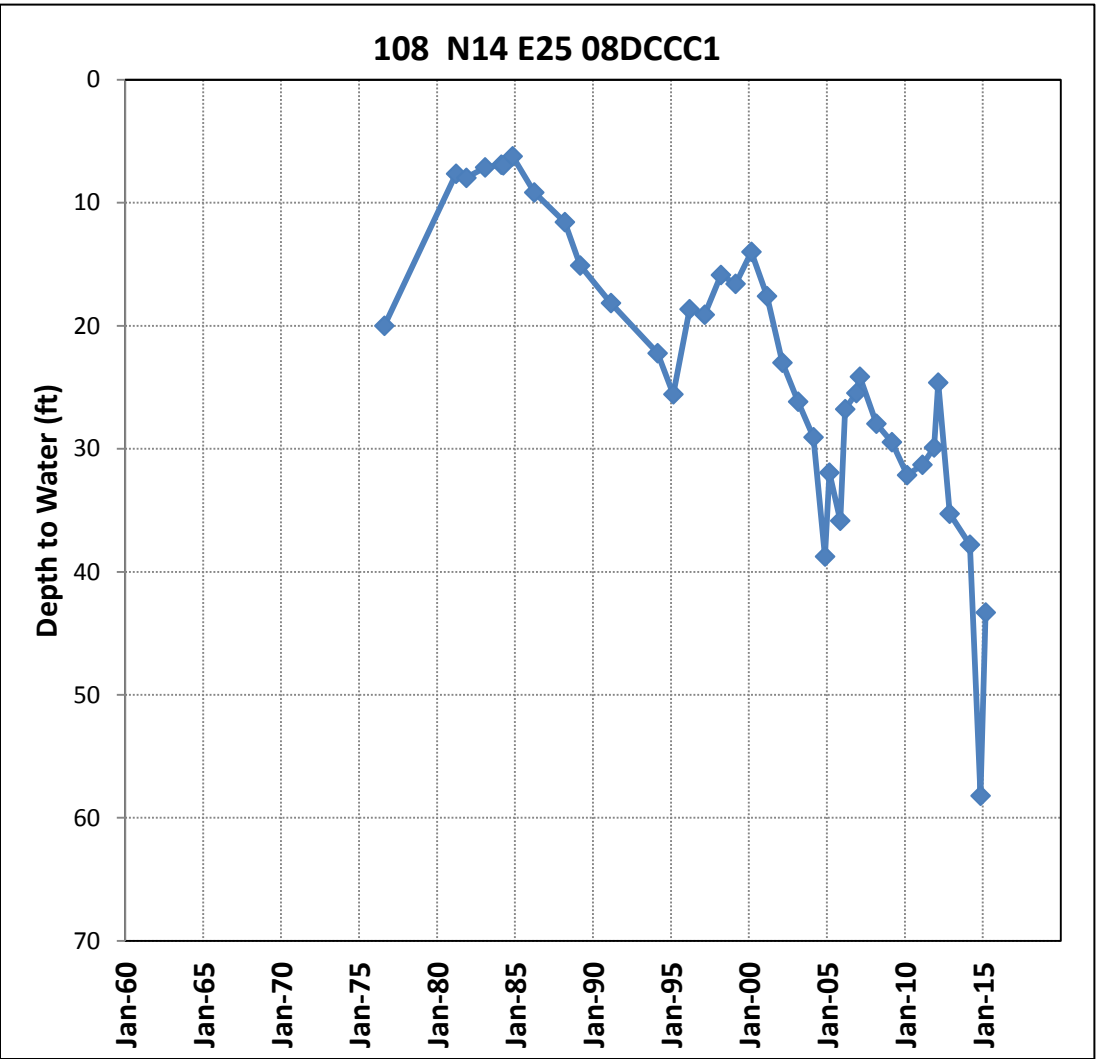
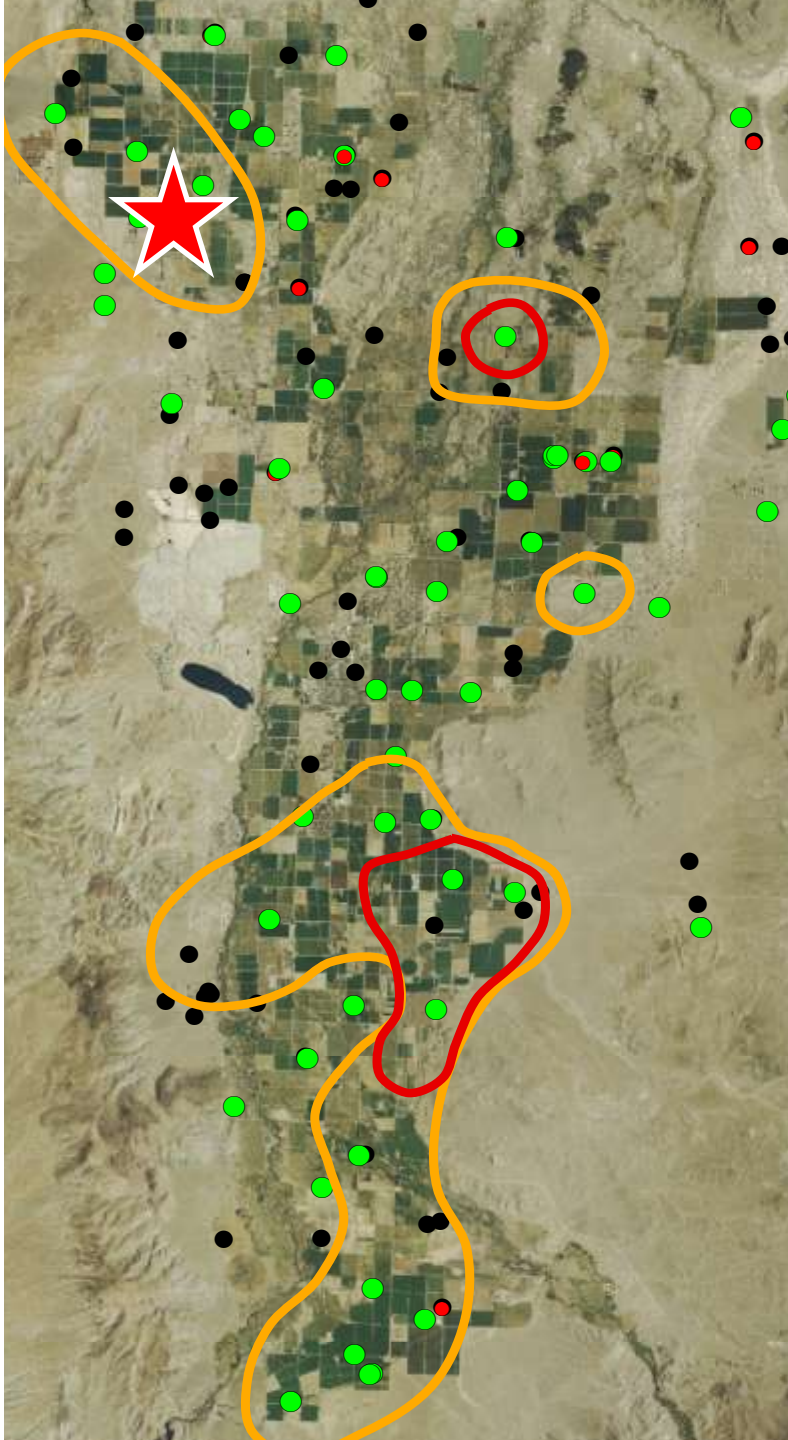
NDWR Inactive

Measured well





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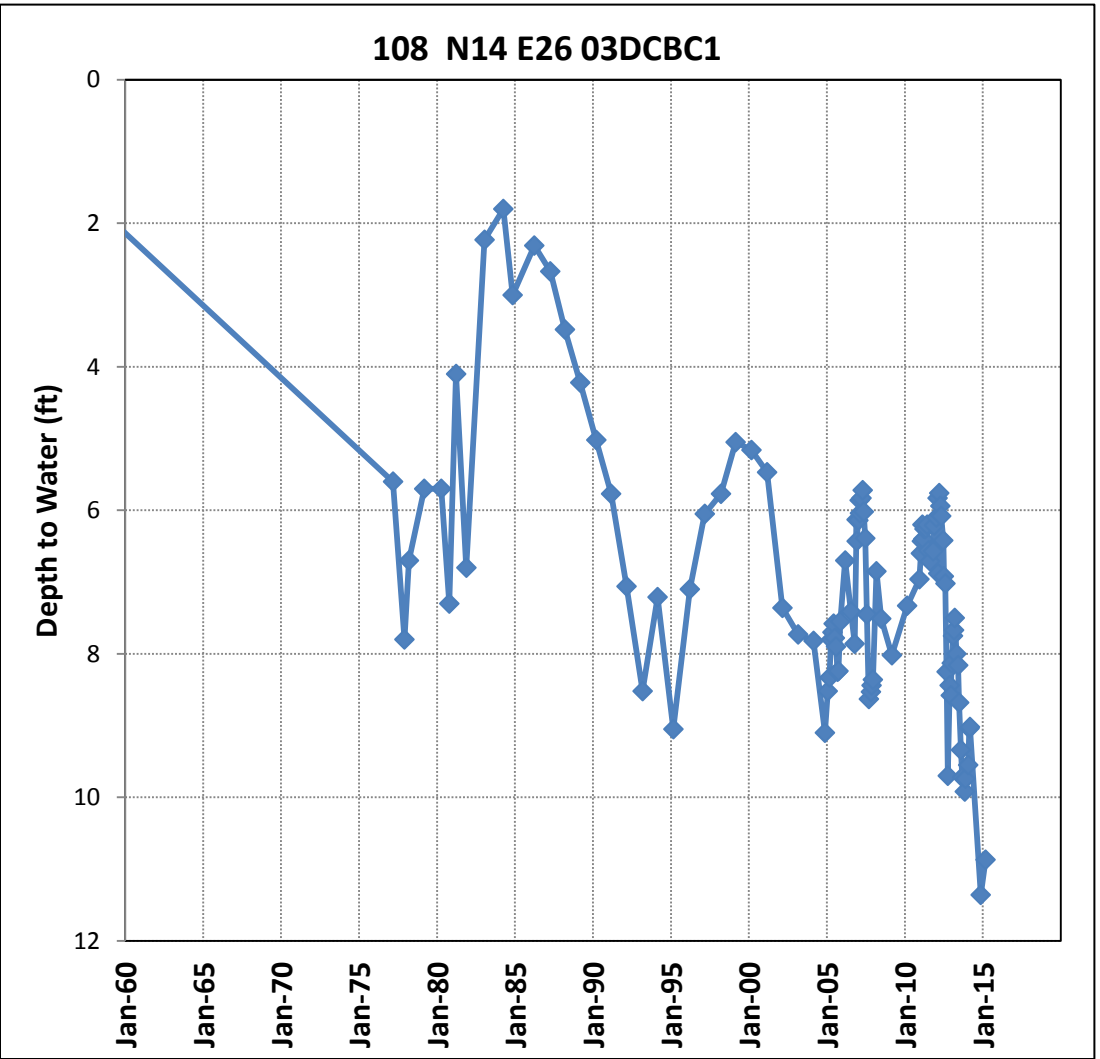
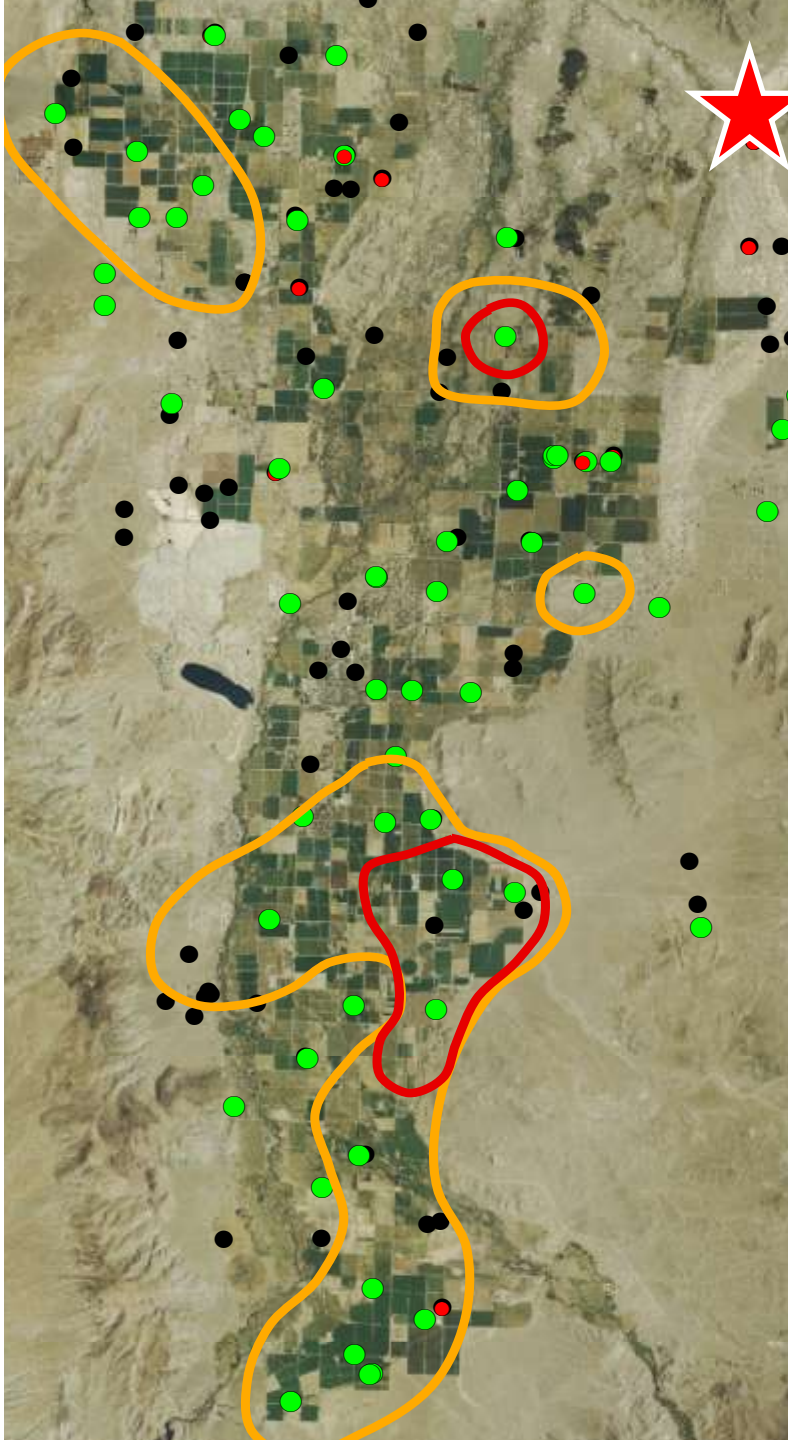
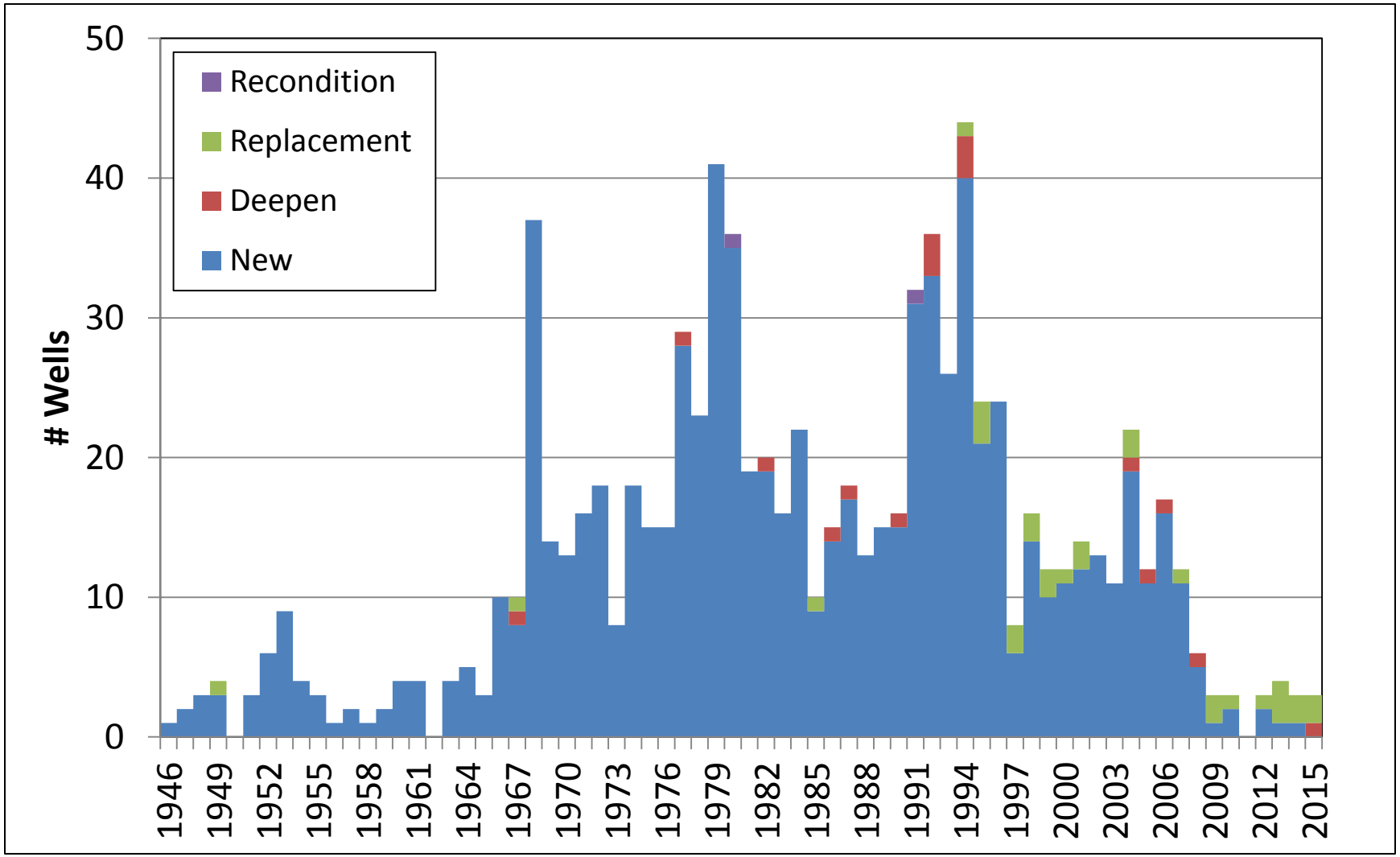


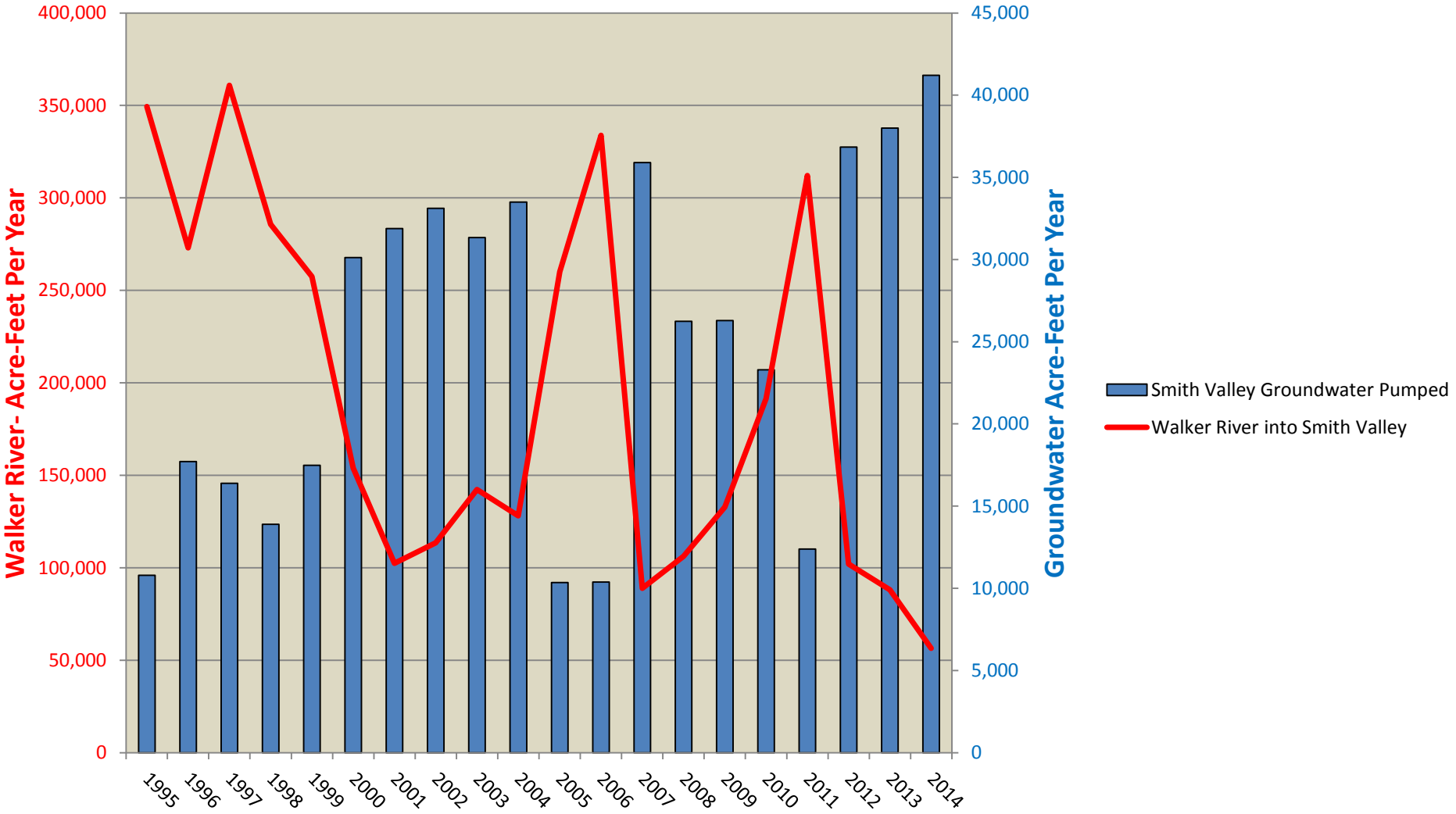


Mason Valley Domestic Wells

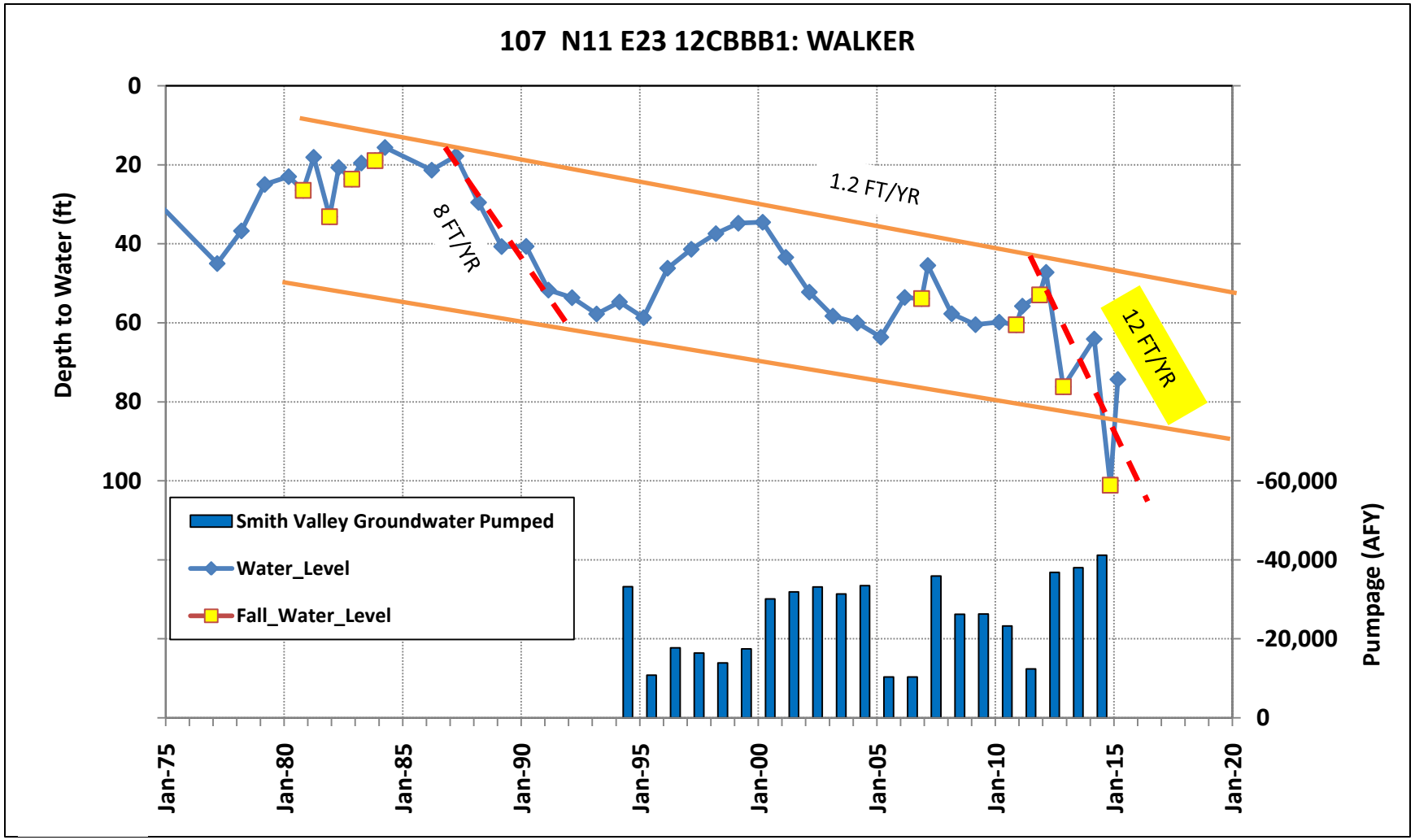


Smith Valley Groundwater & Surface Water History

Less Surface Water Available = More Groundwater Pumped



Smith Valley
Water Levels vs. Pumping



Smith Valley
Water Level Decline from Nov 2011 to Nov 2014

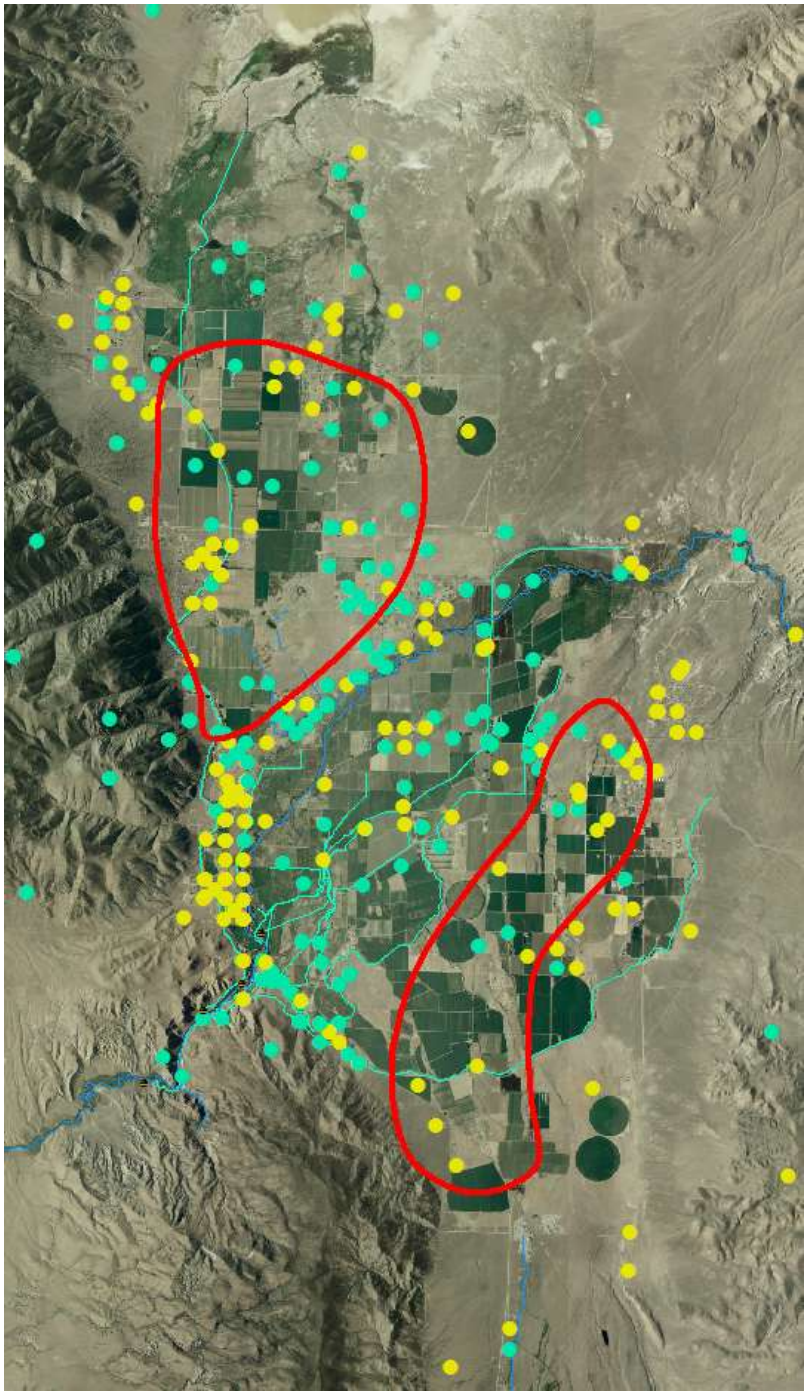
20 - 40 ft

Well Depth

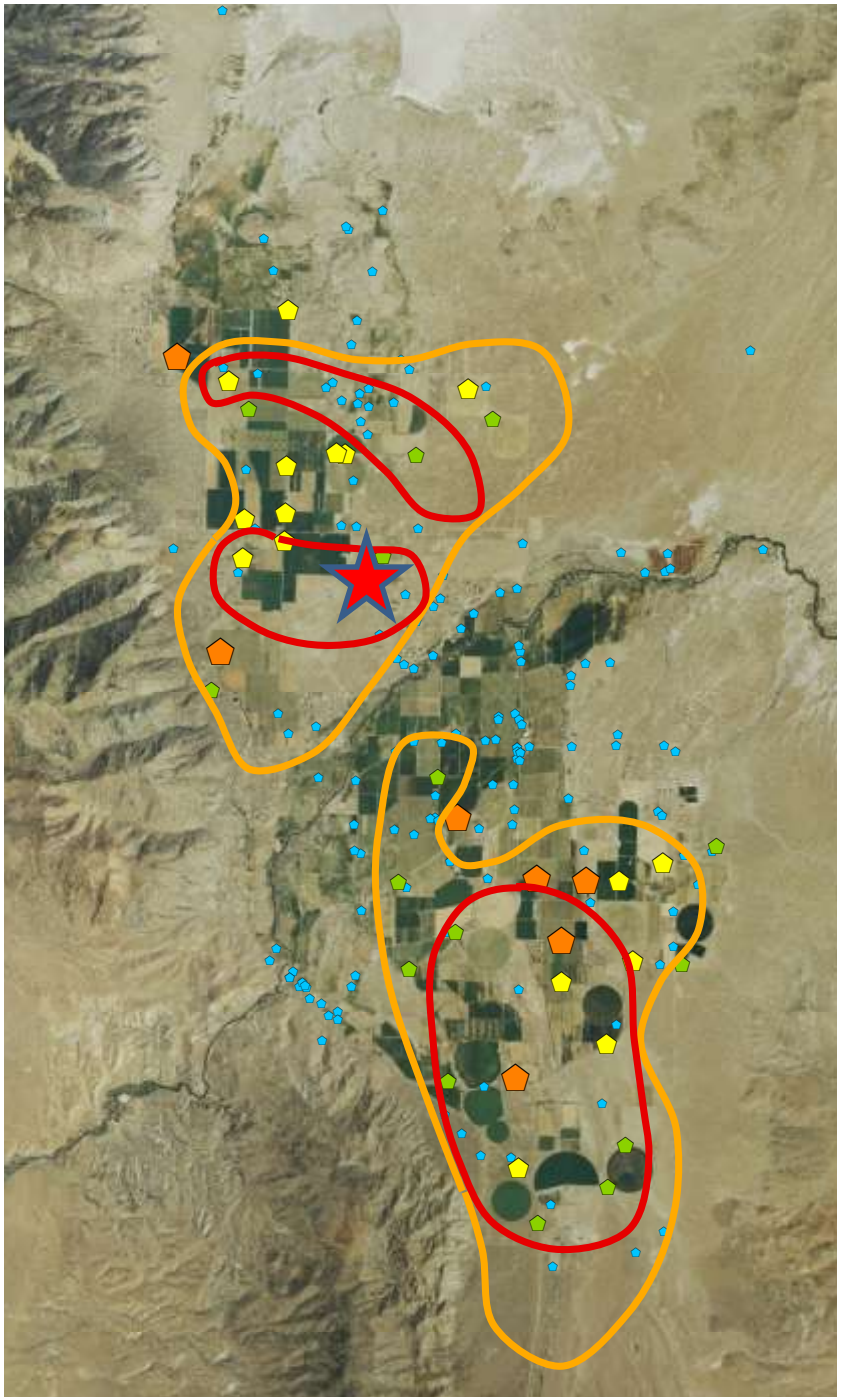
≤ 150 ft

> 150 ft

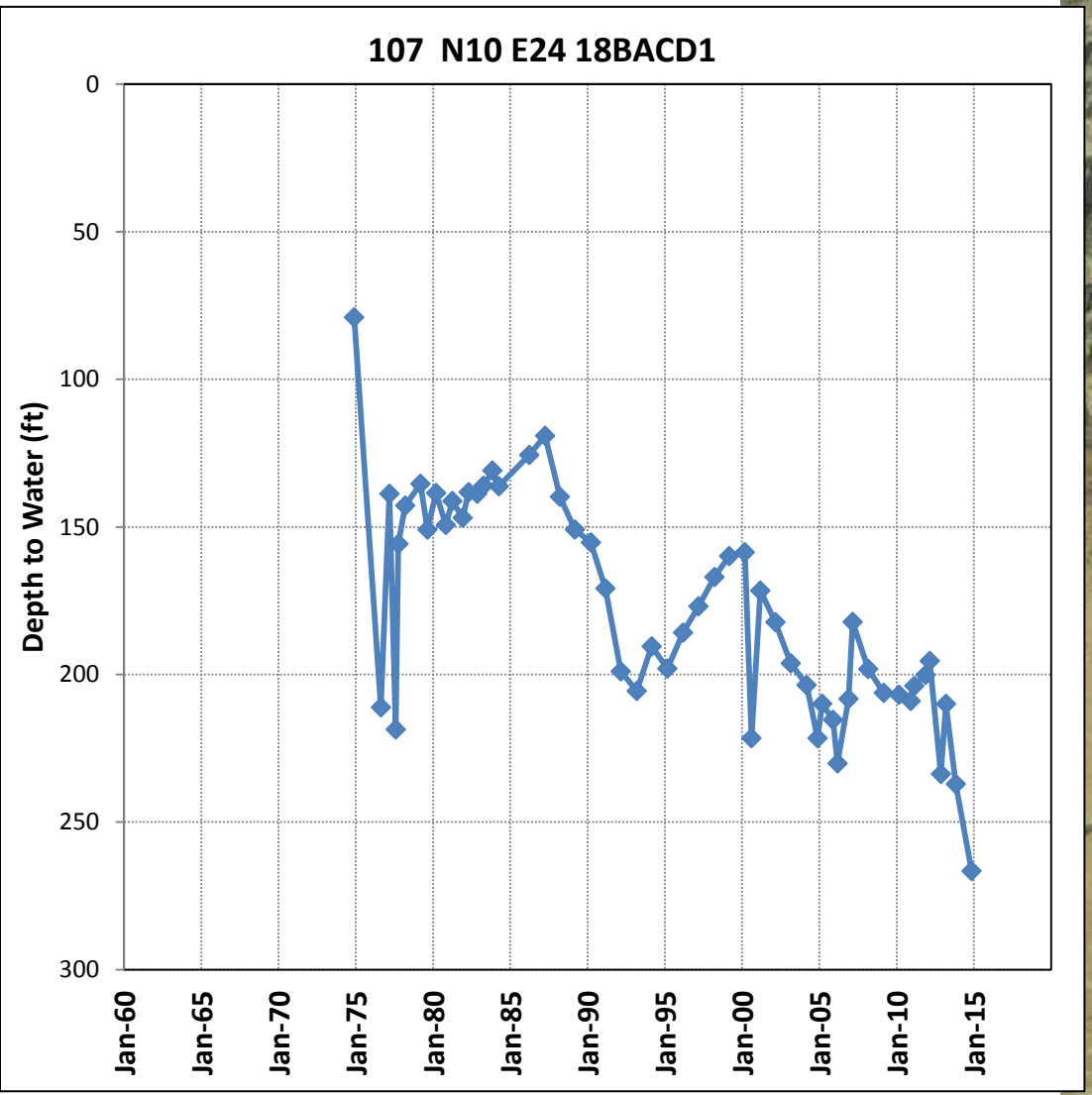
In Smith Valley there are 342 wells that are less than or equal to 150 feet
Of these 269 are domestic.

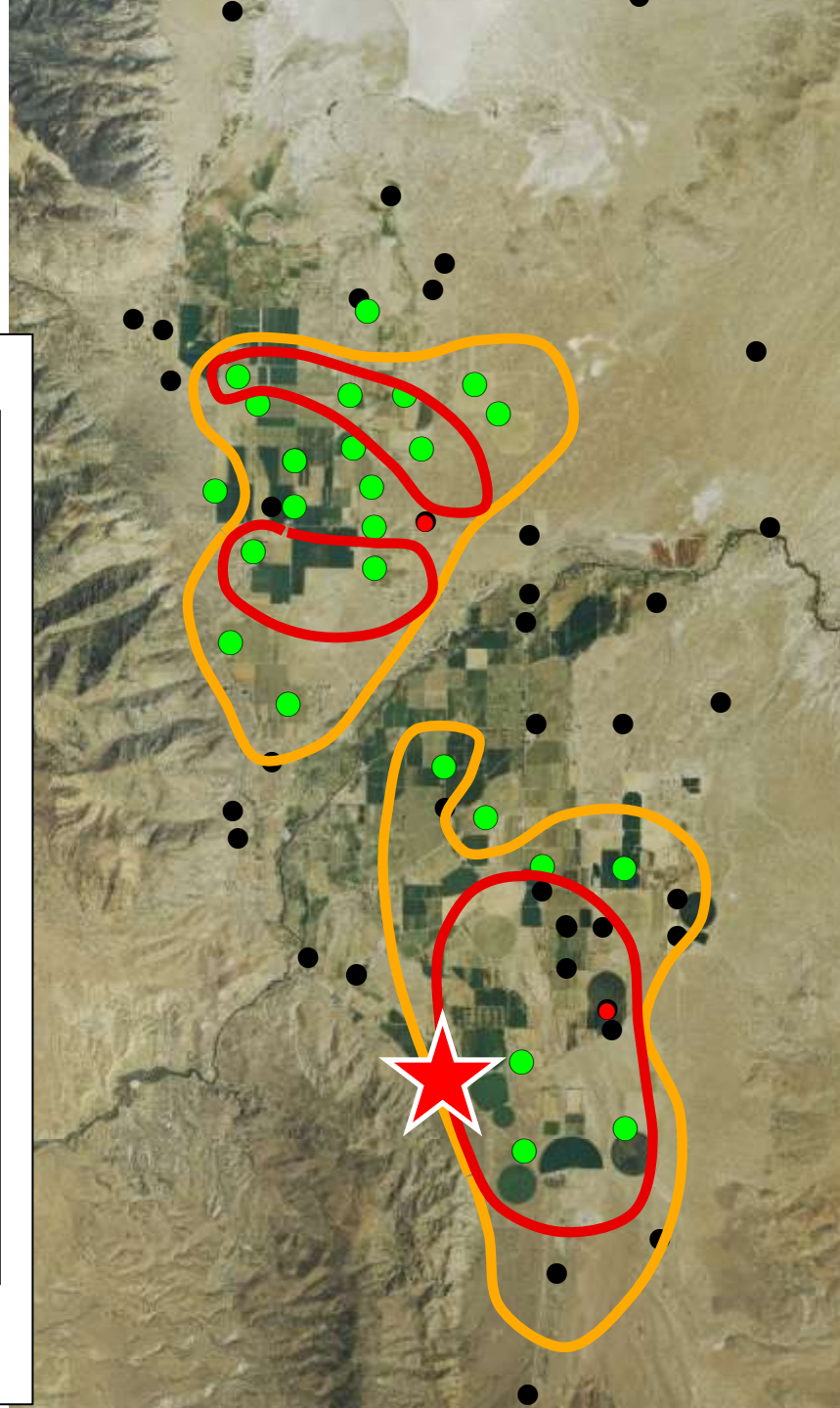


Smith Valley
Water Level Decline from Mar 2014 to Mar 2015



Smith Valley Hydrographs





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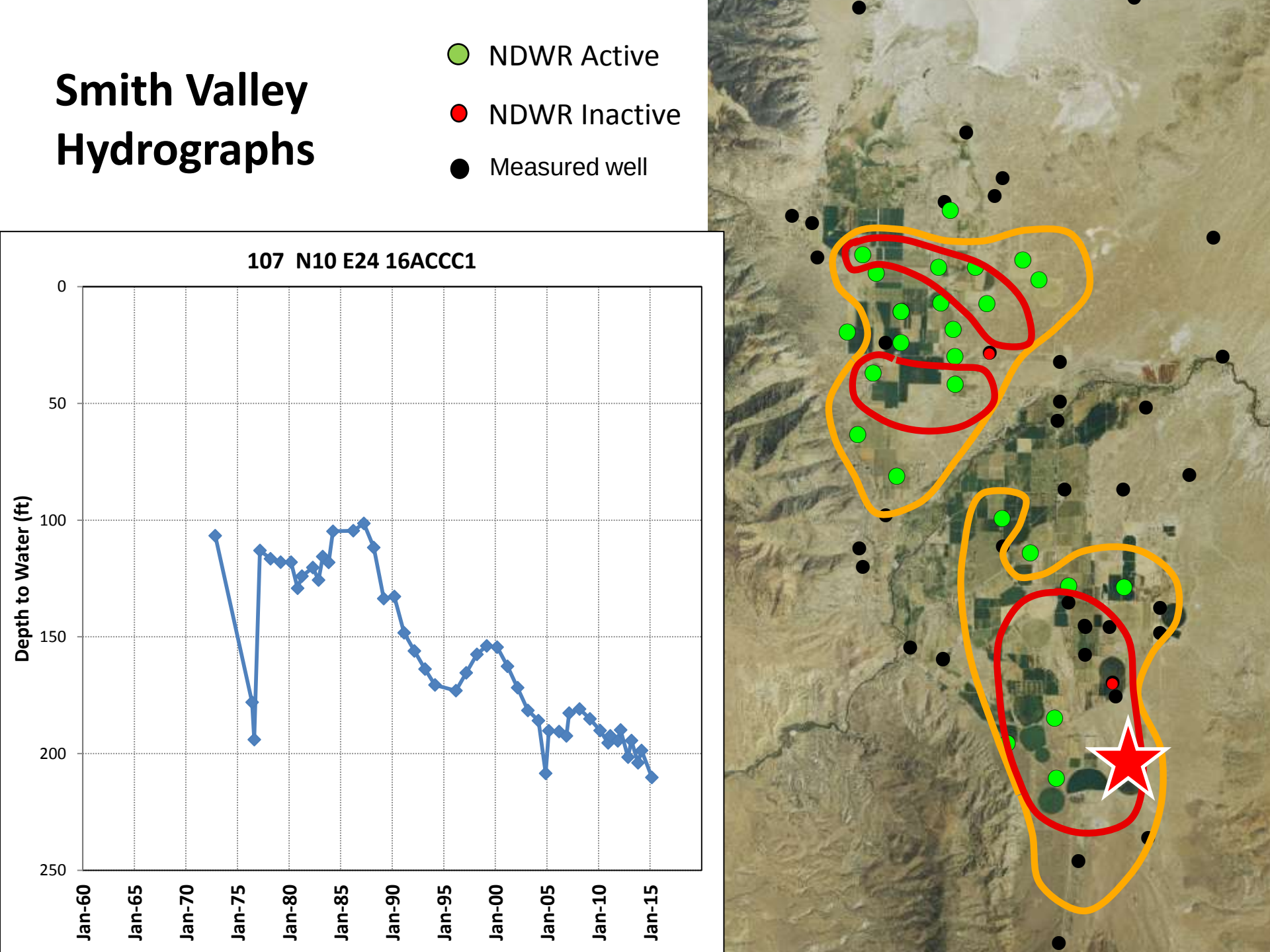

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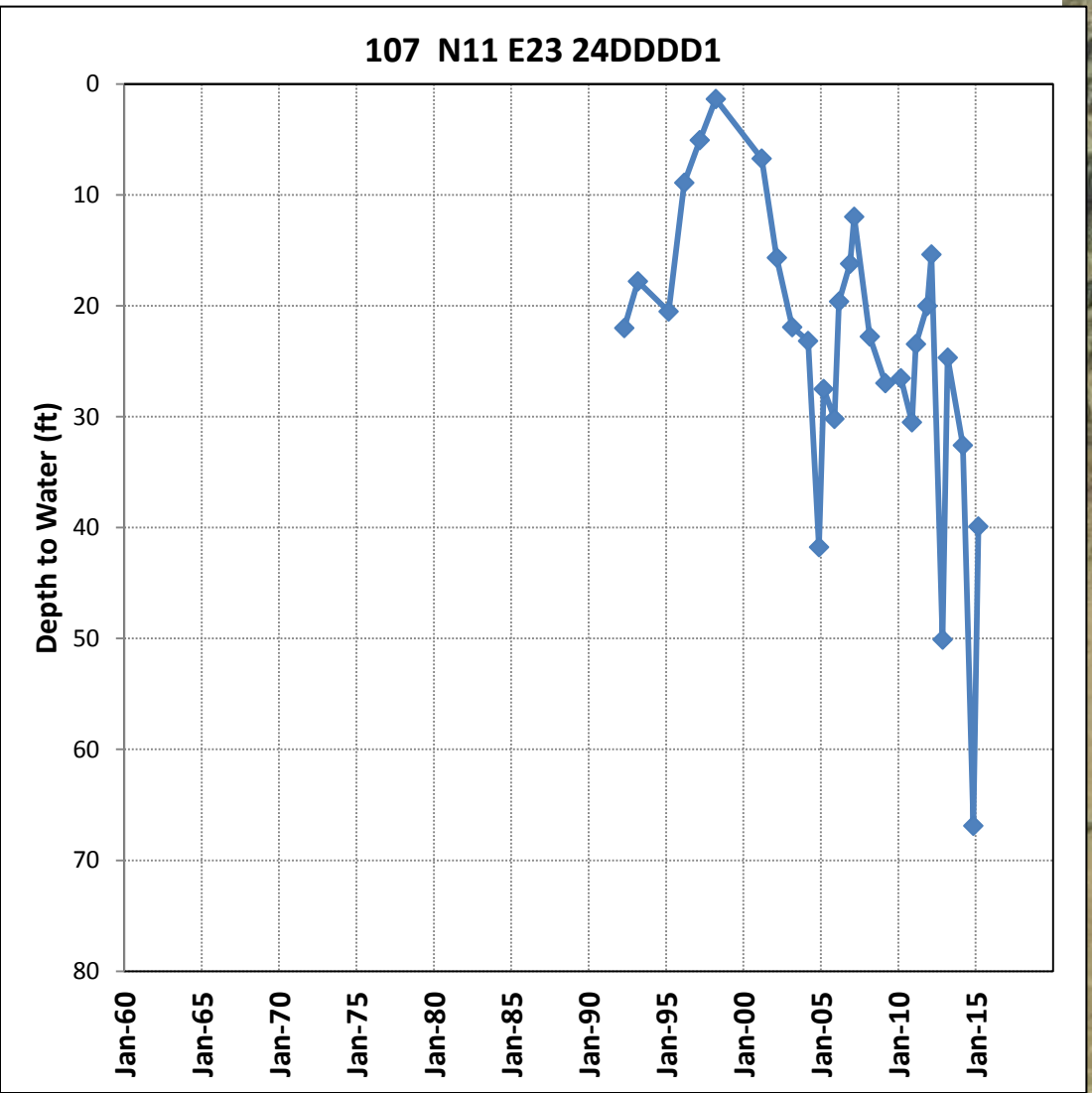
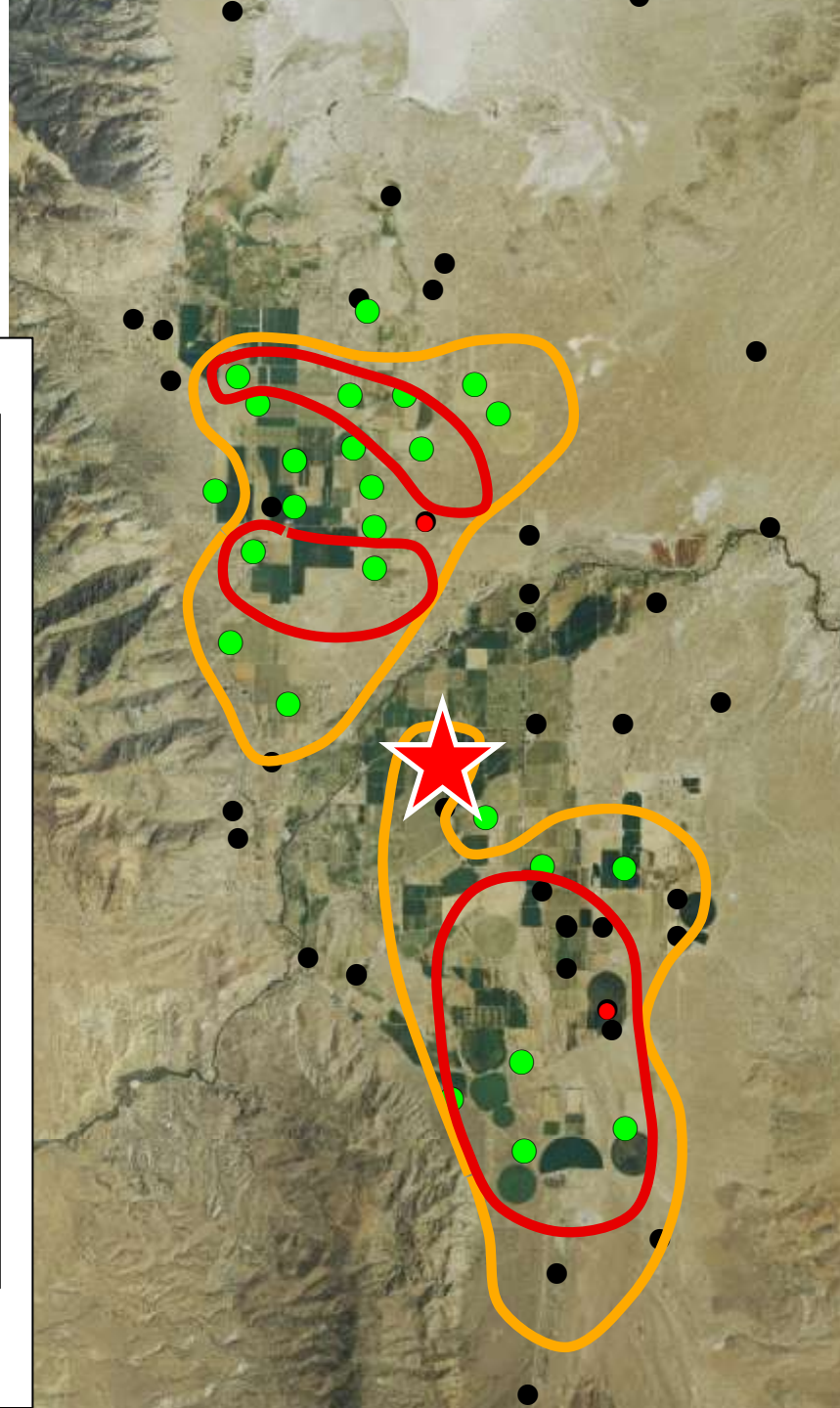


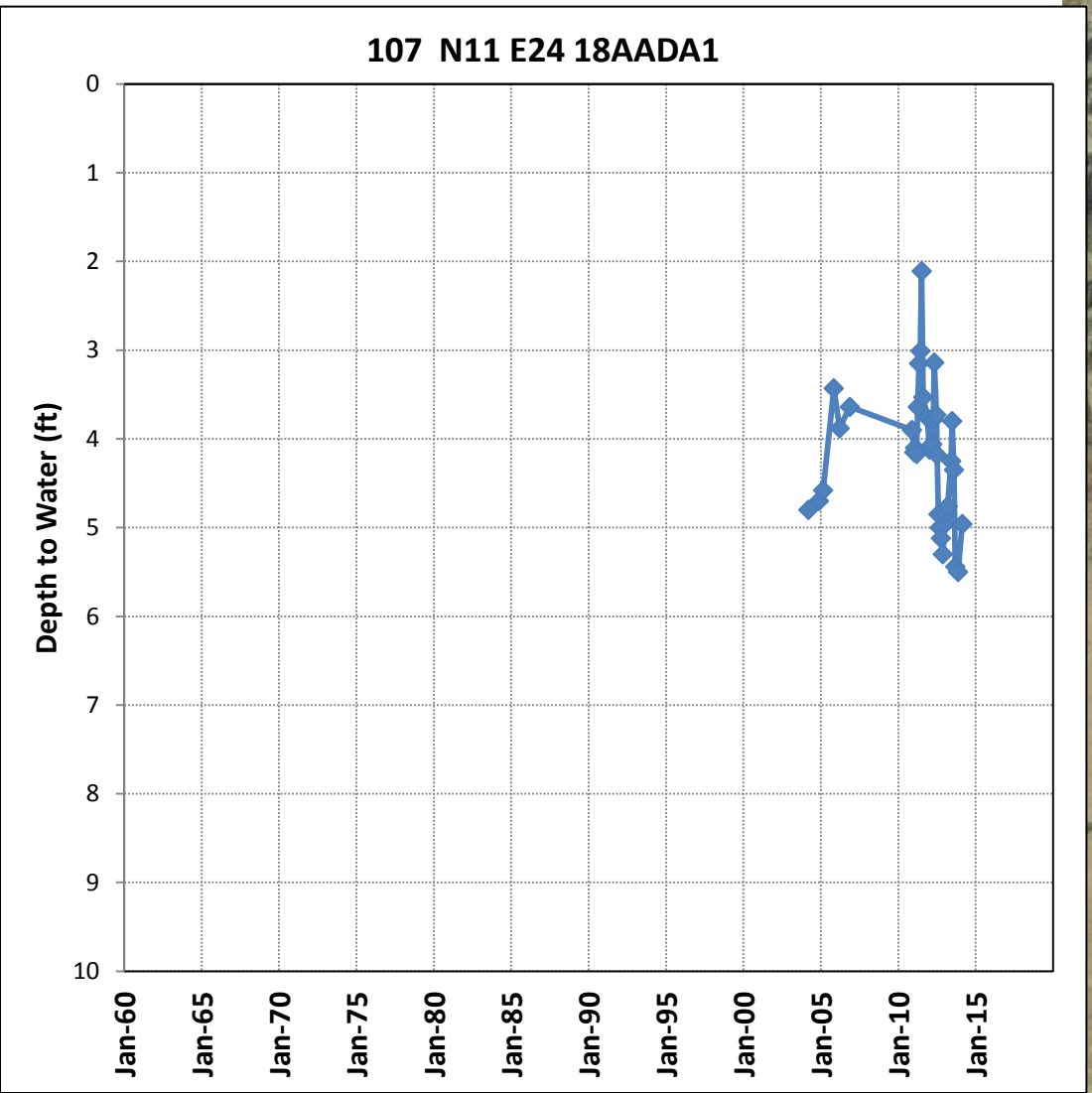


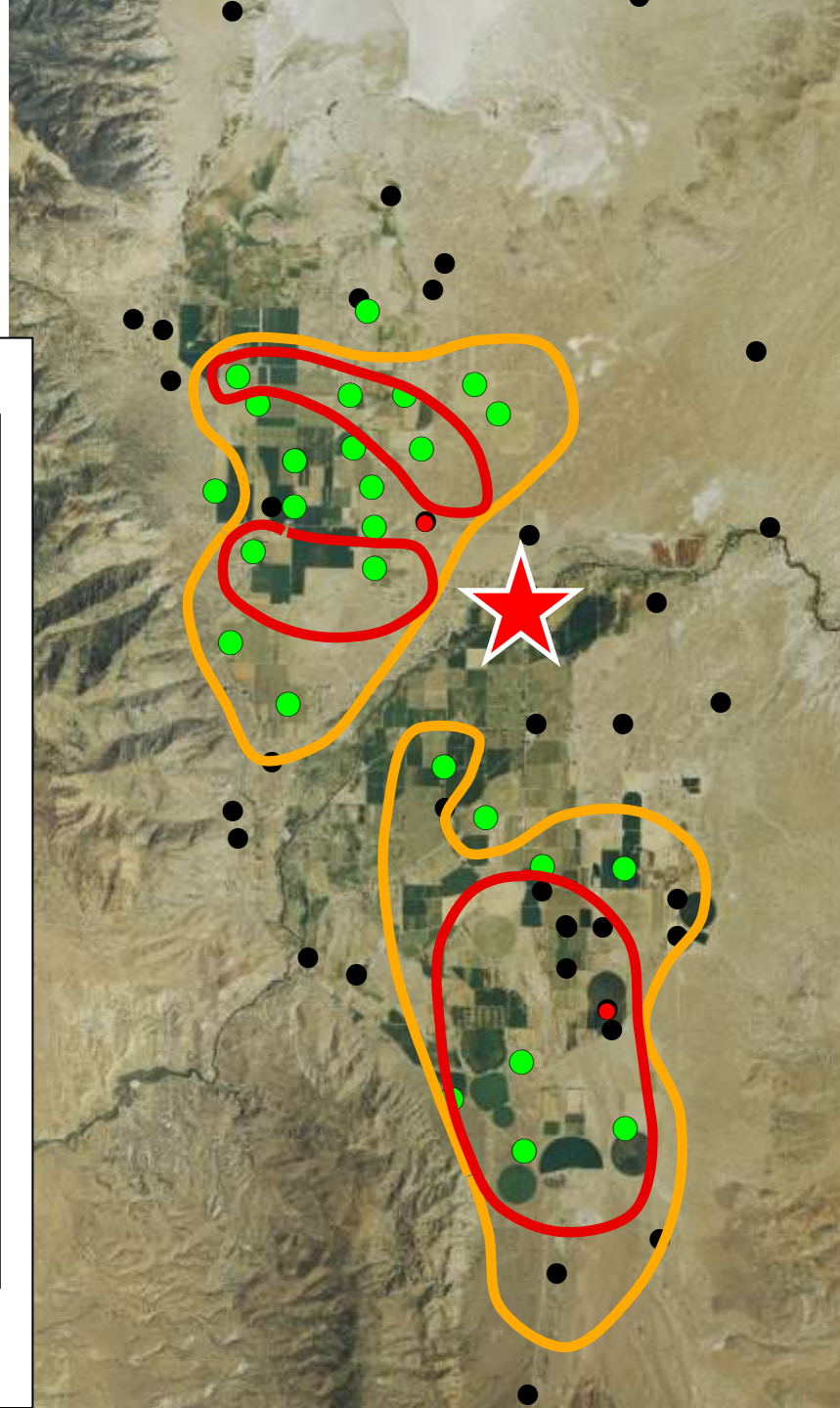
Smith Valley Hydrographs

NDWR Active

NDWR Inactive

Measured well





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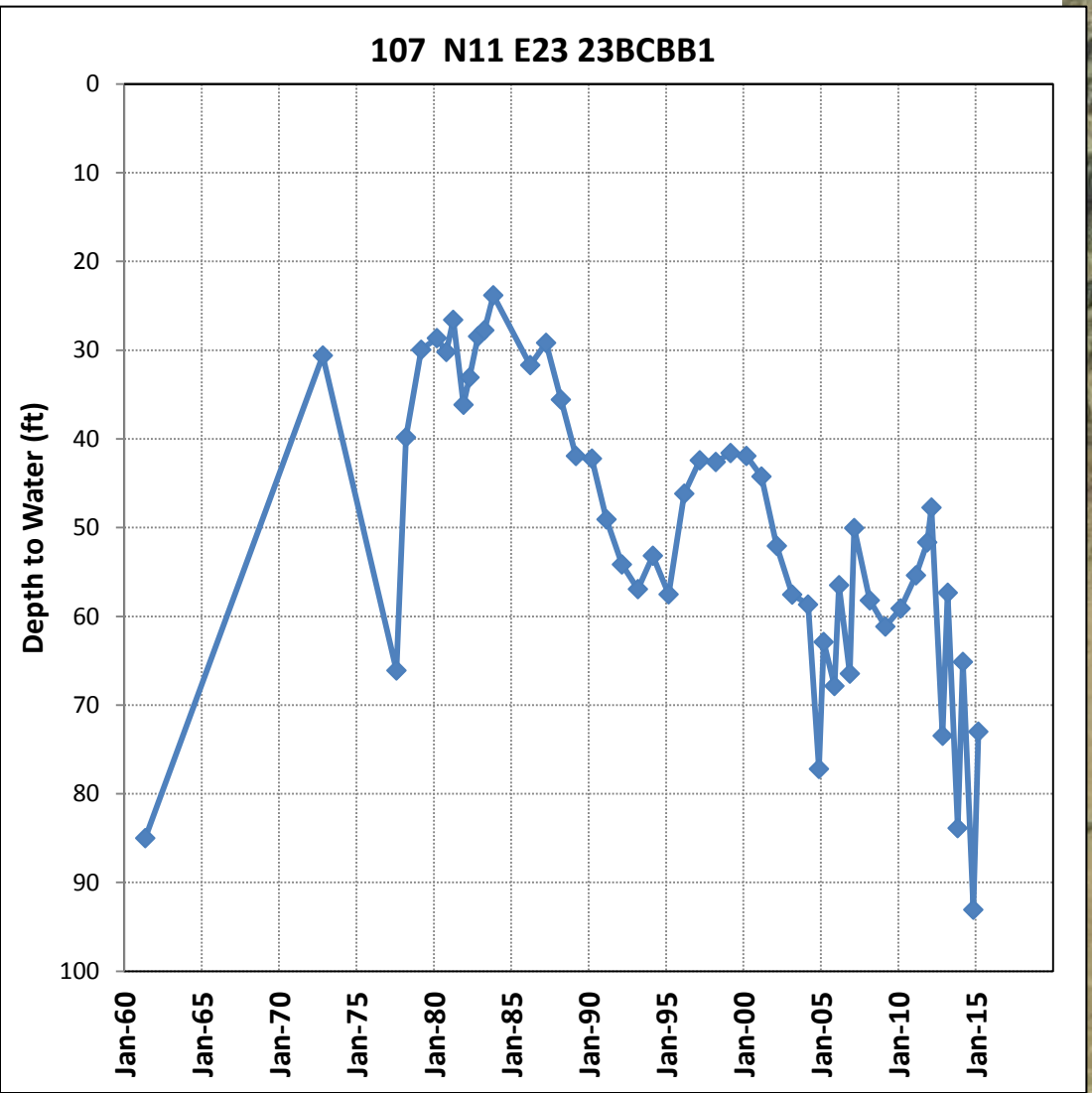

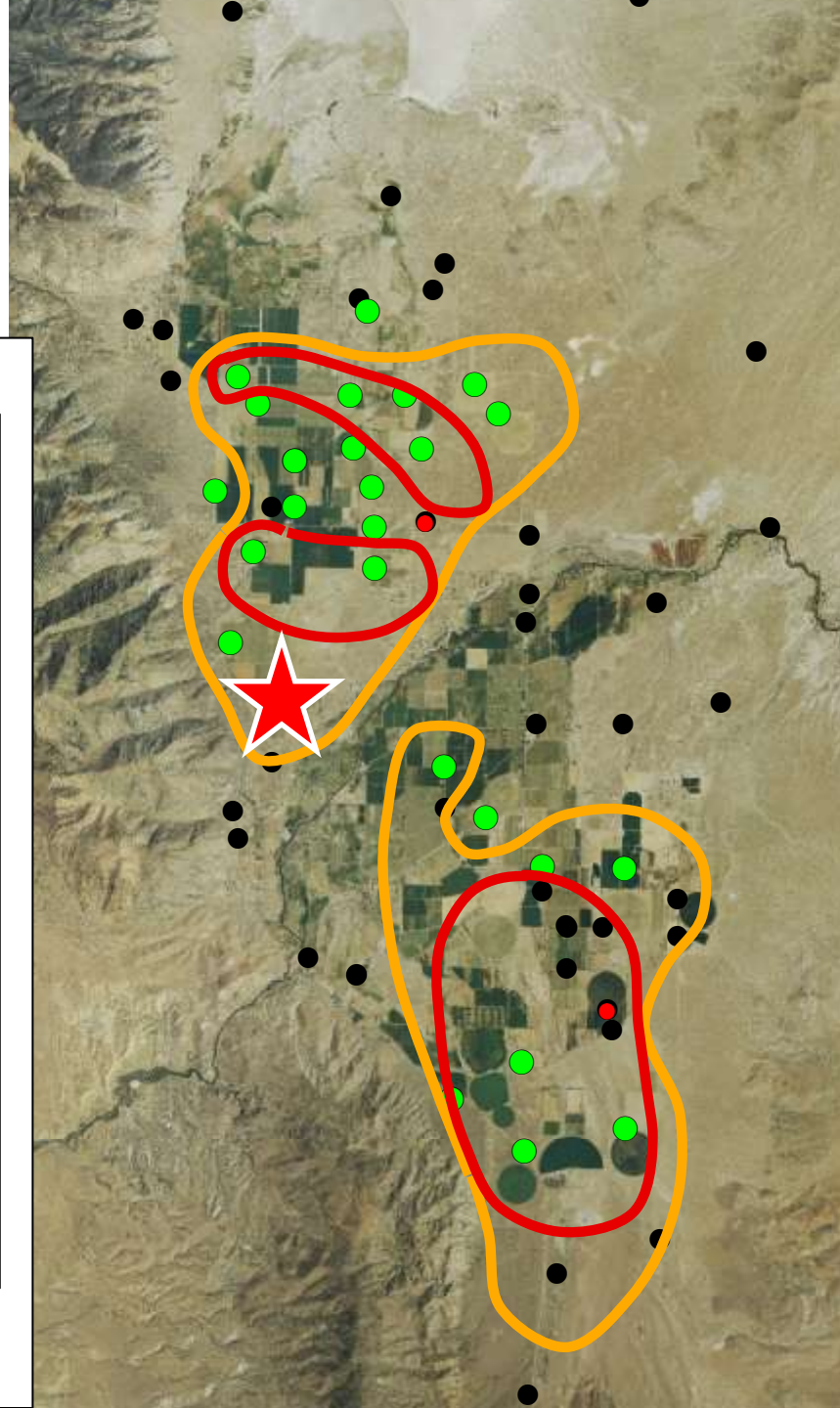

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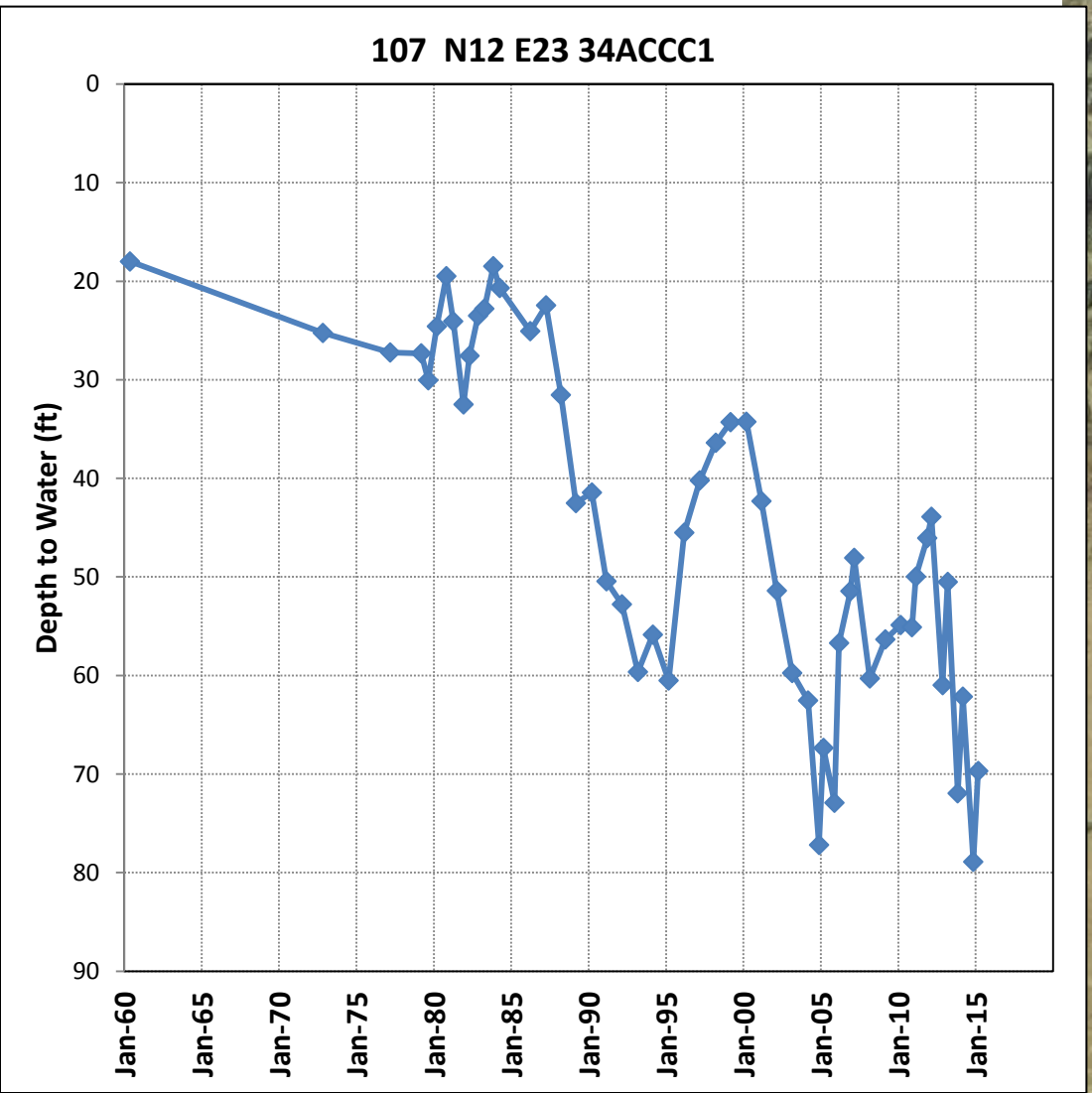

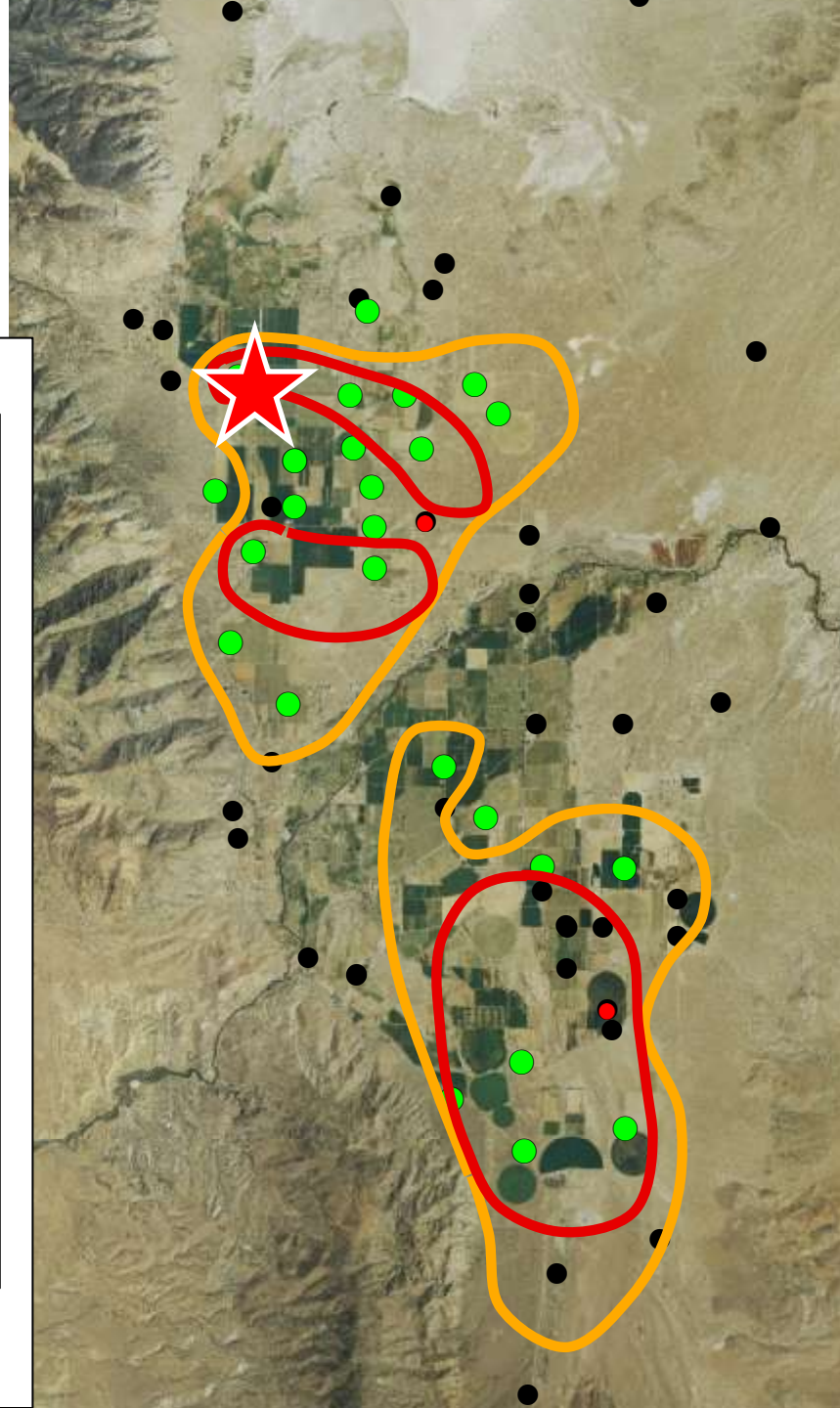

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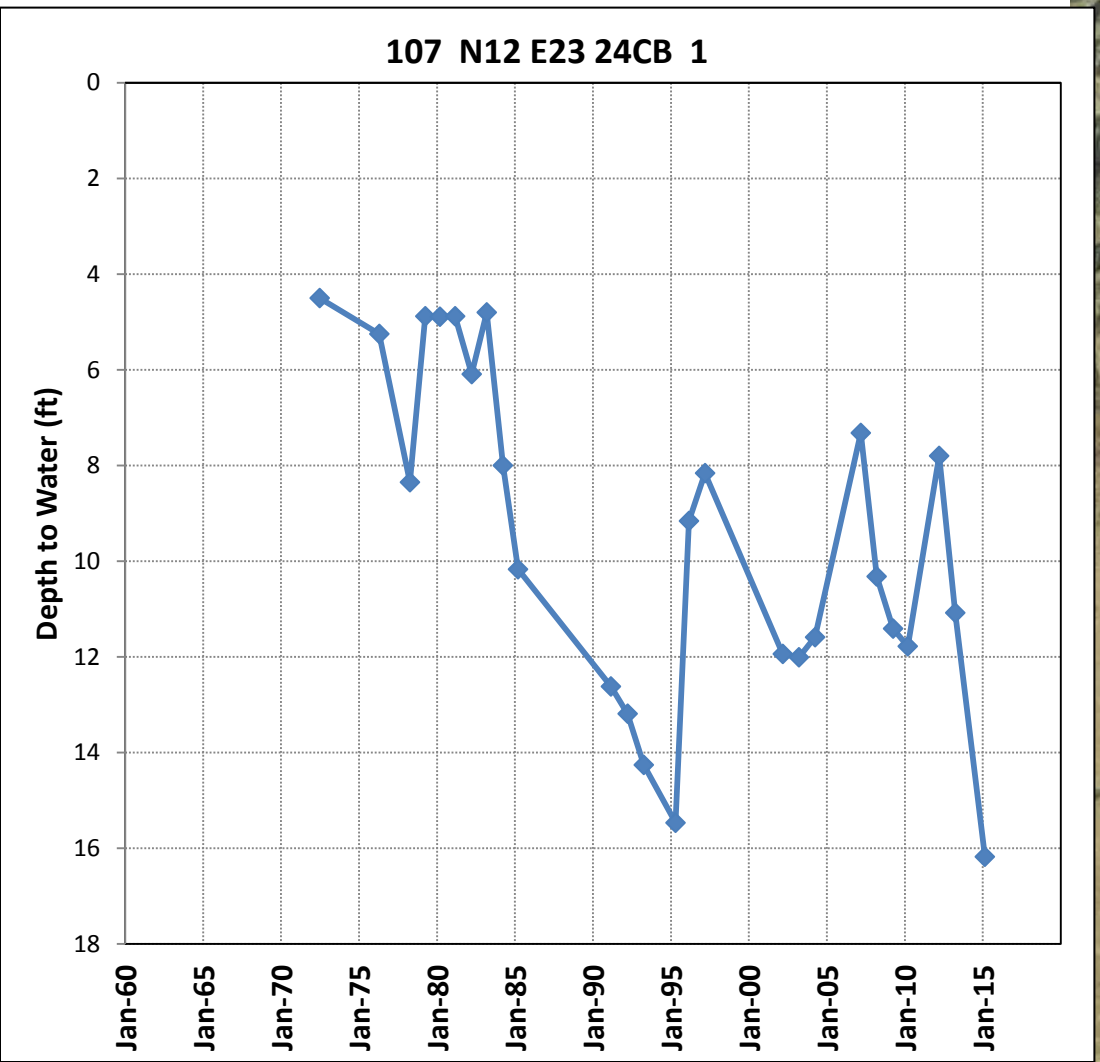
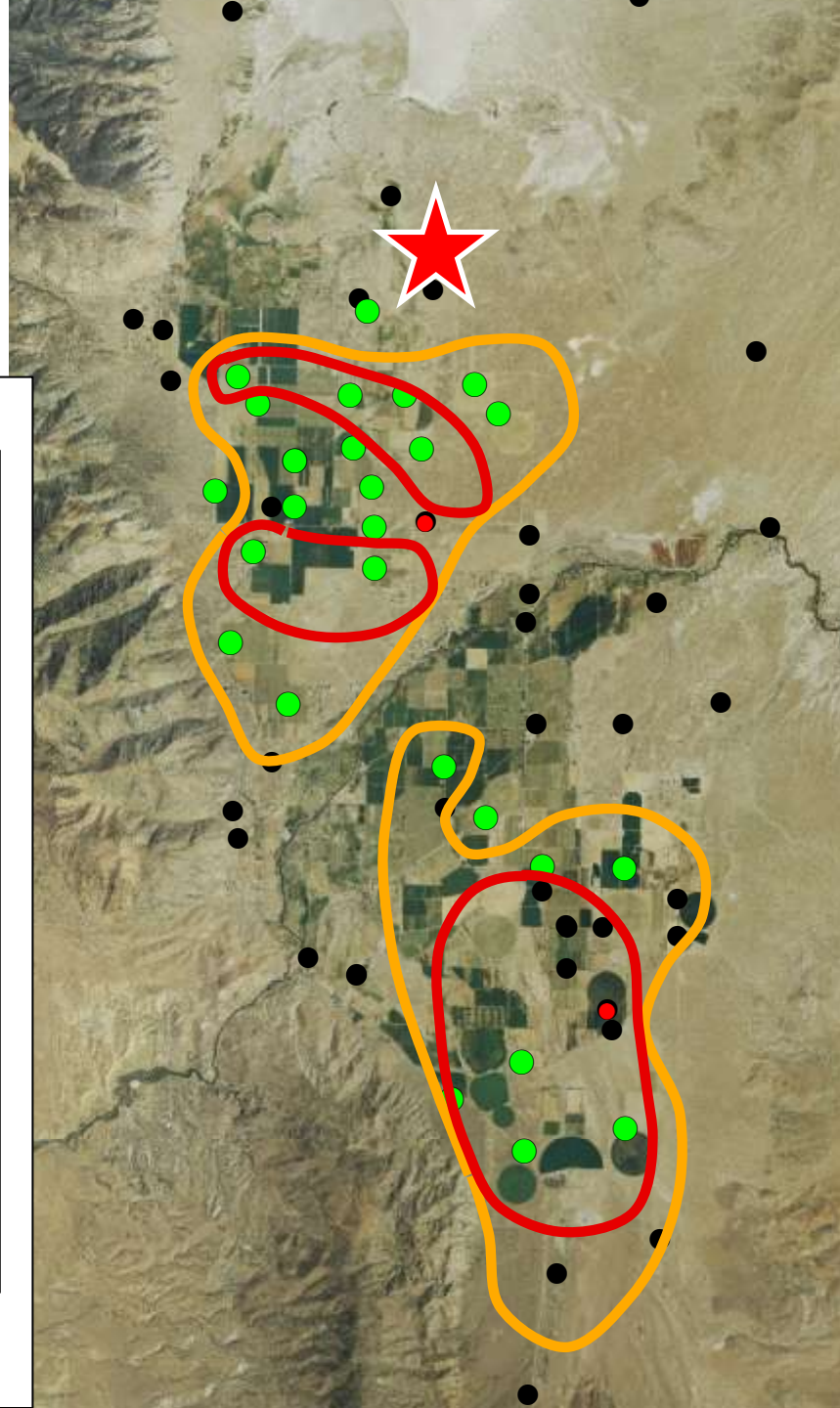
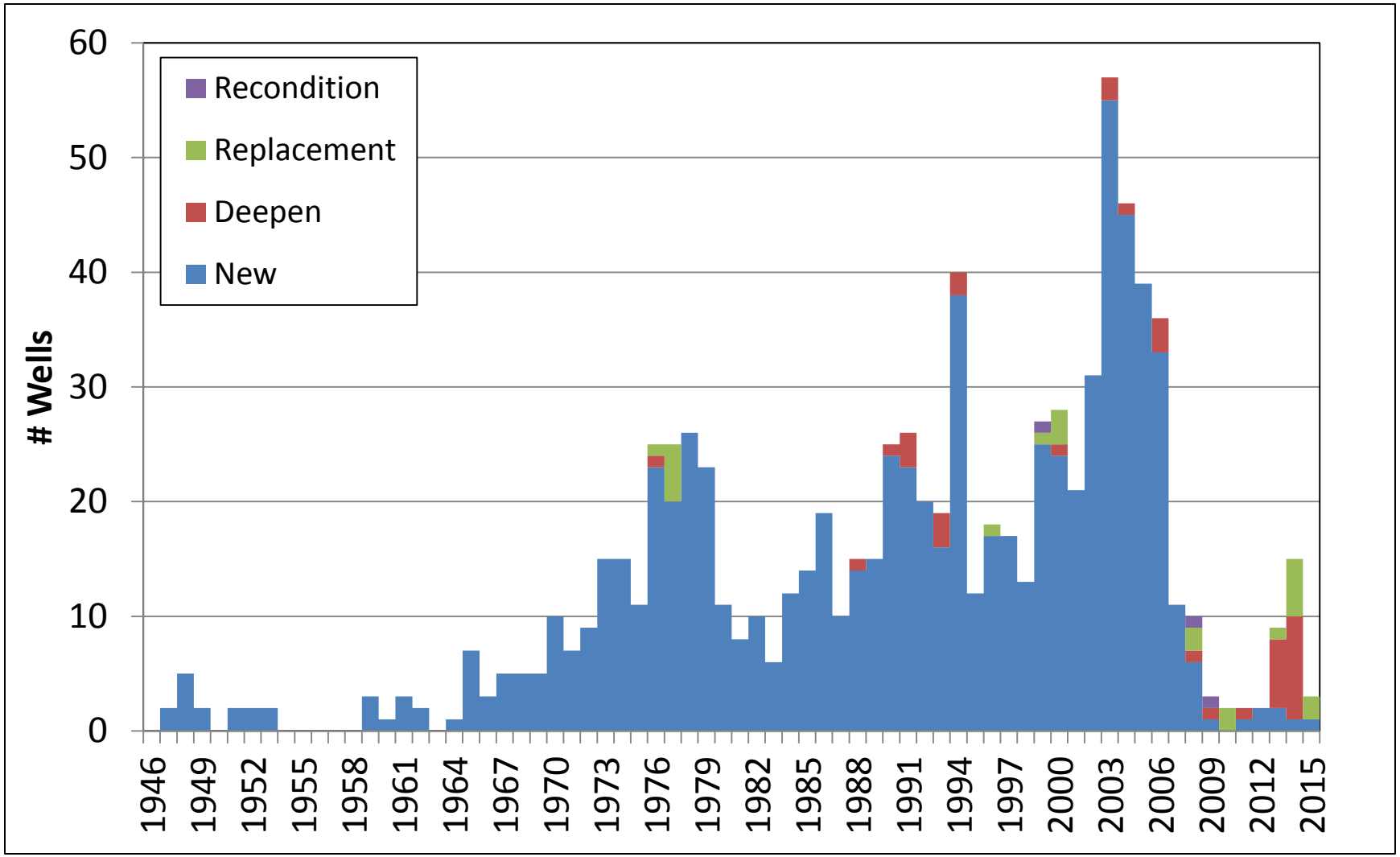
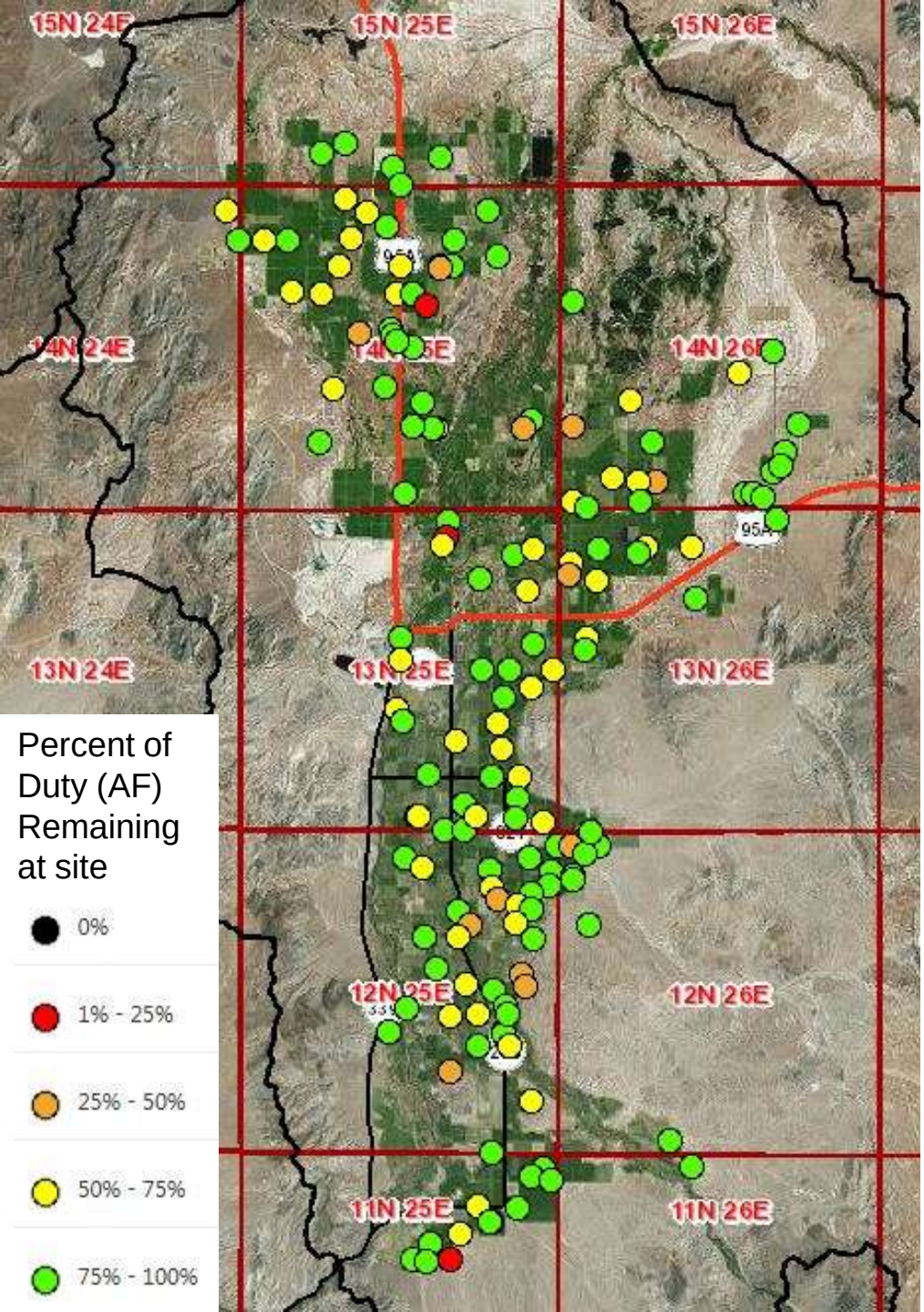




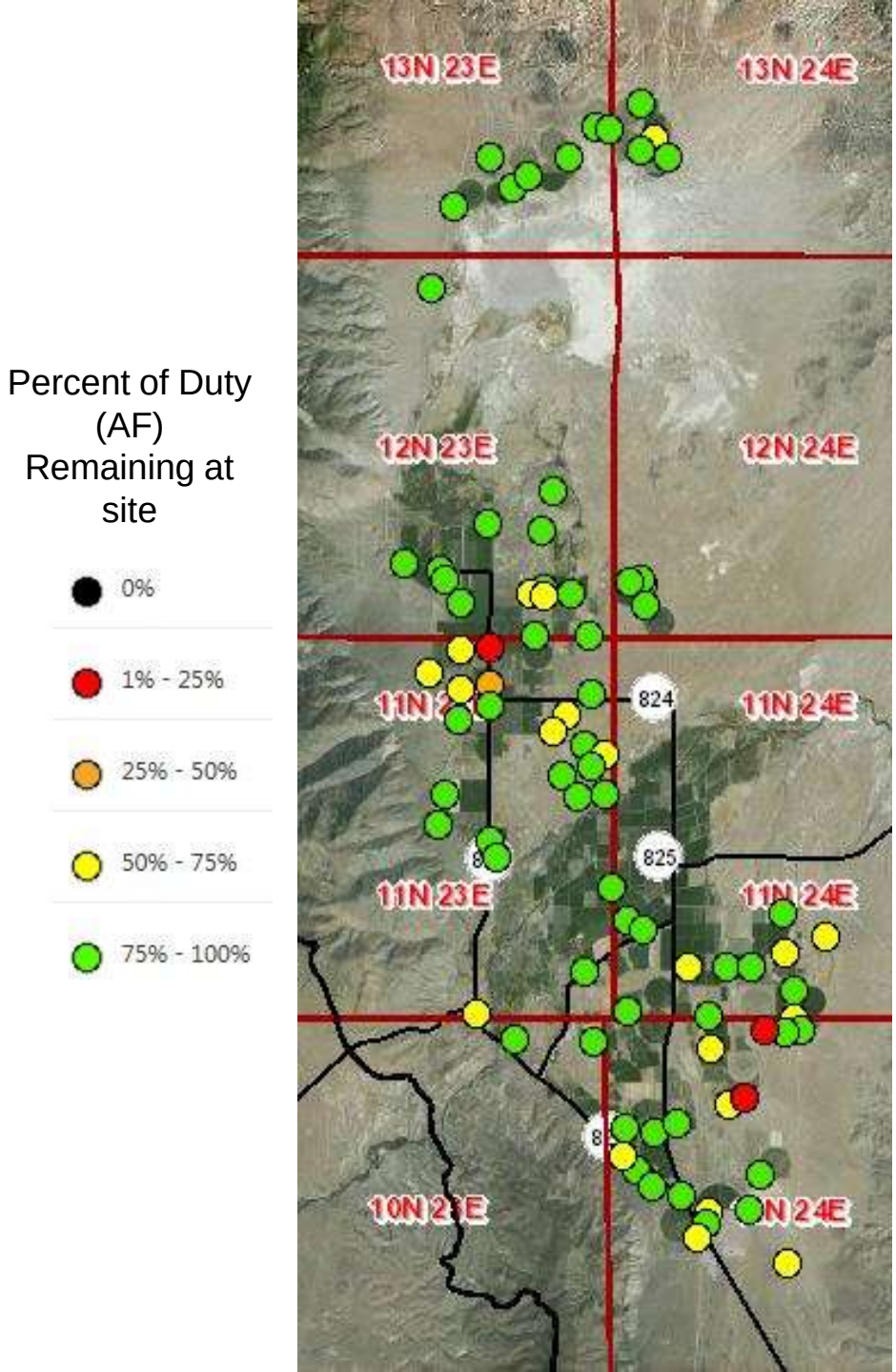
Smith Valley Domestic Wells





Mason Valley Irrigation Pumpage estimate as of July 1, 2015:

26,760 Acre-Feet



Smith Valley Irrigation Pumpage estimate as of July 1, 2015:

9,334 Acre-Feet

Water Flow and Totalizing Meters

Totalizing Meter Requirements

Currently all underground water right diversions, except domestic wells, in Mason and Smith Valley are required to have a totalizing meter installed.

Mason Valley S.E. Order No. 1158

Smith Valley S.E. Order No. 1159

Water Flow and Totalizing Meters

Totalizing Meters are an important management tool for NDWR

- Accurate measurements of water use are important for determining compliance with water rights, and when necessary, administering water rights.
- They also provide the data required to best manage the state's water resources.

Water Flow and Totalizing Meters

Totalizing meters are also a valuable tool for the water user, providing:

- Independent water use records
- Power usage data i.e. KWH per Acre-Feet
- Well and pump (re)design data
- Well maintenance and diagnostics data
- And Water right asset protection data

Water Flow and Totalizing Meters

NDWR continues to work toward the goal of having all non-exempt diversions metered

- This year alone, NDWR has received notice of 21 new meters in Mason Valley; and 8 meters in Smith Valley!
- And, field crews have reported dozens of other replacement meters and calibration efforts!

Water Flow and Totalizing Meters

- Totalizing meters must be installed in accordance with manufacturer's specifications
- NDWR encourages all water users to independently calibrate their meters.
- Please note it is the Water Users responsibility to properly install and maintain their totalizing meter(s)
- Please do not hesitate to contact NDWR with questions about meter installation or usage.

Assessment of Water Level Changes Caused by Pumpage

- DRI groundwater model thoroughly vetted/peer reviewed/published
- Can be used to quantify amount of curtailment needed to achieve targeted water-levels
- Uses 2010 as proxy for average flow and diversions
- Uses 2004 as baseline for water levels
- Water level changes simulated for scenarios:
  - River flows of 20%, 40%, 60%, 80%, 100% of average
  - Pumpage curtailed by priority by 0%, 25%, 50%, and 75% of duty

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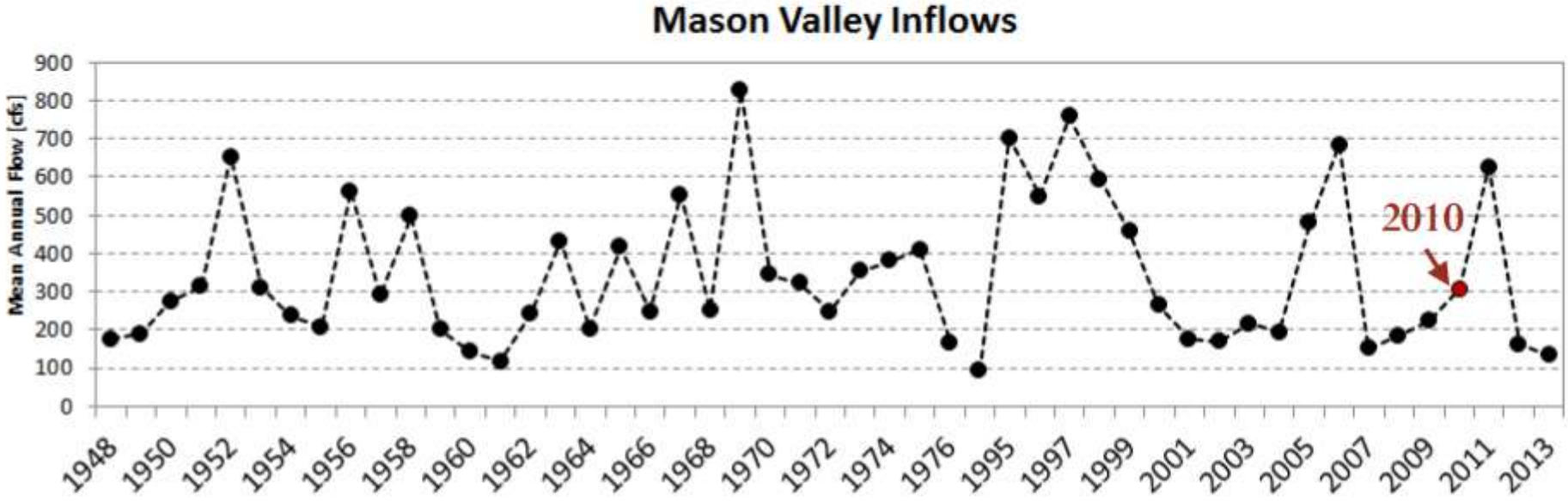
MASON VALLEY GROUNDWATER MODEL: LINKING SURFACE WATER AND GROUNDWATER IN THE WALKER RIVER BASIN, NEVADA[1]

Rosemary W.H. Carroll, Greg Pohll, David McGraw, Chris Garner, Anna Knust, Doug Boyle, Tim Minor, Scott Bassett, and Karl Pohlmann[2]

ABSTRACT: An integrated surface water and groundwater model of Mason Valley, Nevada is constructed to replicate the movement of water throughout the different components of the demand side of water resources in the Walker River system. The Mason Valley groundwater surface water model (MVGSM) couples the river/drain network with agricultural demand areas and the groundwater system using MODFLOW, MODFLOW's stream-flow routing package, as well as a surface water linking algorithm developed for the project. The MVGSM is capable of simulating complex feedback mechanisms between the groundwater and surface water system that is not dependent on linearity among the related variables. The spatial scale captures important hydrologic components while the monthly stress periods allow for seasonal evaluation. A simulation spanning an 11-year record shows the methodology is robust under diverse climatic conditions. The basin-wide modeling approach predicts a river system generally gaining during the summer irrigation period but losing during winter months and extended periods of drought. River losses to the groundwater system approach 25% of the river's annual budget. Reducing diversions to hydrologic response units will increase river flows exiting the model domain, but also has the potential to increase losses from the river to groundwater storage.

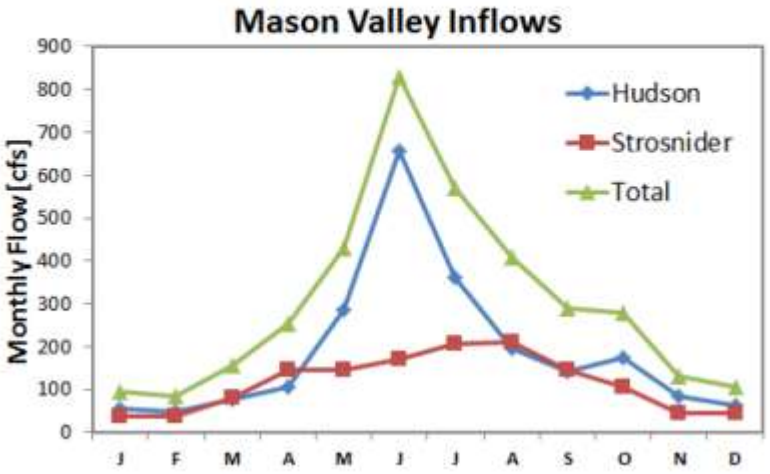
What is a representative year?



Arithmetic Mean Flow = 338 cfs

Geometric Mean Flow = 292 cfs

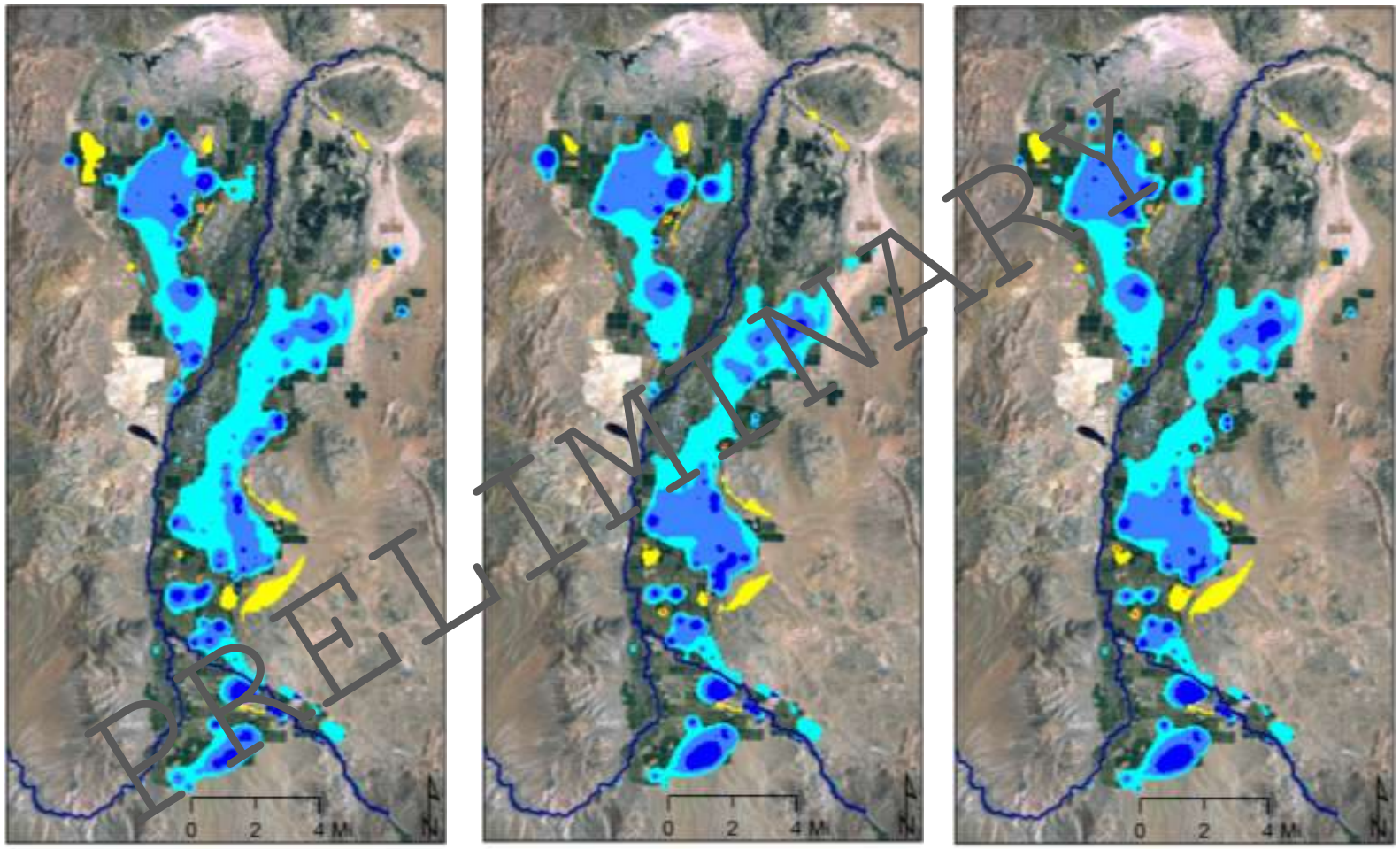
2010 Mean flow = 305 cfs



Aug. to Aug. Drawdown

Streamflow = 100%; Curtailment = 25%

No Curtailment | All | Supplemental

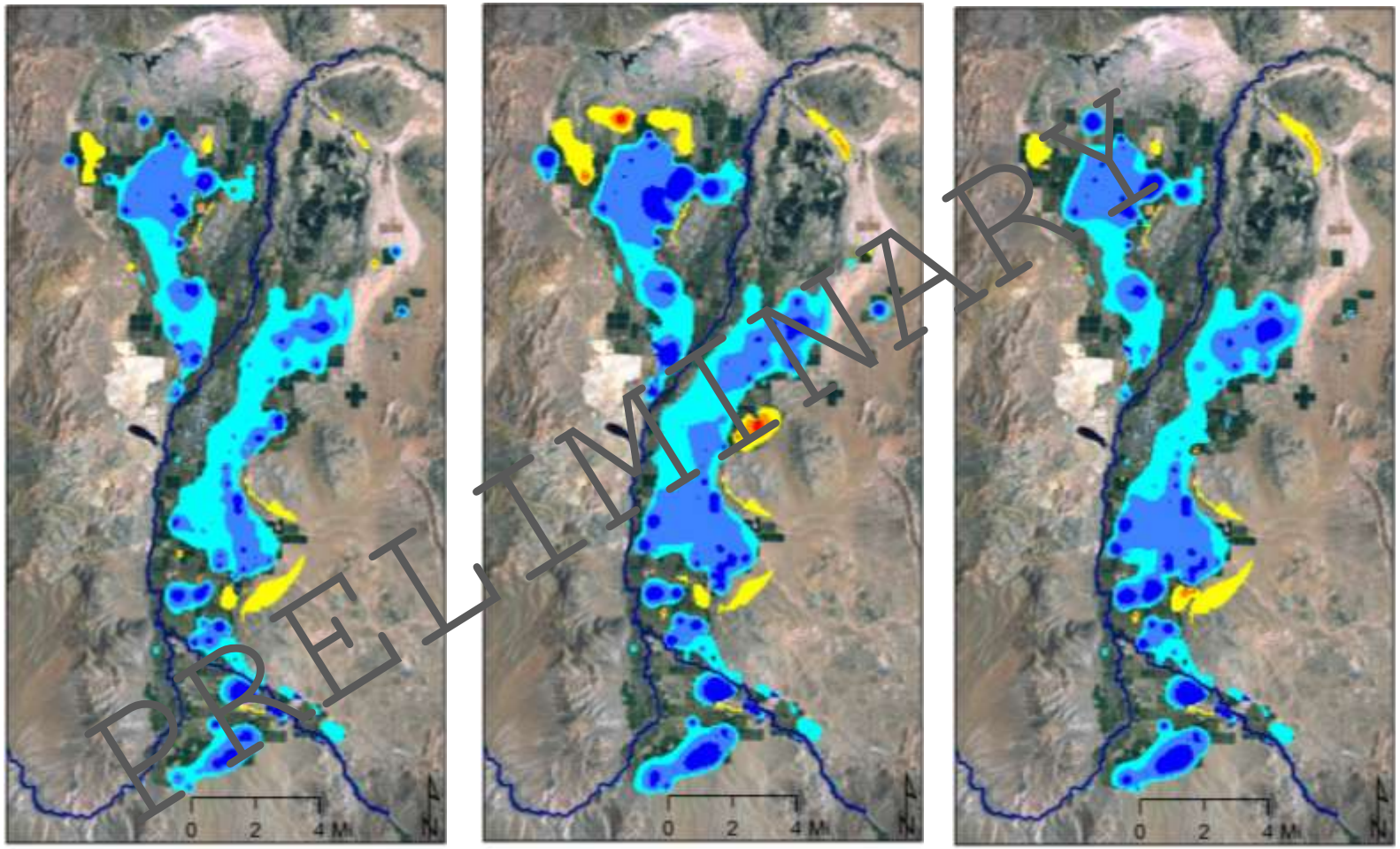


* negative drawdown indicates rising water levels

Aug. to Aug. Drawdown

Streamflow = 100%; Curtailment = 50%

No Curtailment | All | Supplemental

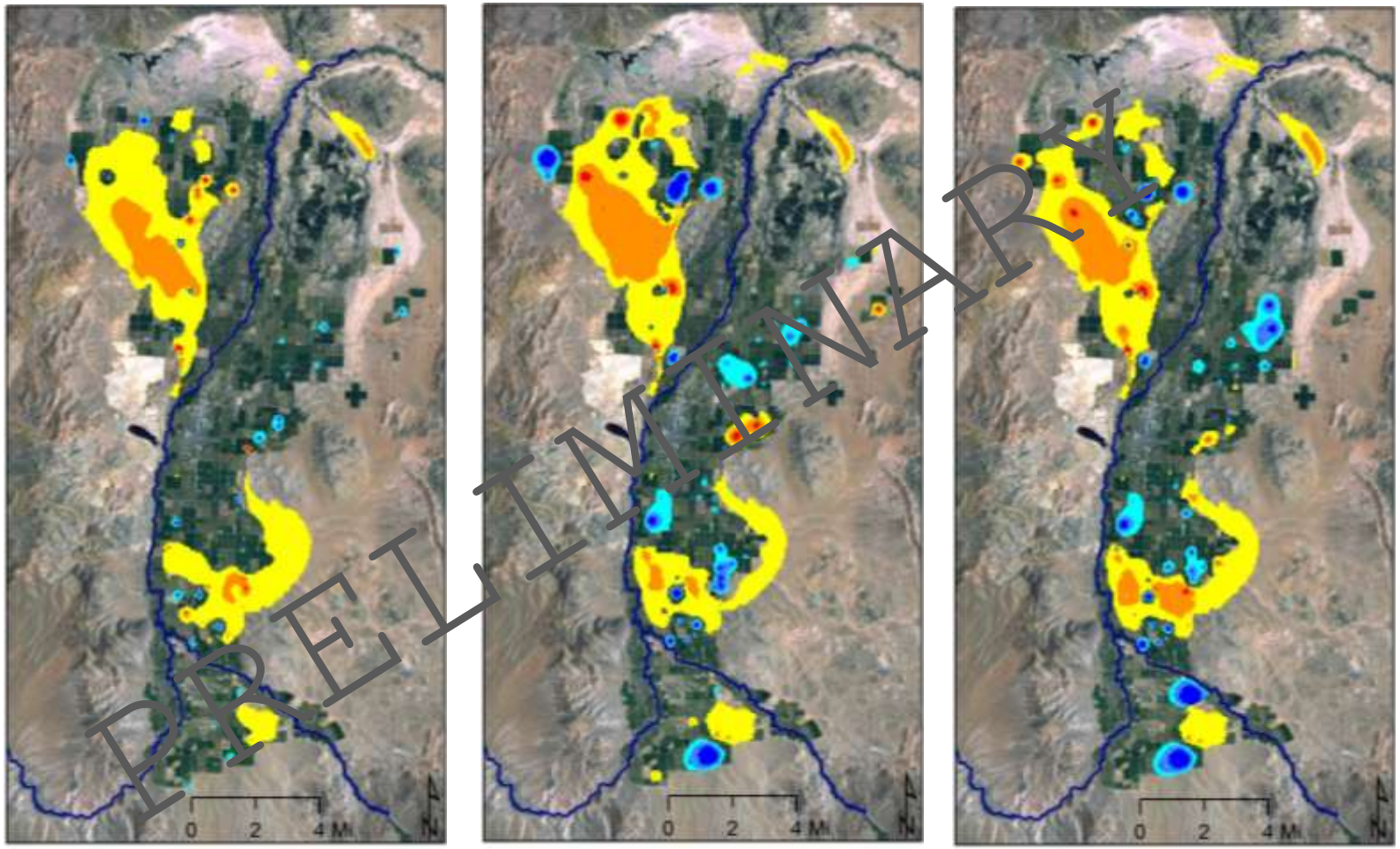


* negative drawdown indicates rising water levels

Aug. to Aug. Drawdown

Streamflow = 60%; Curtailment = 25%

No Curtailment | All | Supplemental

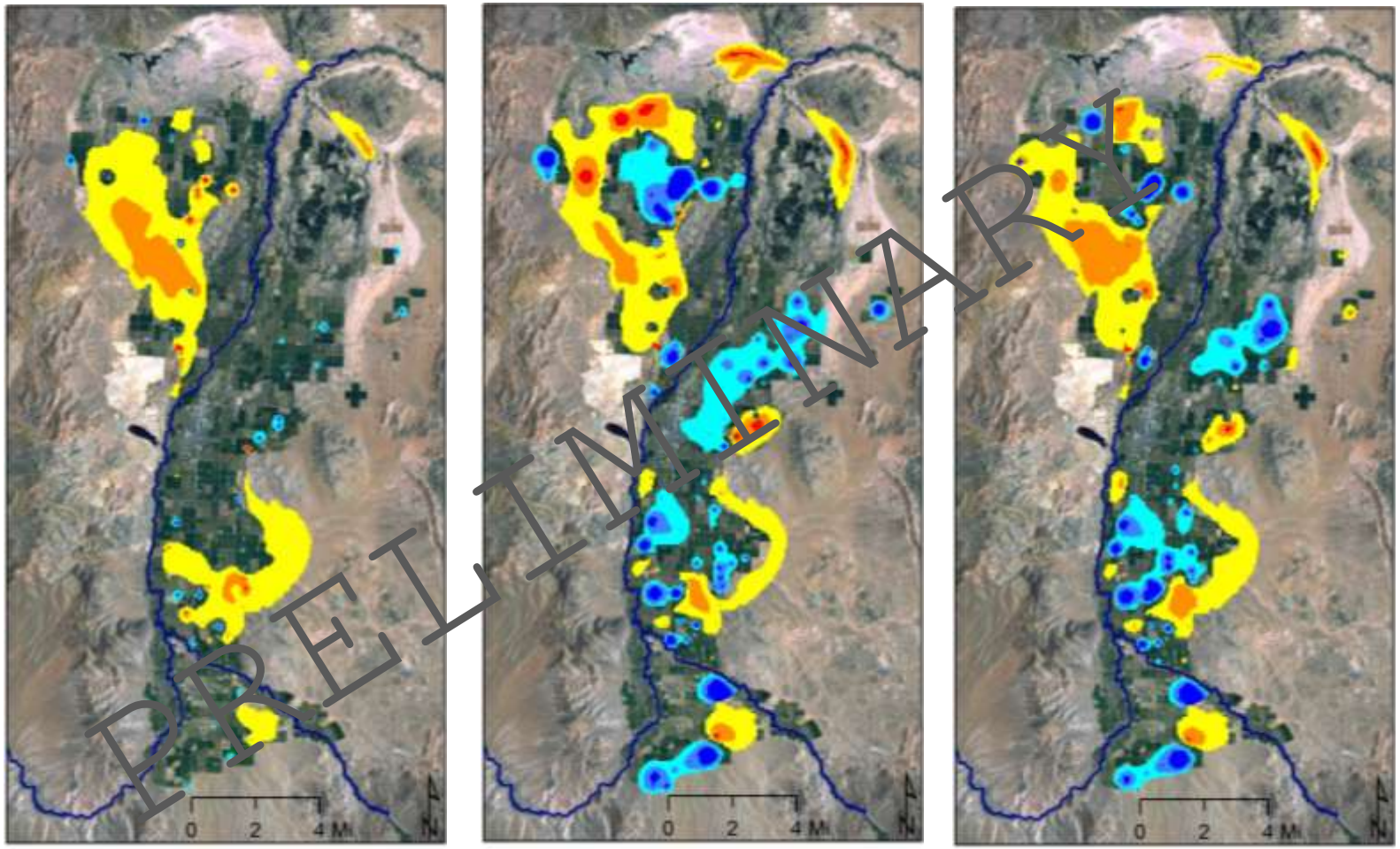


* negative drawdown indicates rising water levels

Aug. to Aug. Drawdown

Streamflow = 60%; Curtailment = 50%

No Curtailment | All | Supplemental

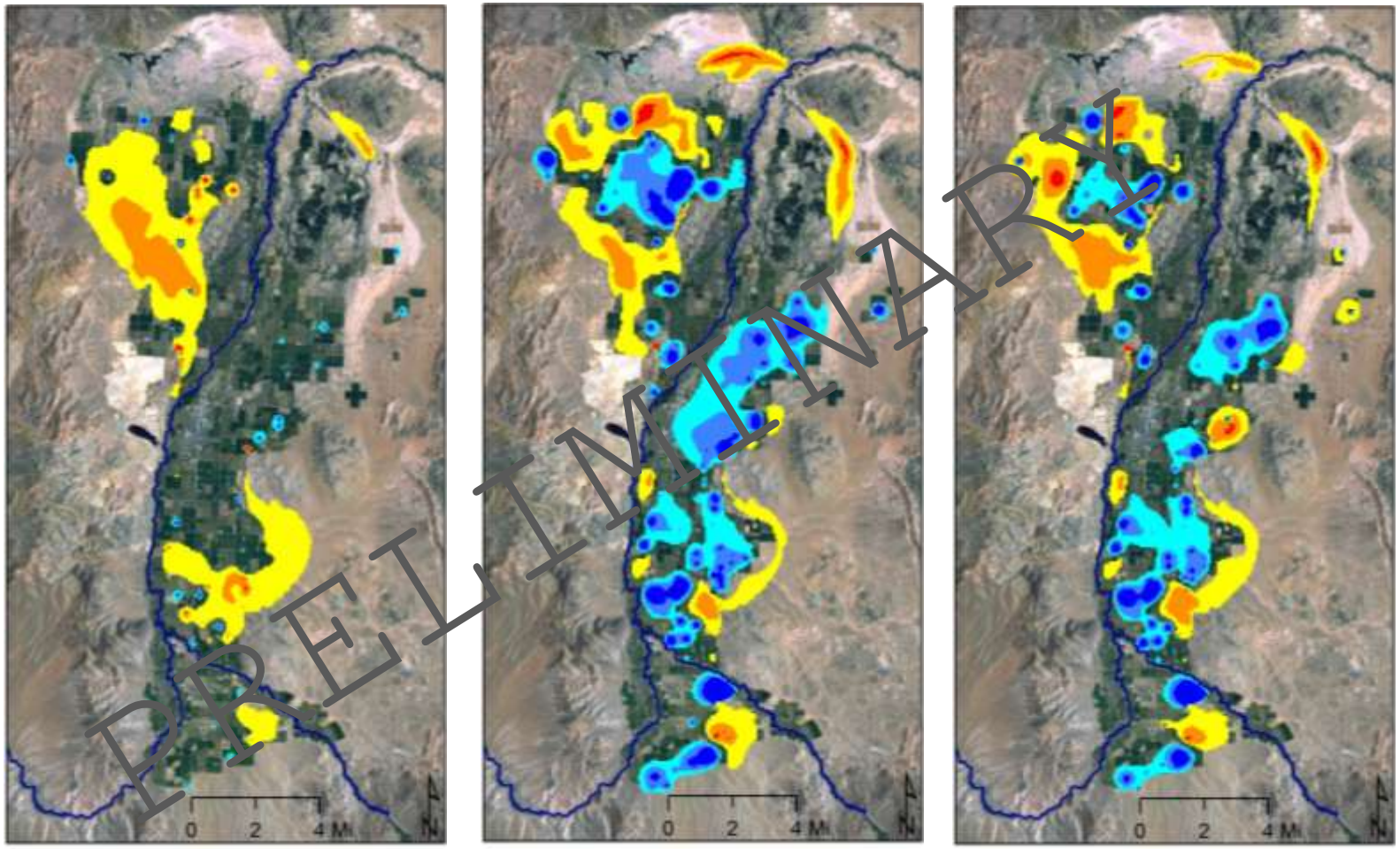


* negative drawdown indicates rising water levels

Aug. to Aug. Drawdown

Streamflow = 60%; Curtailment = 75%

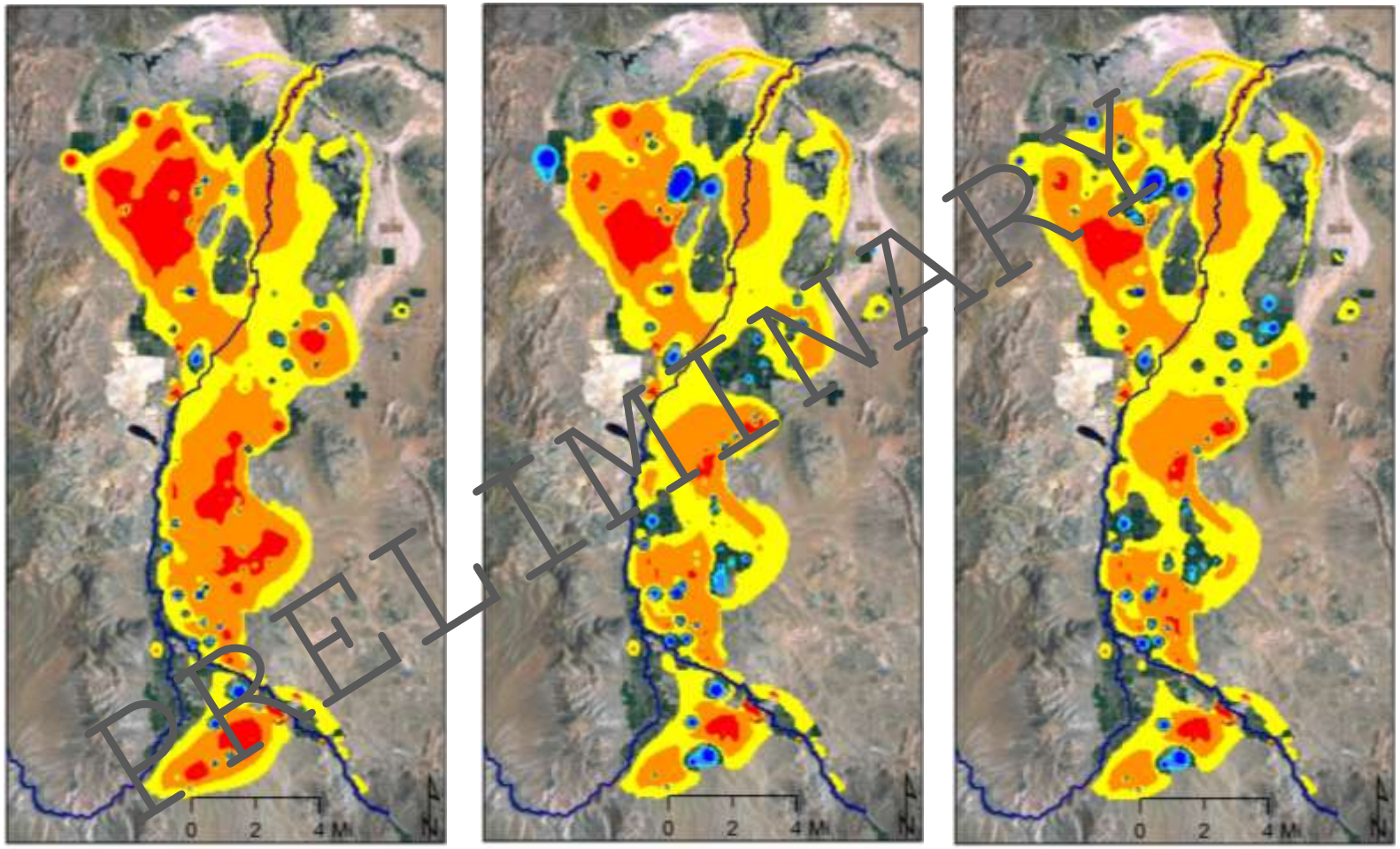
No Curtailment | All | Supplemental



Aug. to Aug. Drawdown

Streamflow = 20%; Curtailment = 25%

No Curtailment | All | Supplemental

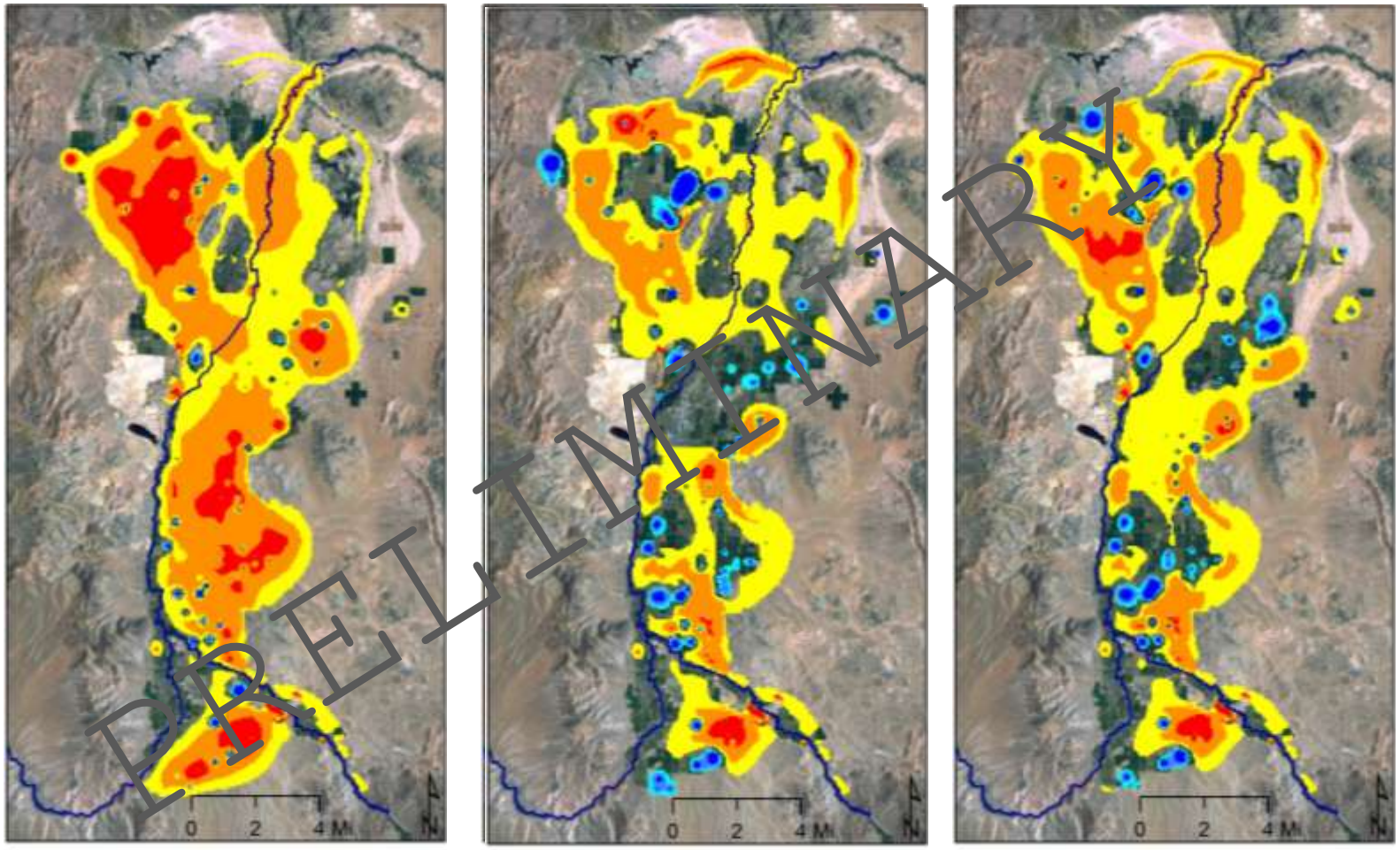


* negative drawdown indicates rising water levels

Aug. to Aug. Drawdown

Streamflow = 20%; Curtailment = 50%

No Curtailment | All | Supplemental

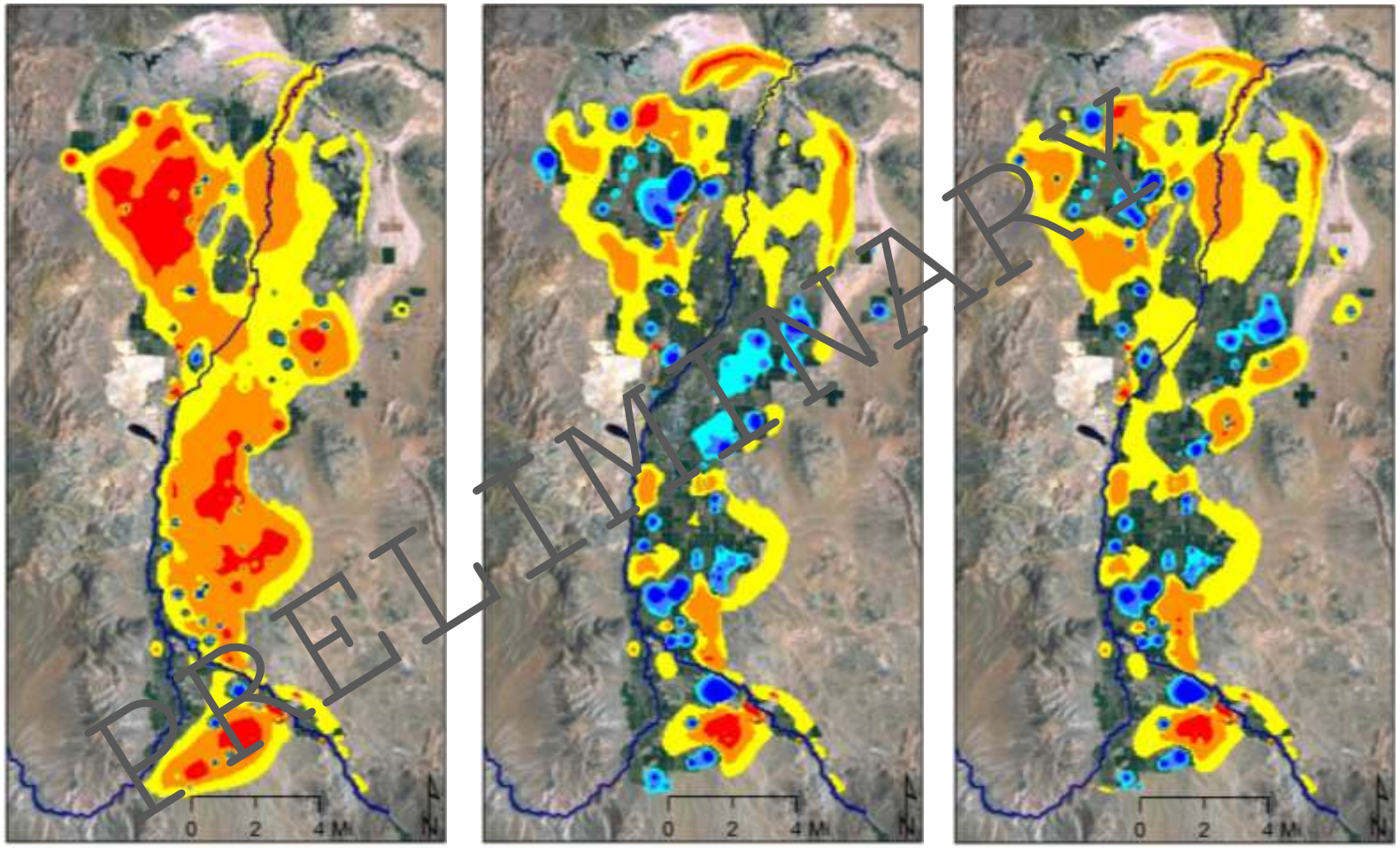


* negative drawdown indicates rising water levels

Aug. to Aug. Drawdown

Streamflow = 20%; Curtailment = 75%

No Curtailment | All | Supplemental

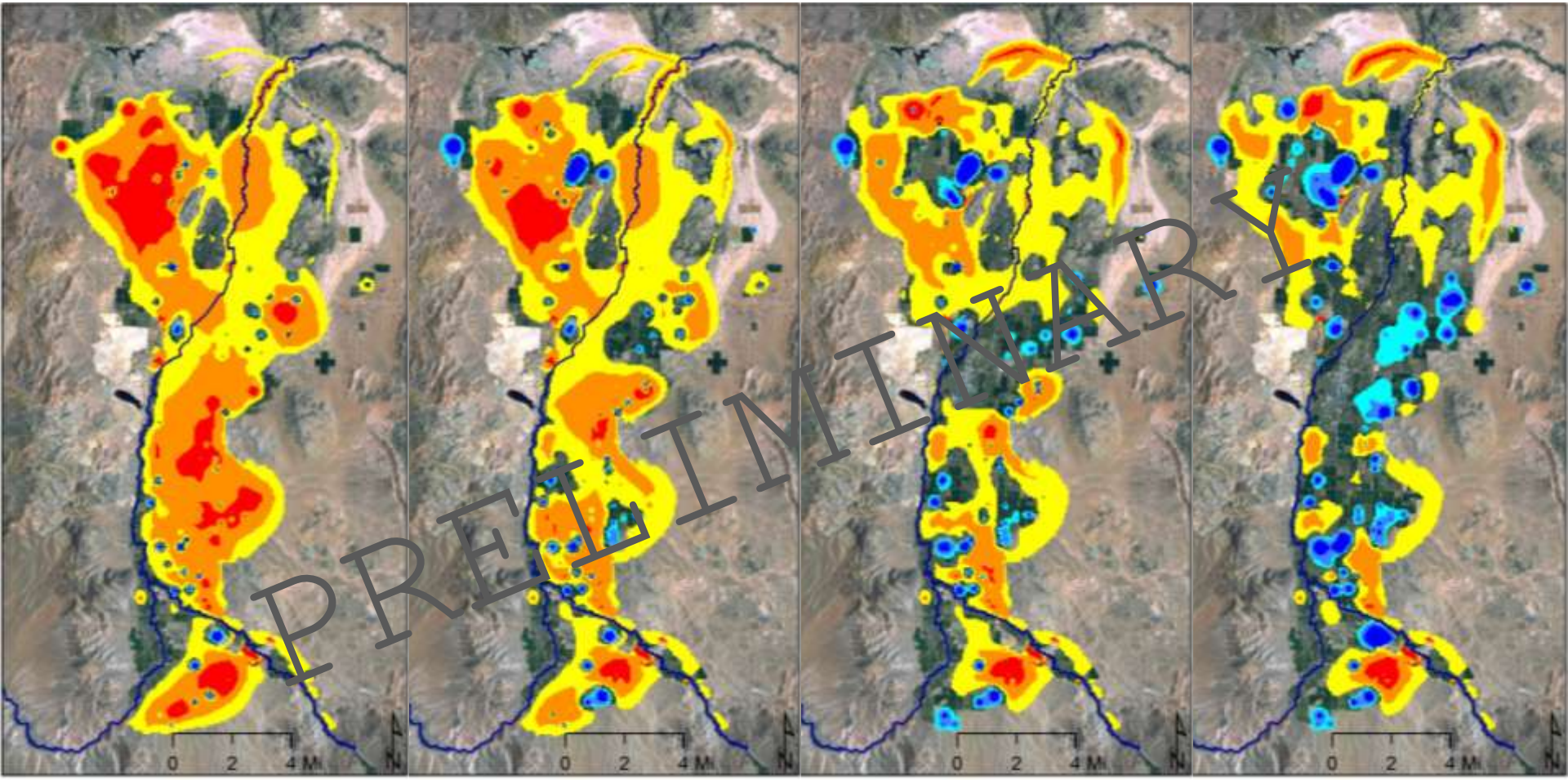


* negative drawdown indicates rising water levels

Aug. to Aug. Drawdown

Streamflow = 20%

No Curtailment | 25% | 50% | 75%



Water Right Change Applications

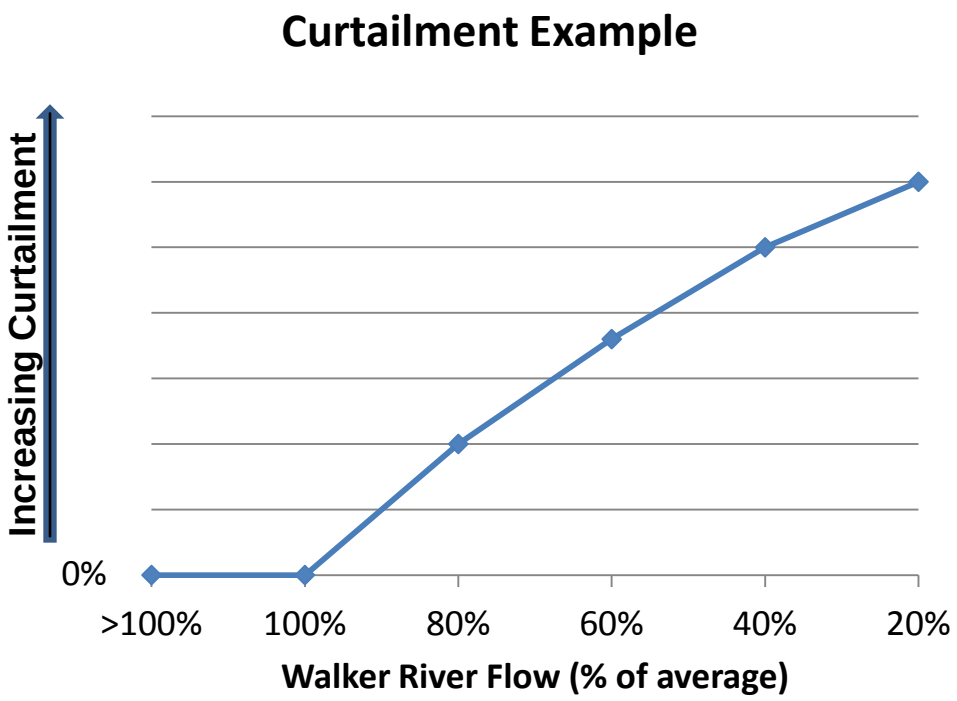
- DWR review process
  - Use standard Theis non-equilibrium equation to estimate drawdown
  - Use existing pumping tests to estimate hydraulic properties
  - Quantify drawdown at existing rights and domestic wells
  - Estimates of drawdown are conservative (particularly for longer timeframes)

Discussion of Possible Curtailment in 2016

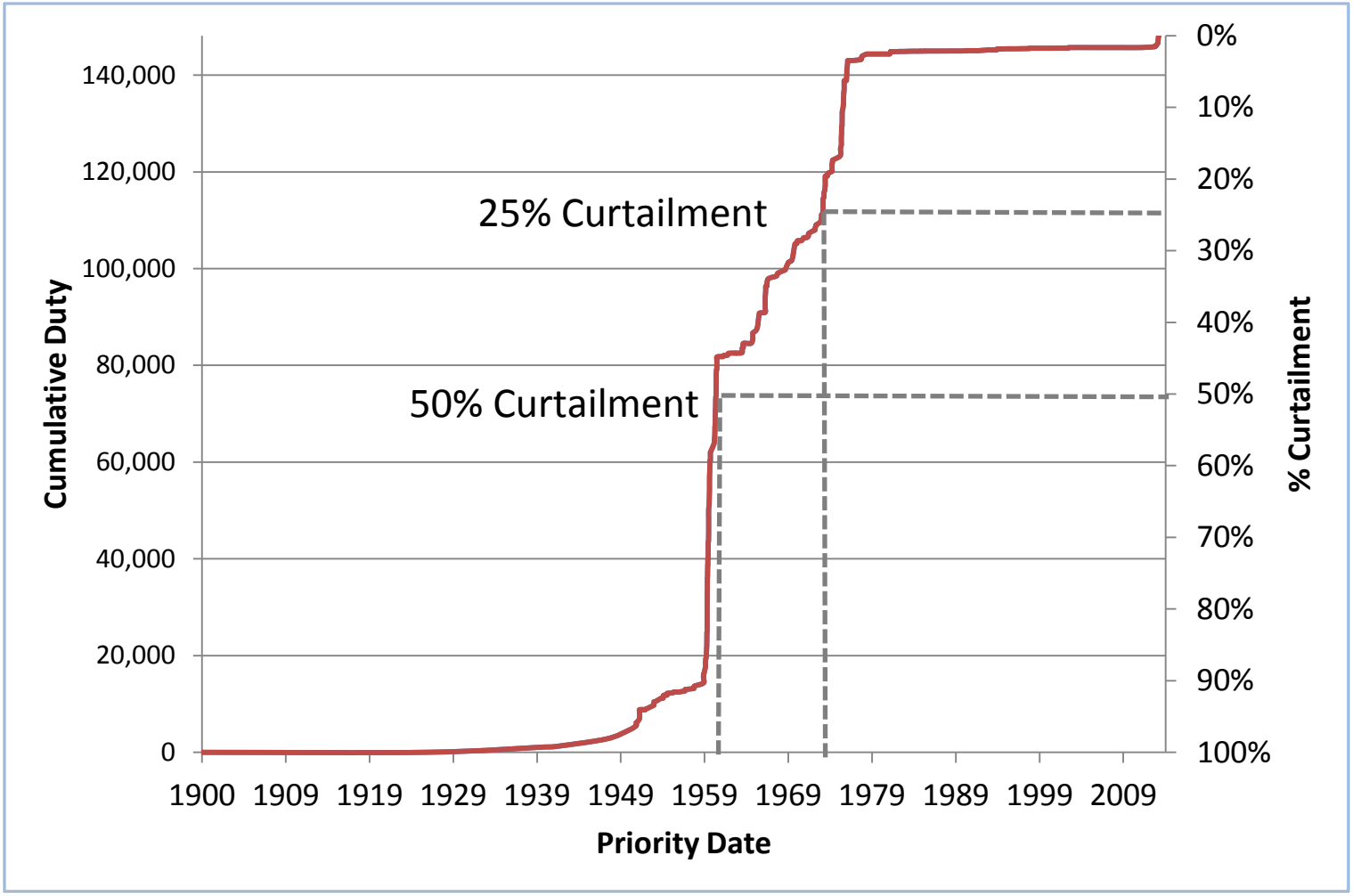
- Targeted water level change
- Workshops and Hearings
- What rights to curtail
  - All water rights plus domestic wells or
  - Supplemental irrigation only
- Use groundwater model for curtailment
- Sliding scale approach
  - Increasing curtailment when flows are lower
  - Priority dates to be made available
- Date to be used for setting water supply
  - April 1
  - March 1

Discussion of Possible Curtailment in 2016

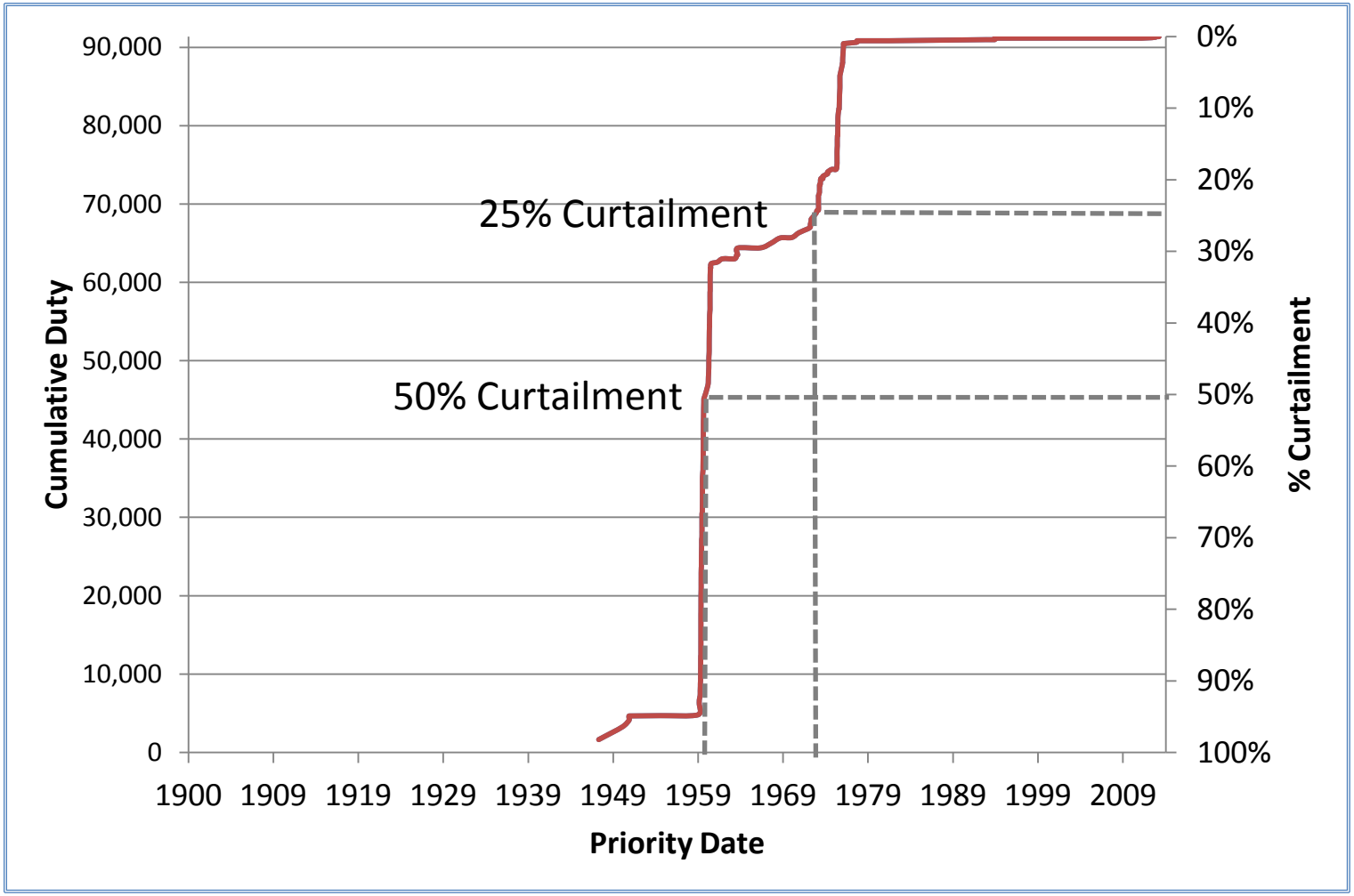
- Sliding scale
- Less curtailment if river flow is higher
- Priority dates determined for each curtailment



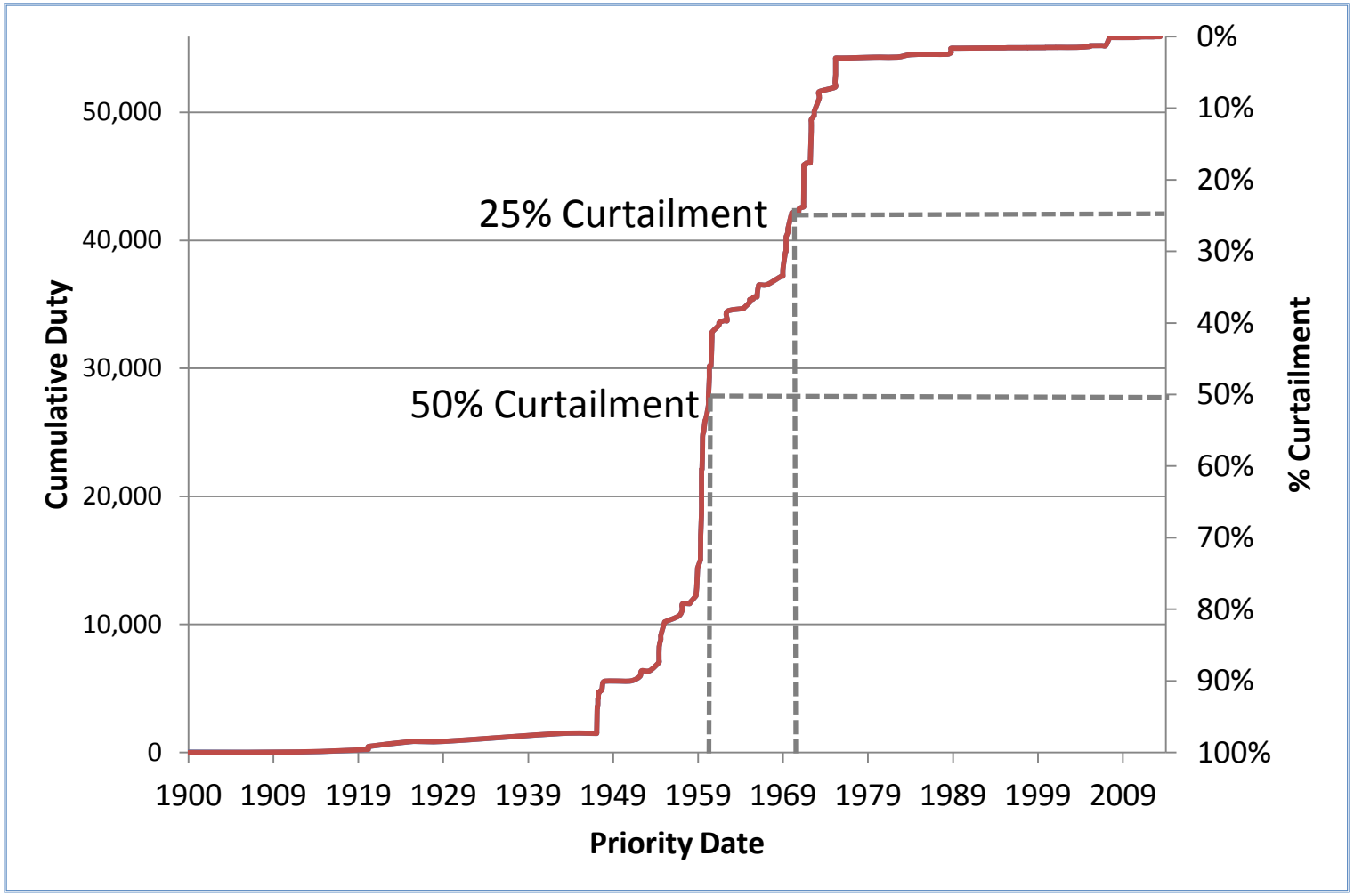
Water Rights in Mason Valley



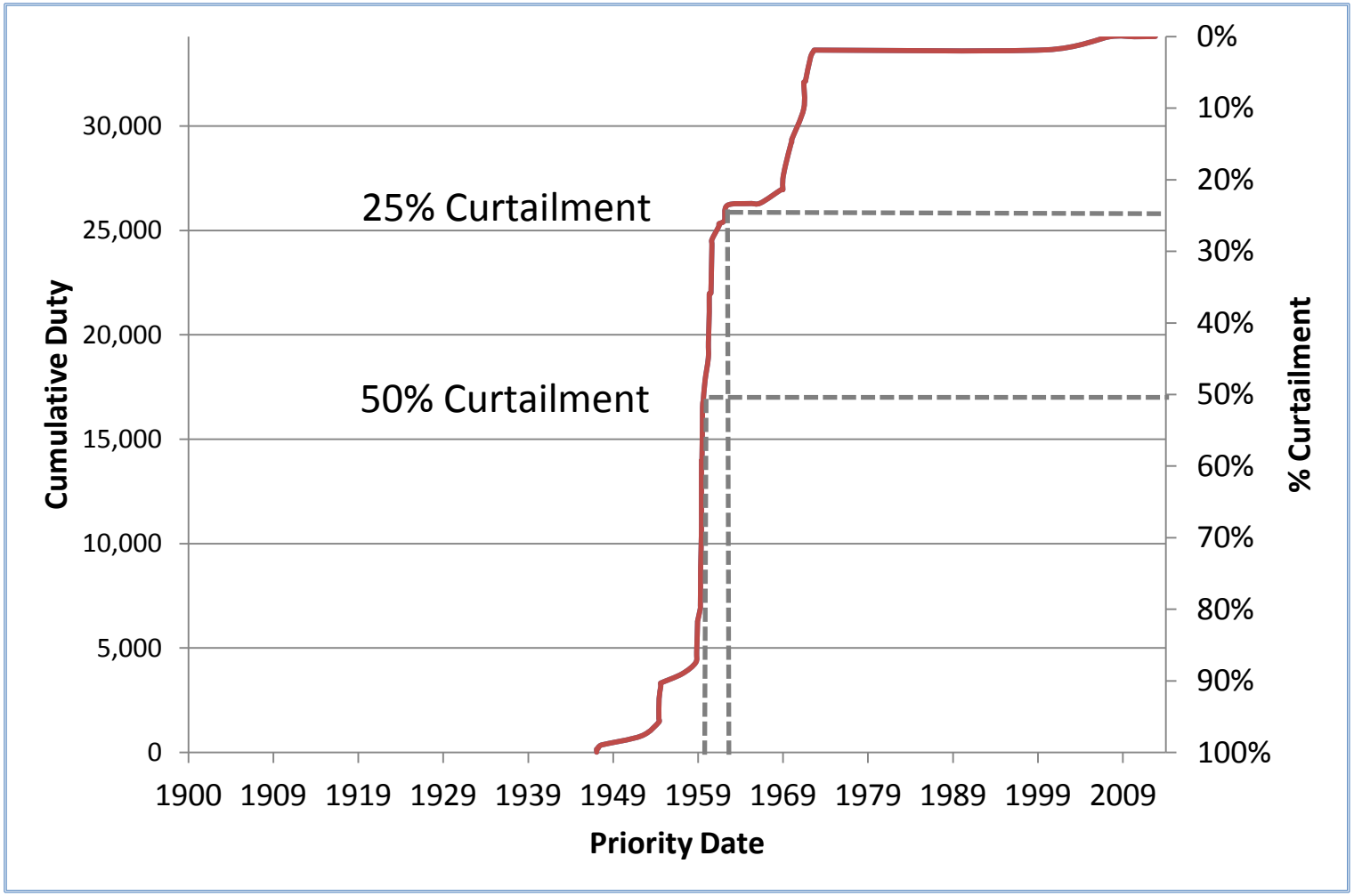
Supplemental Water Rights in Mason Valley



Water Rights in Smith Valley



Supplemental Water Rights in Smith Valley



Discussion of Need for GWMP

- Do we need one
- Pros and cons
- Just for drought periods

State Engineer Actions for 2016

- Possible new curtailment order
- Water-supply based level of curtailment
- Use April 1 snowpack and runoff estimates as basis
- Continued high level of presence in both basins
- Require certification of meter accuracy


Questions