

Cuyama Basin Groundwater Sustainability Agency

Sustainability Agency Meeting and Public Workshops

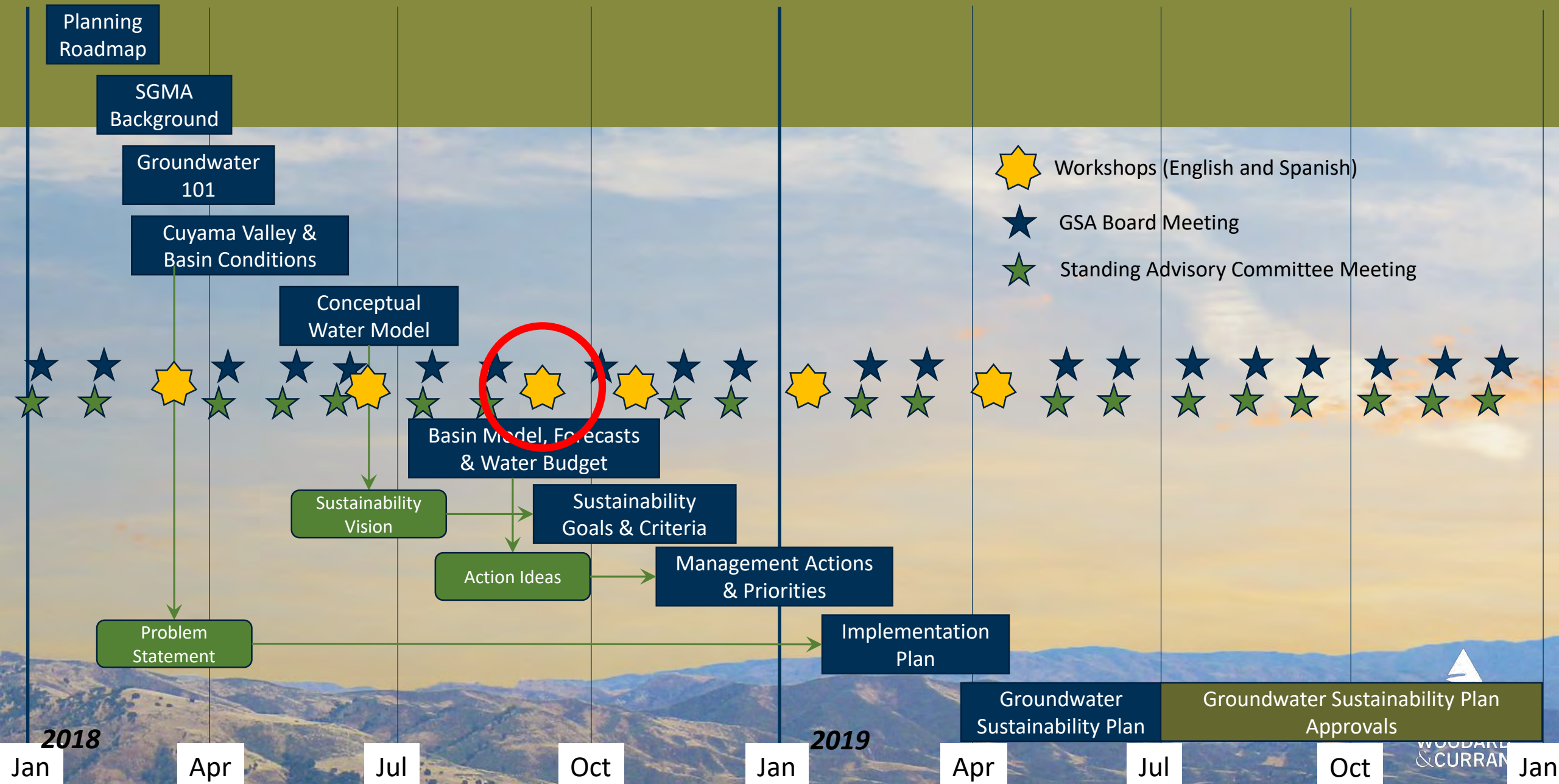
September 5, 2018



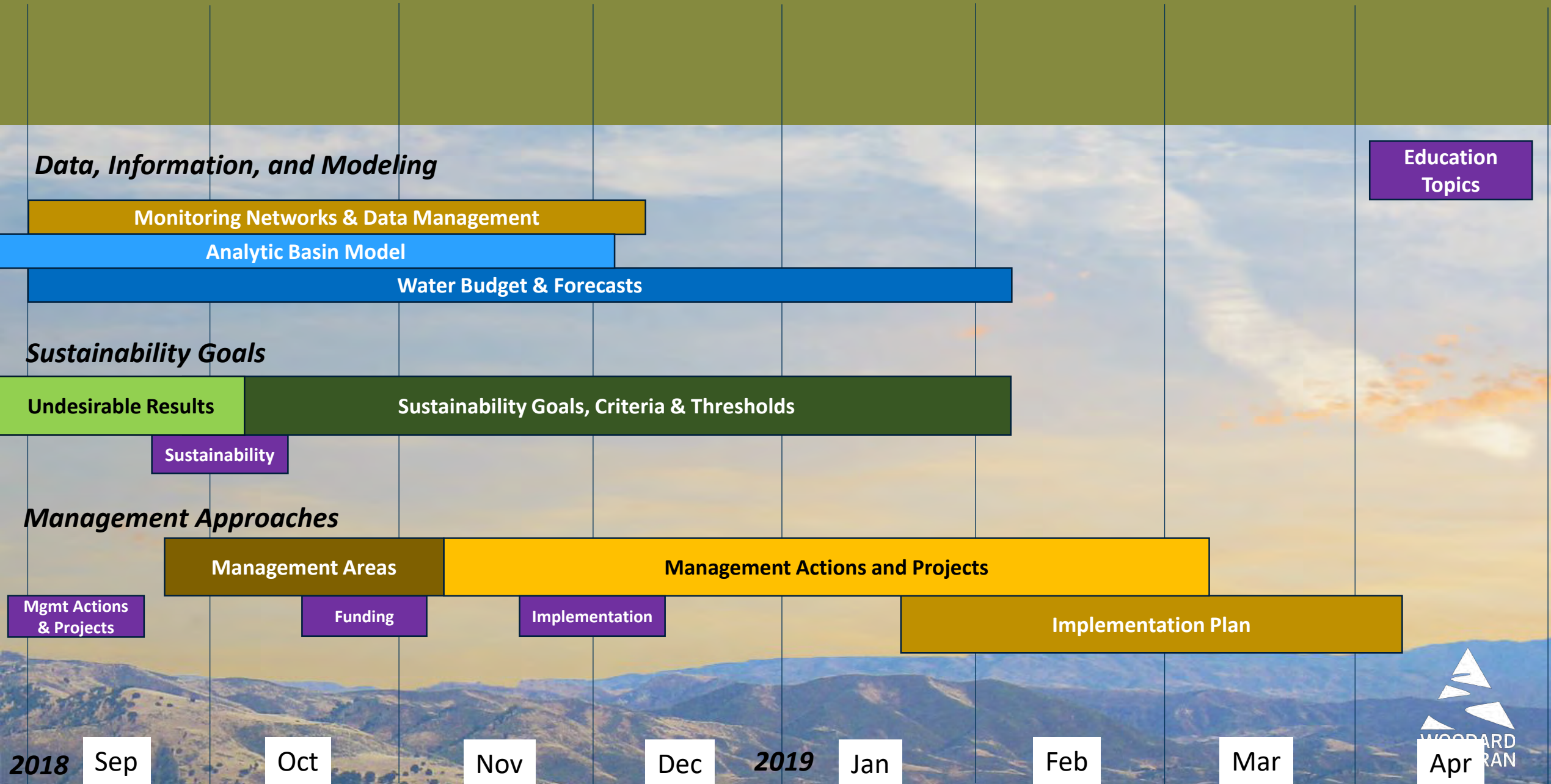
Agenda

- Welcome and Introduction (5 min)
- Modeling Cuyama Basin Groundwater Conditions (25 min)
- Audience Discussion (30 min)
- Examples of Management Actions and Projects (10 min)
- Audience Discussion (15 min)
- Options for Management Areas in the Cuyama Basin (10 min)
- Audience Discussion (15 min)
- Wrap Up and Next Steps (10 min)

Cuyama Basin Groundwater Sustainability Plan – Planning Roadmap



Cuyama Basin Groundwater Sustainability Plan – Discussion Topics



Cuyama Basin Groundwater Sustainability Agency

Modeling Cuyama Basin Groundwater Conditions

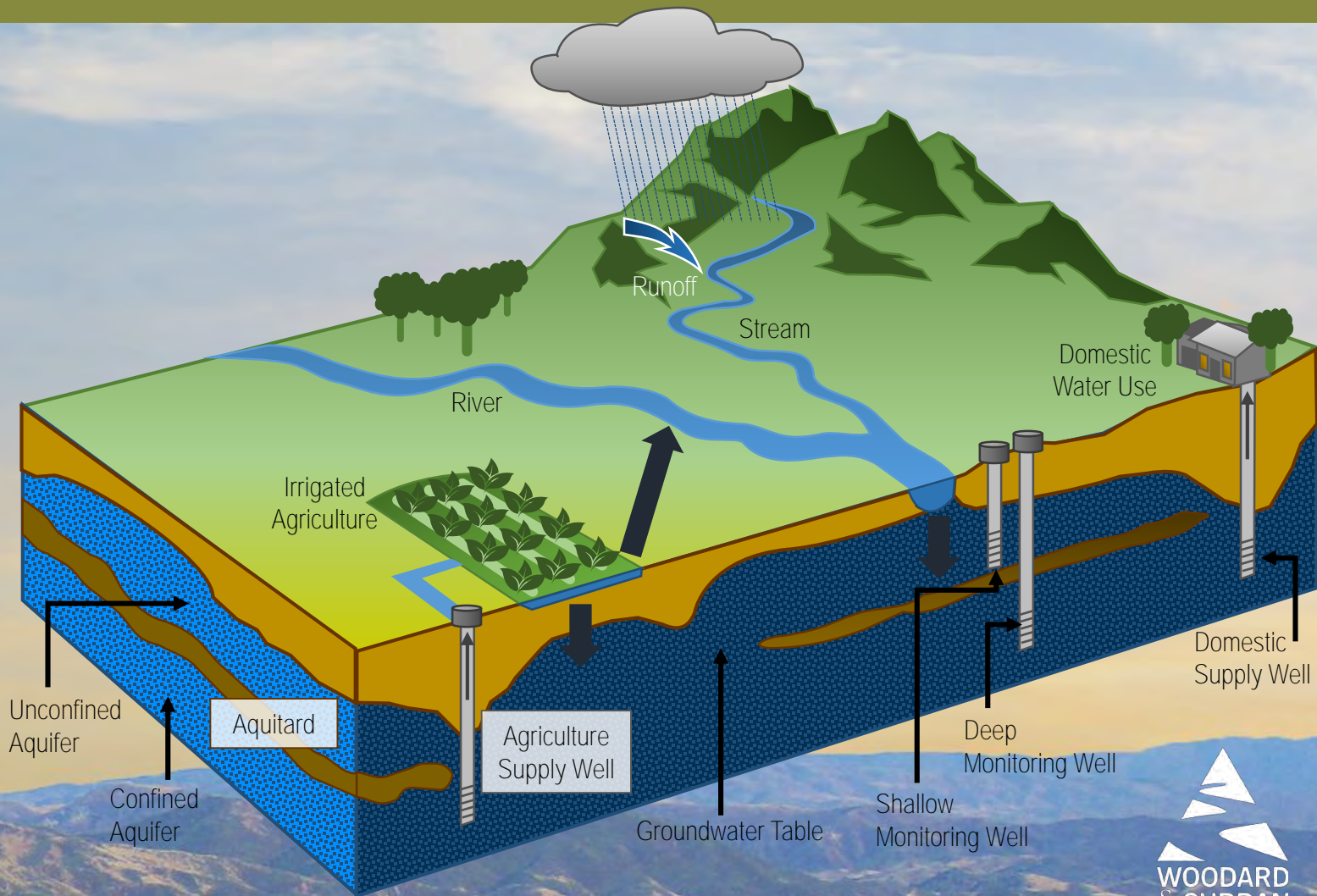
September 5, 2018



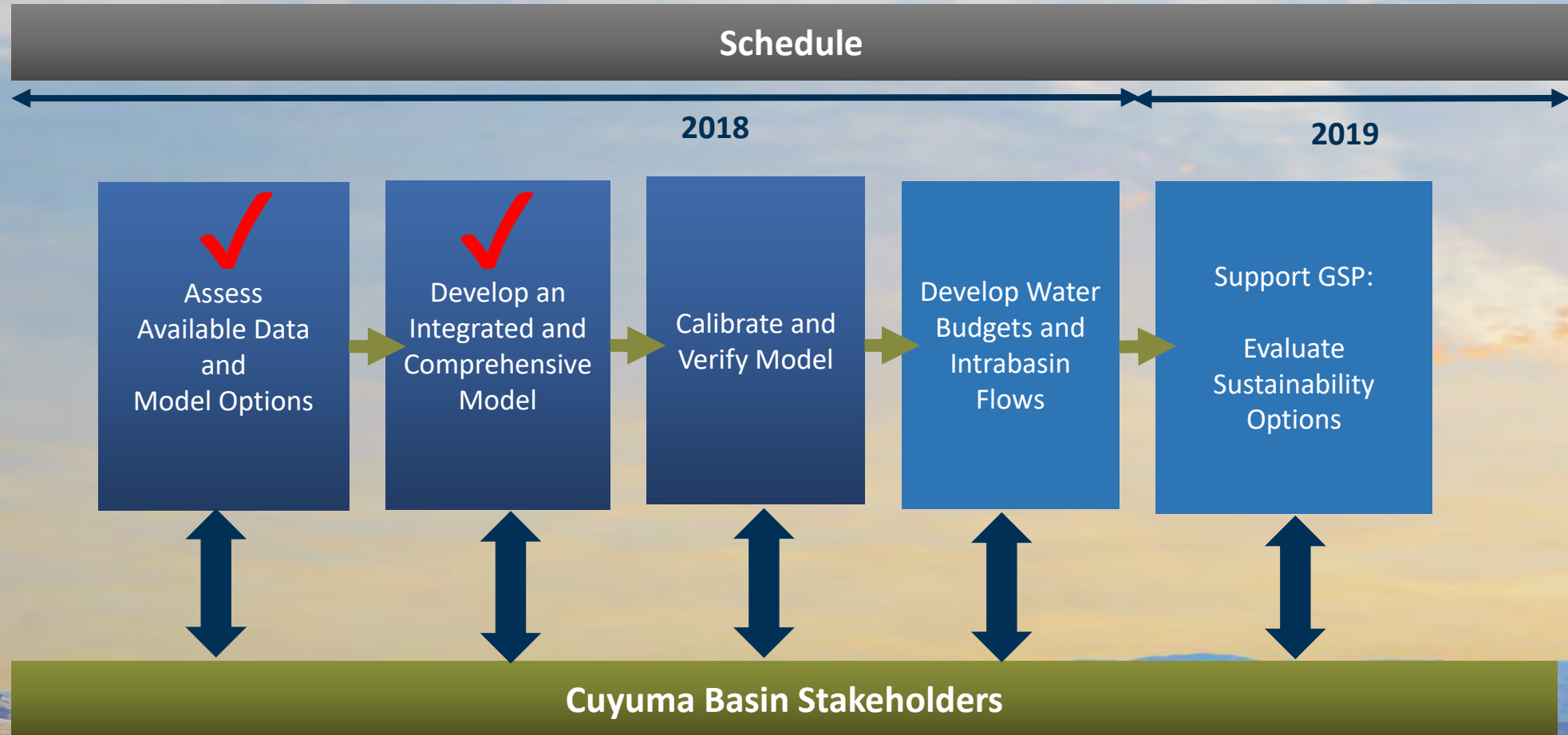
Approach for Cuyama Basin Model Development

- Developing a Robust and Defensible Integrated Water Flow Model (IWFM)

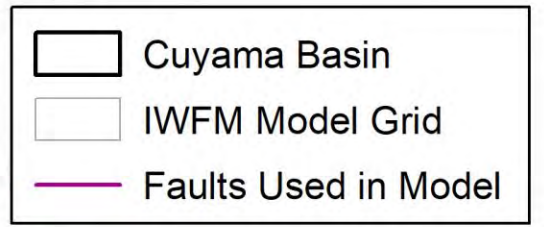
- Robust Model Grid
- Agricultural and Municipal Water Demands
- Simulates physical movement of water
- Simulates interaction between groundwater and surface water systems



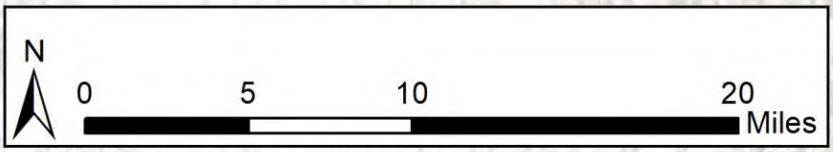
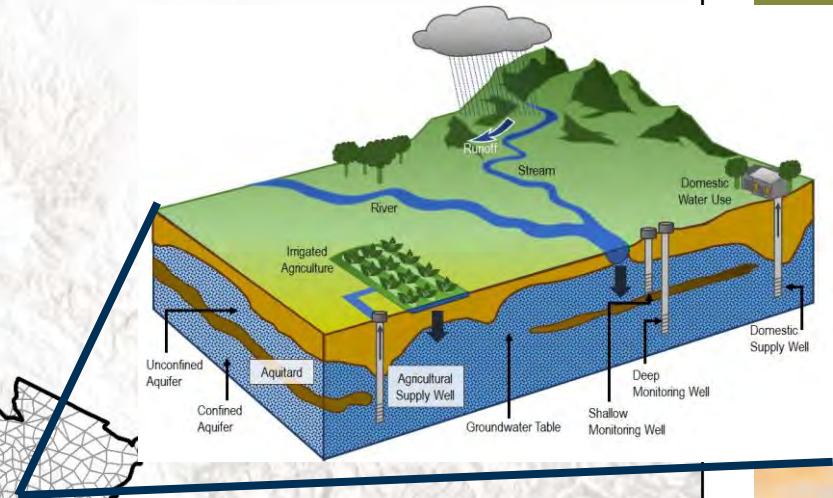
Cuyama Basin Integrated Water Resources Model Development



IWFM Model Network

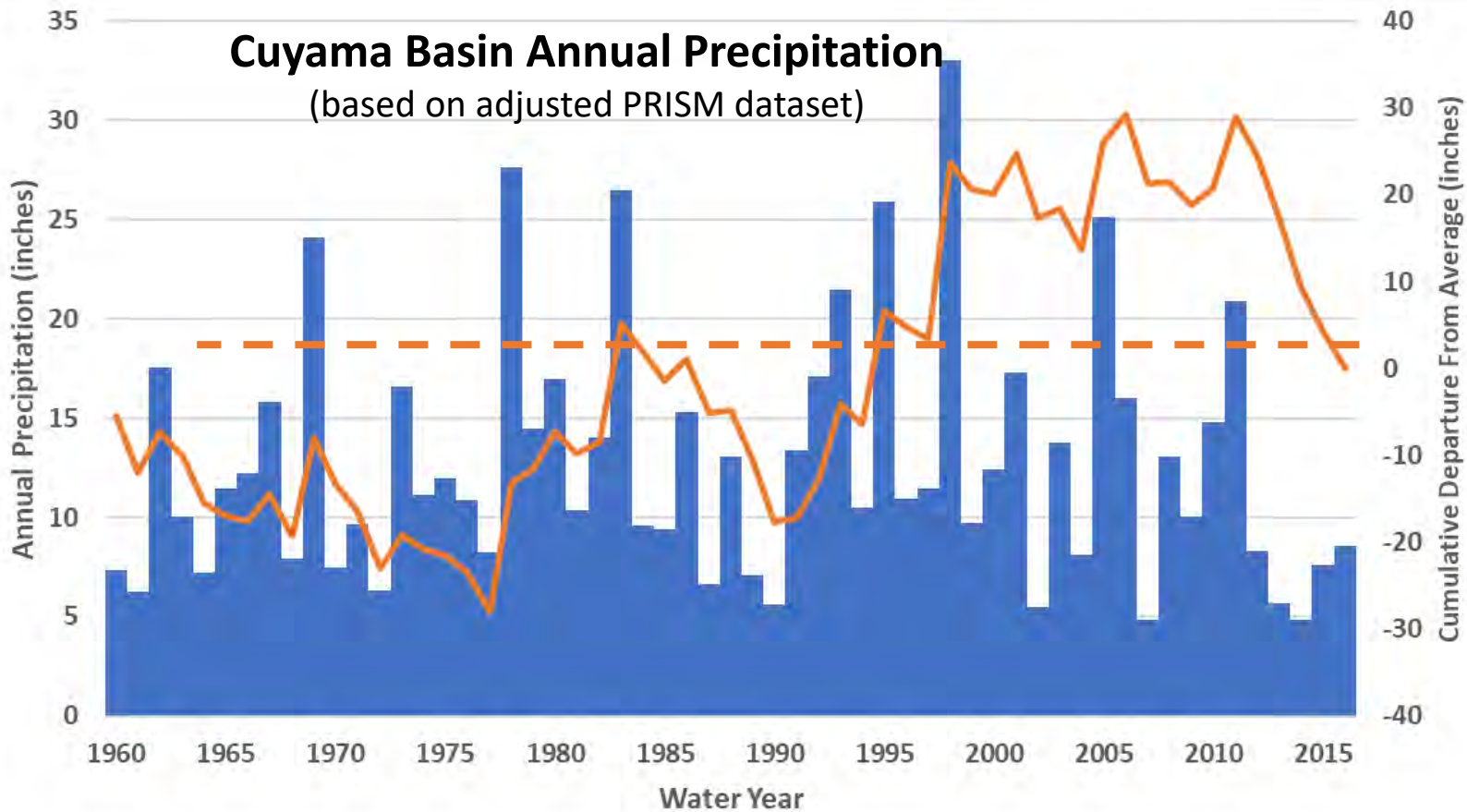


6,582 elements
Avg element area: 36.8 acres



Cuyama Basin – Adjusted PRISM Precipitation 1960-2015

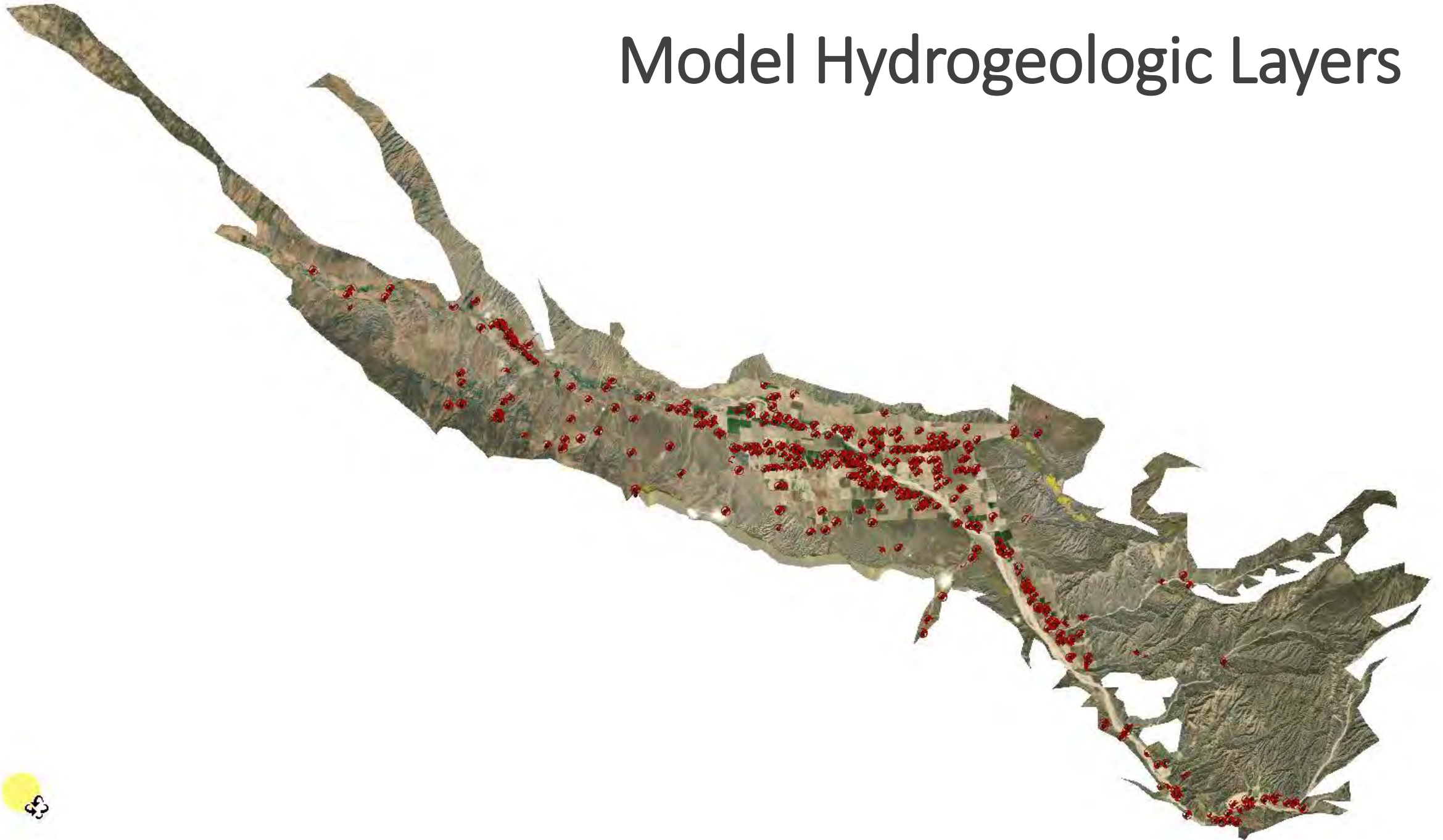
Cuyama Basin Annual Precipitation
(based on adjusted PRISM dataset)



Average Annual Precipitation:

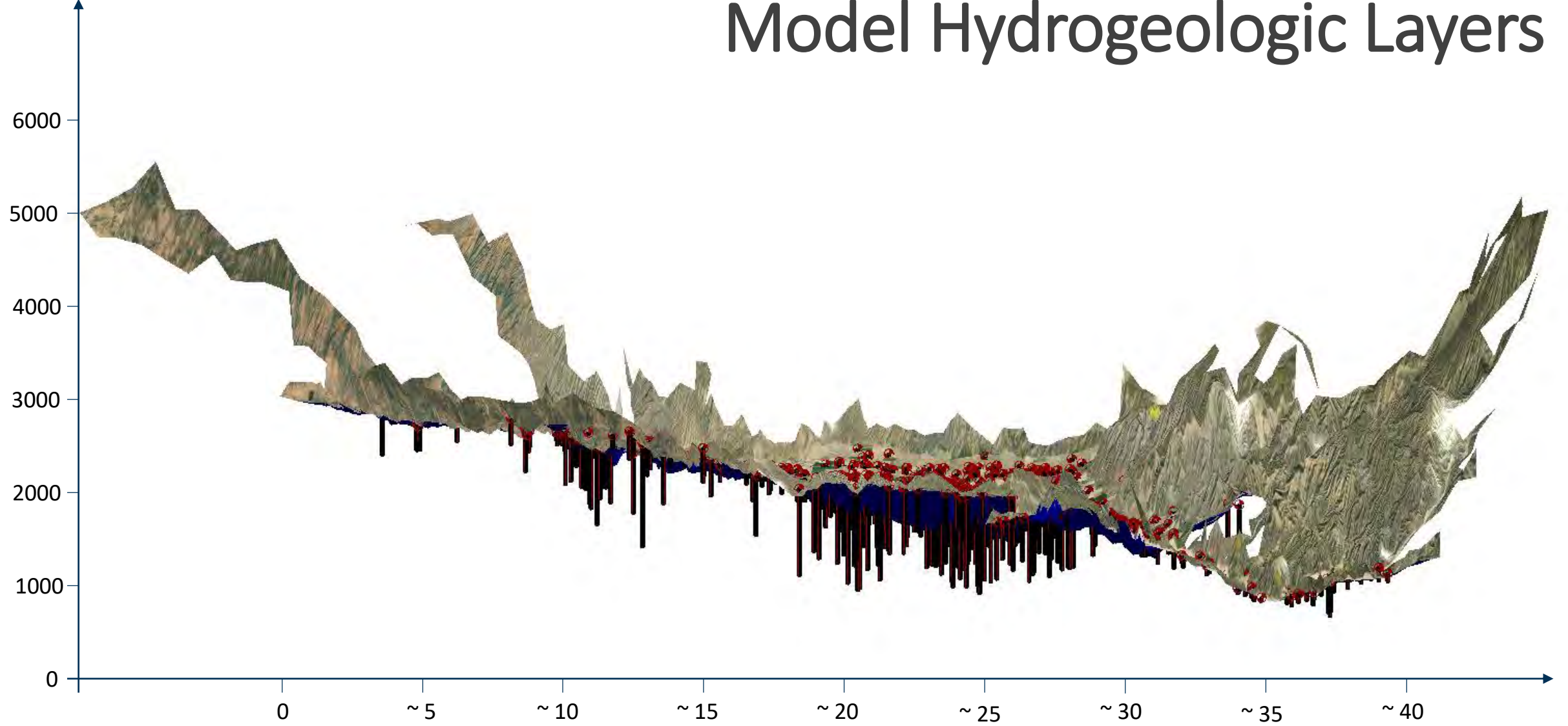
- 12.8 inches (including foothills)
- 11 inches (Valley Floor & Ventucopa)

Model Hydrogeologic Layers



Model Hydrogeologic Layers

Elevation (ft)

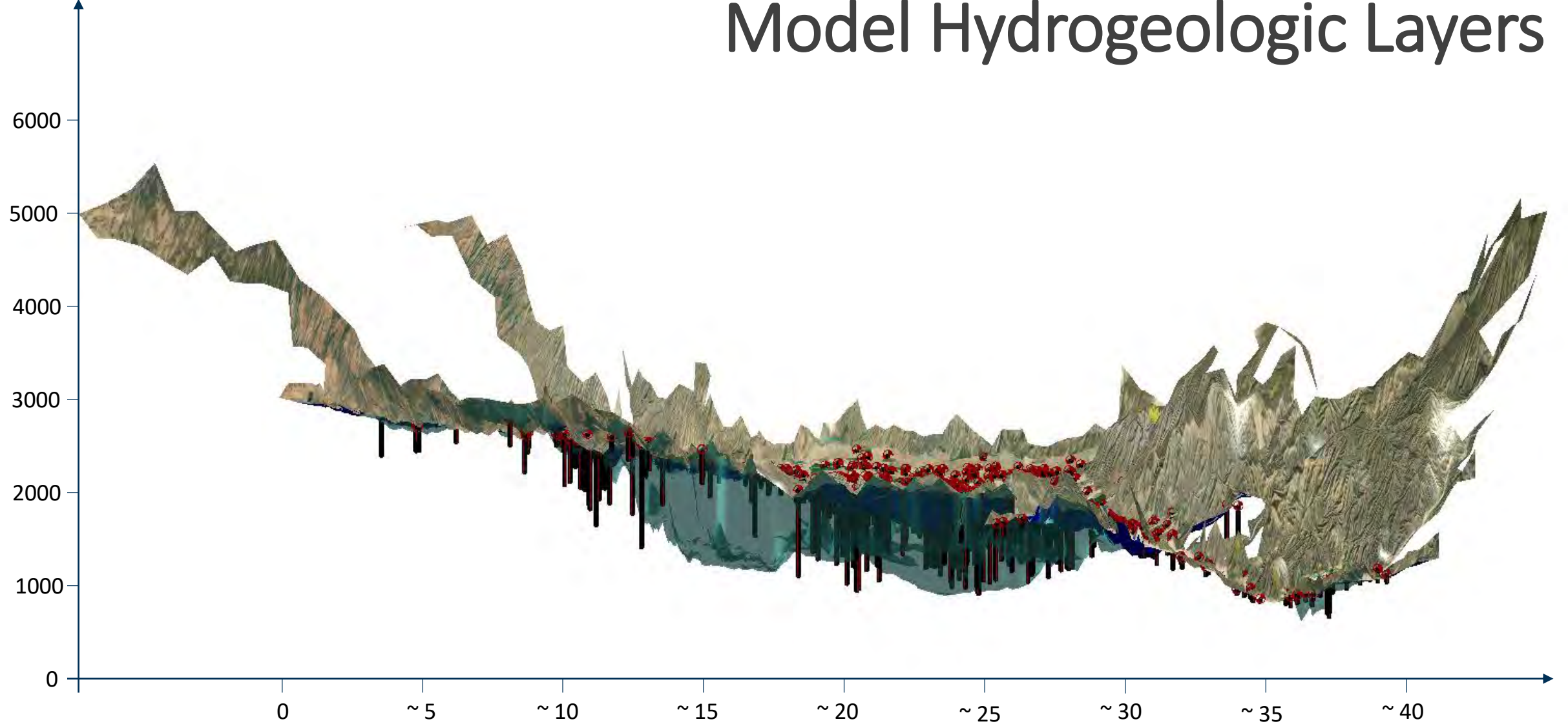


Mile



Model Hydrogeologic Layers

Elevation (ft)

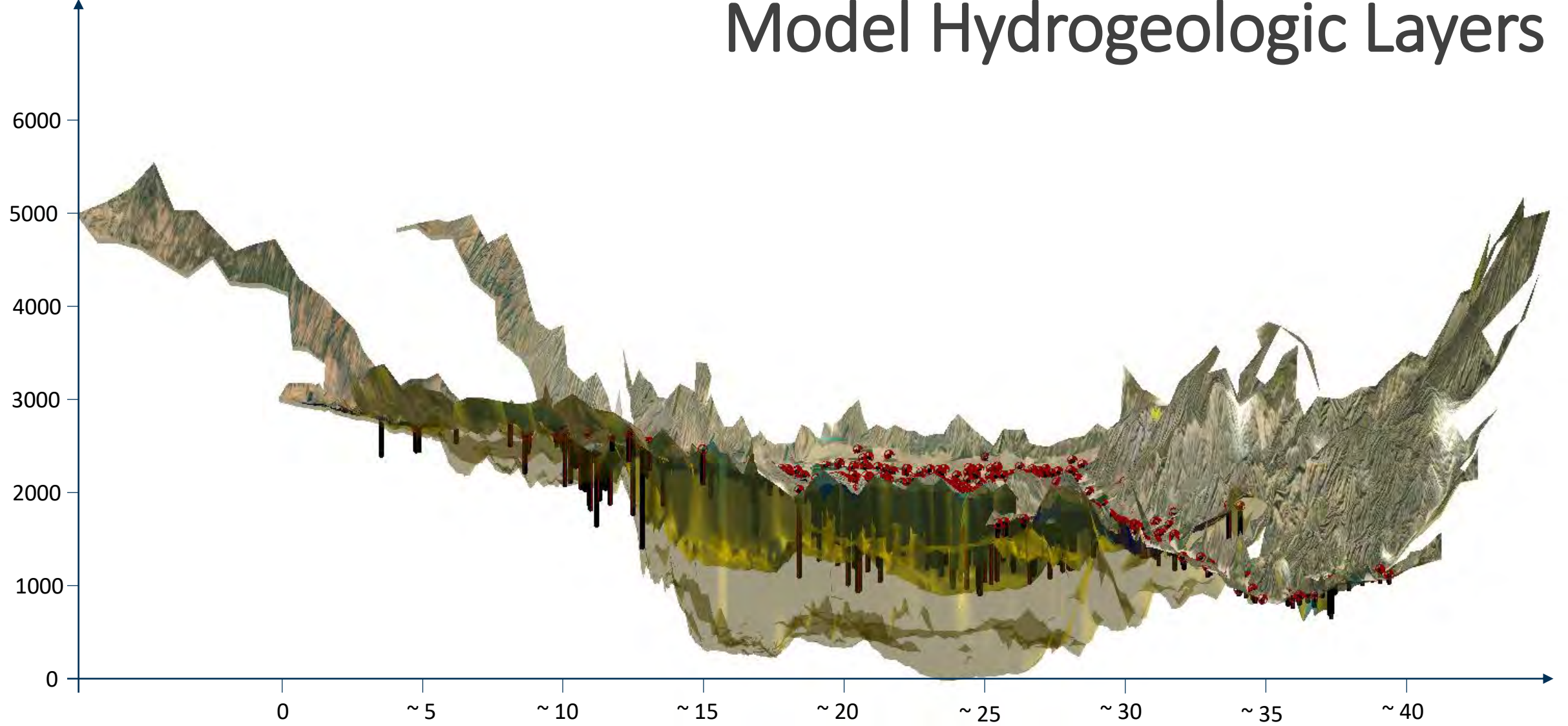


Mile



Model Hydrogeologic Layers

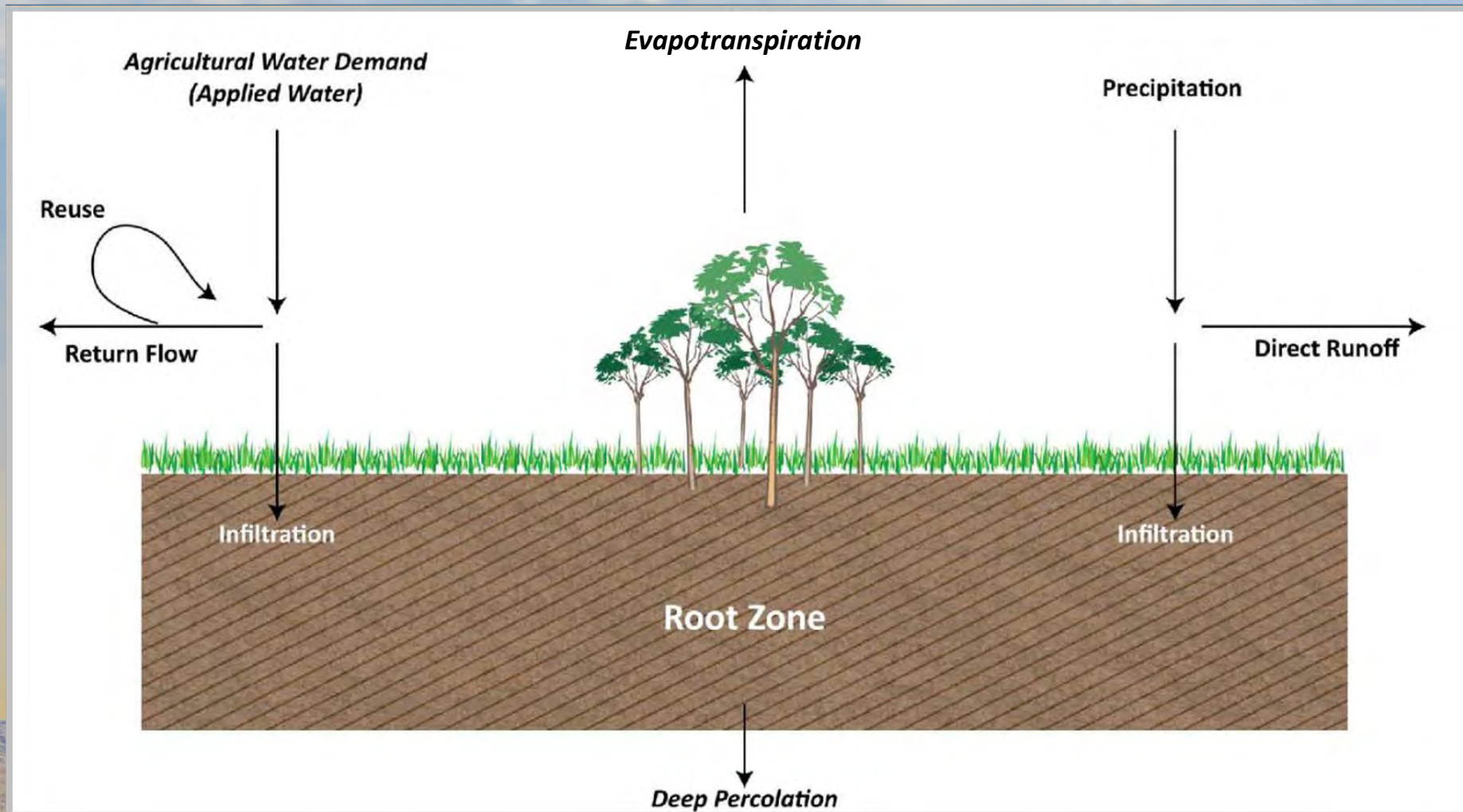
Elevation (ft)



Mile

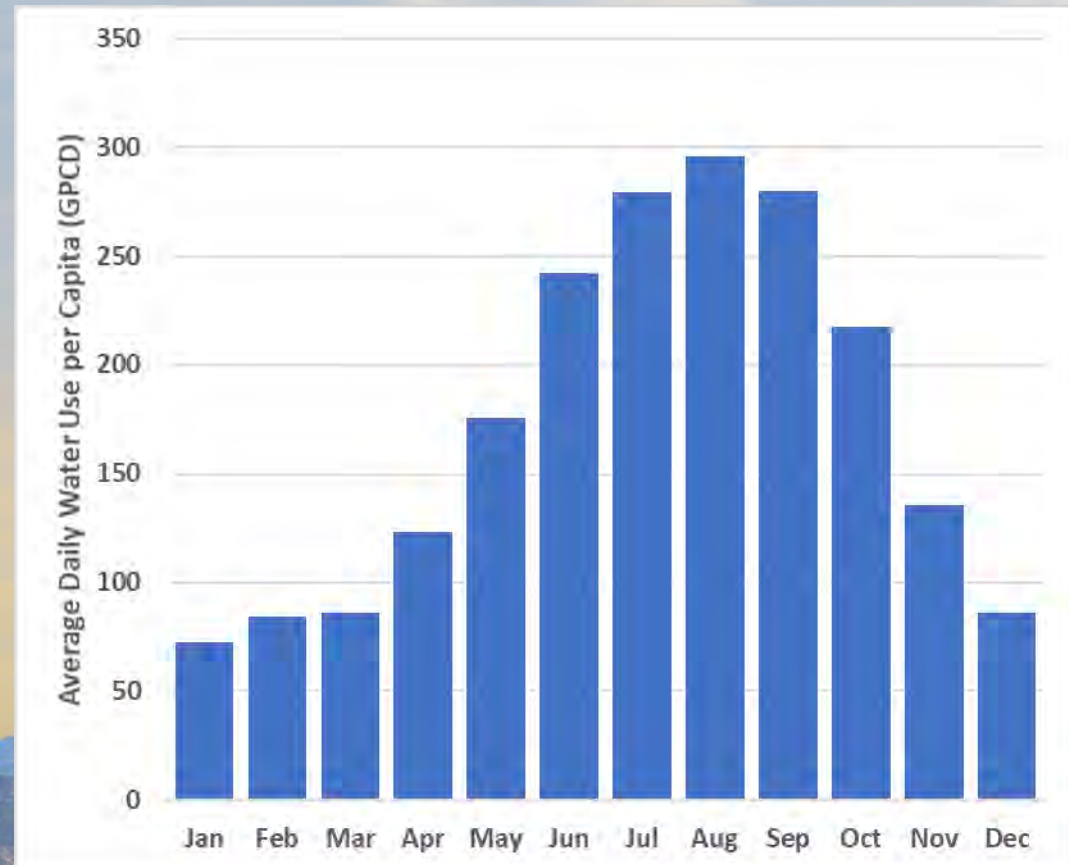


Estimation of Agricultural Water Use



Domestic Water Use Estimation

- Domestic Water Use = Population x Per person water use
 - Population based on recent census information.
 - Per person water use (gallons per capita per day) based on historical Cuyama CSD data (~170 GPCD)



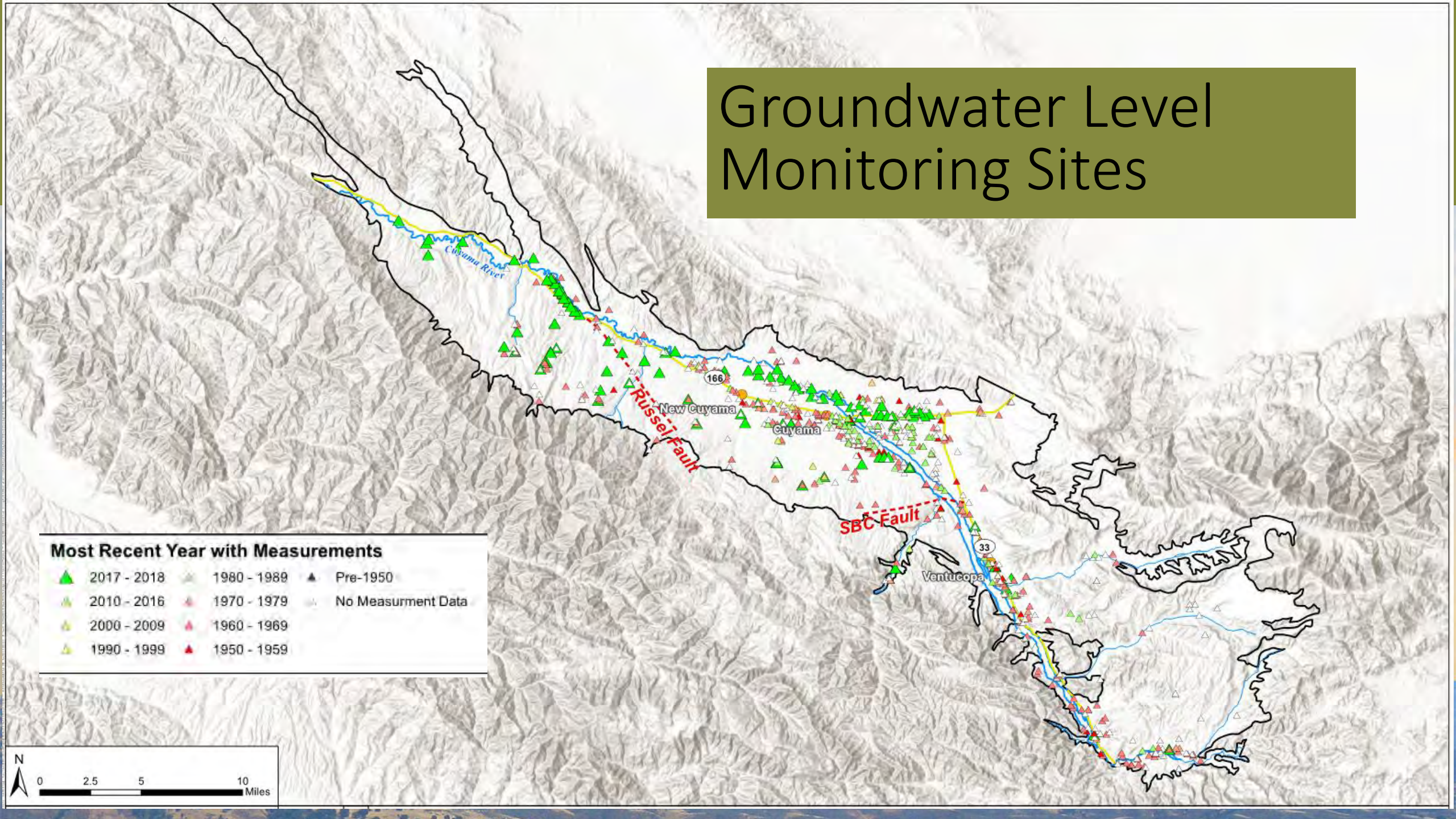
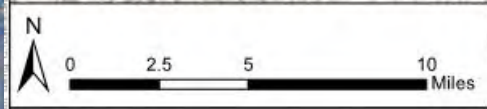
Groundwater Pumping Estimation

Groundwater Pumping = Agricultural Water Use
+ Domestic Water Use
+ Other Uses
(e.g. Frost protection,
dust control)

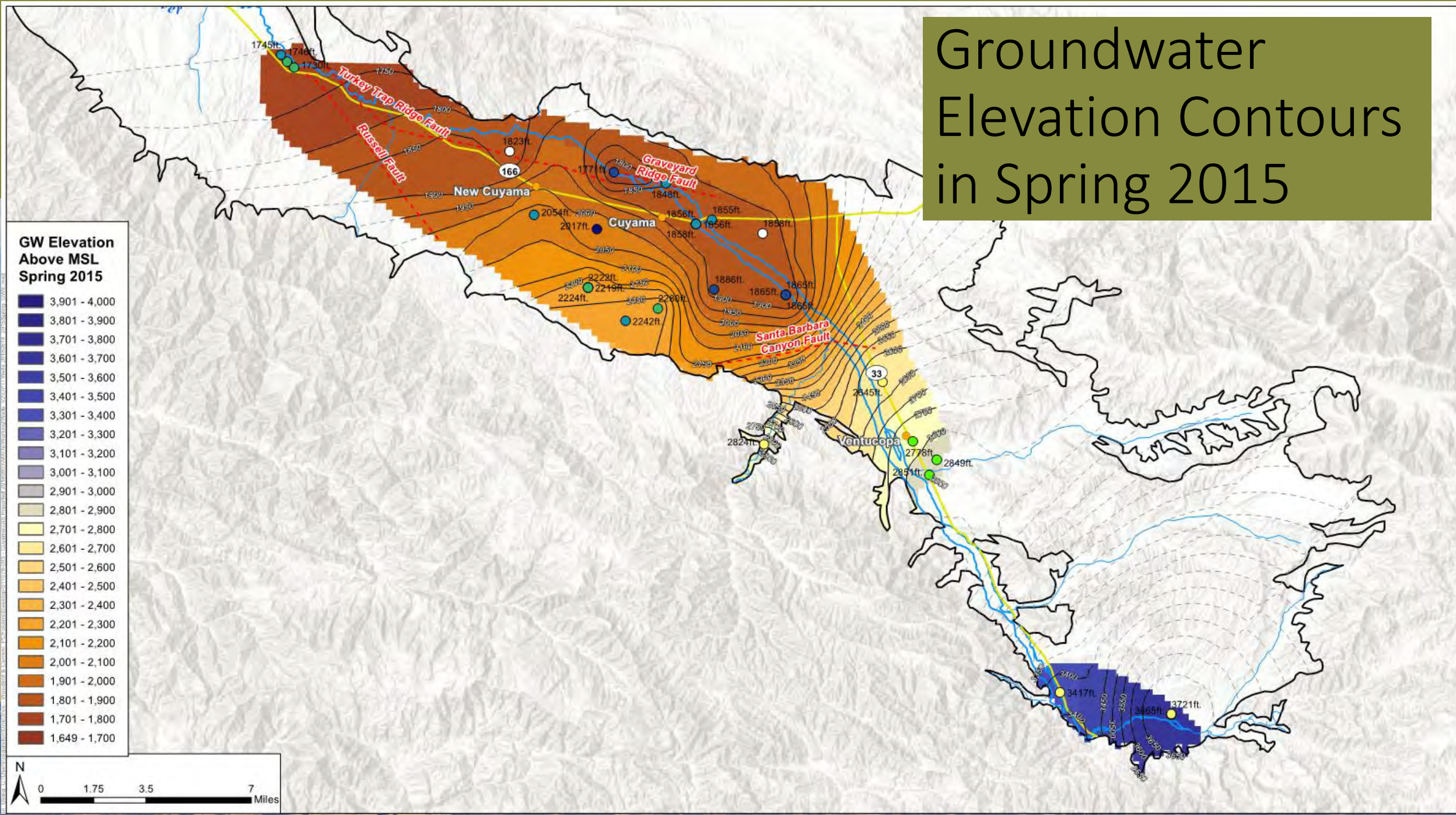
Groundwater Level Monitoring Sites

Most Recent Year with Measurements

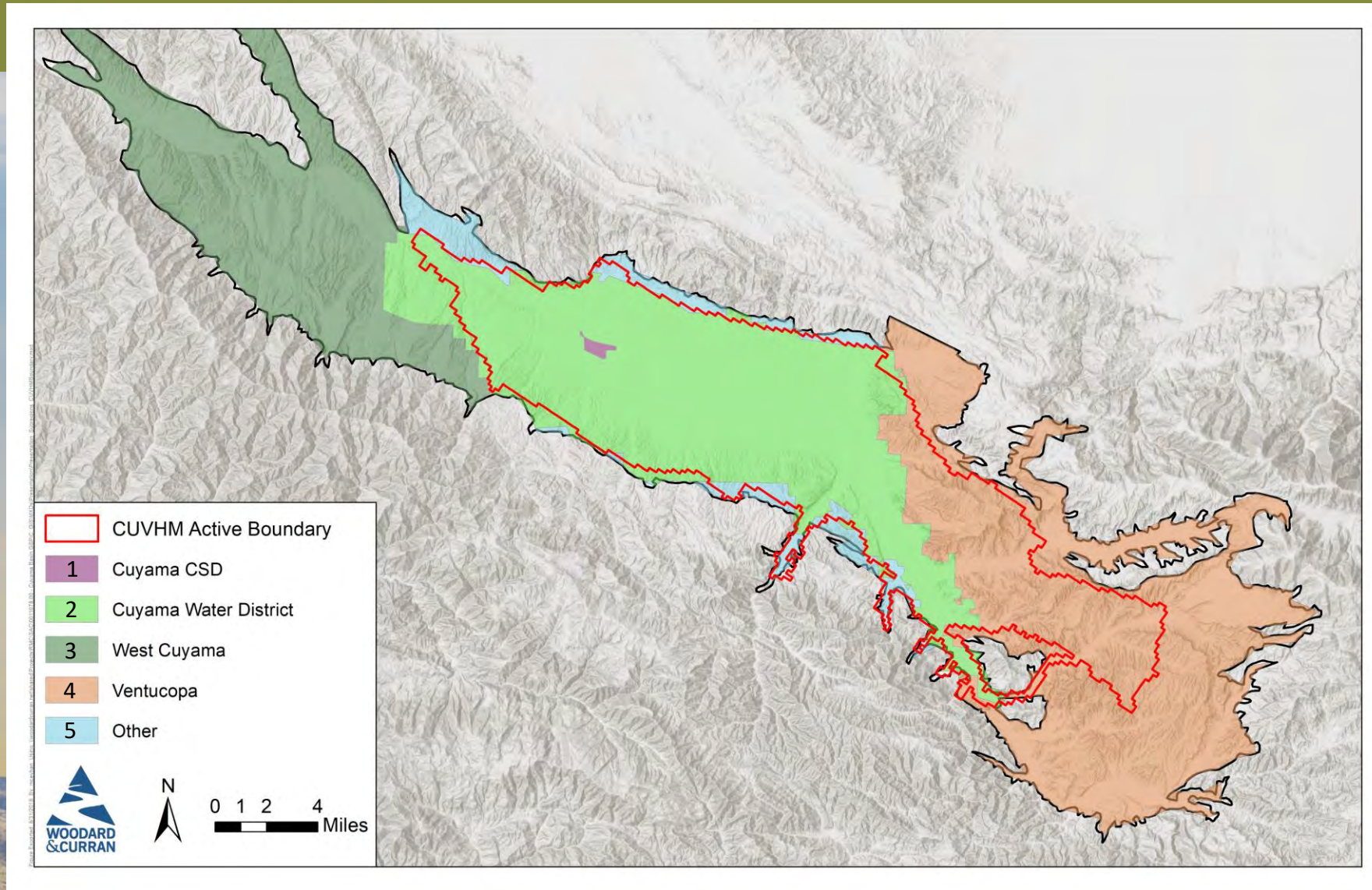
▲ 2017 - 2018	▲ 1980 - 1989	▲ Pre-1950
▲ 2010 - 2016	▲ 1970 - 1979	▲ No Measurement Data
▲ 2000 - 2009	▲ 1960 - 1969	
▲ 1990 - 1999	▲ 1950 - 1959	



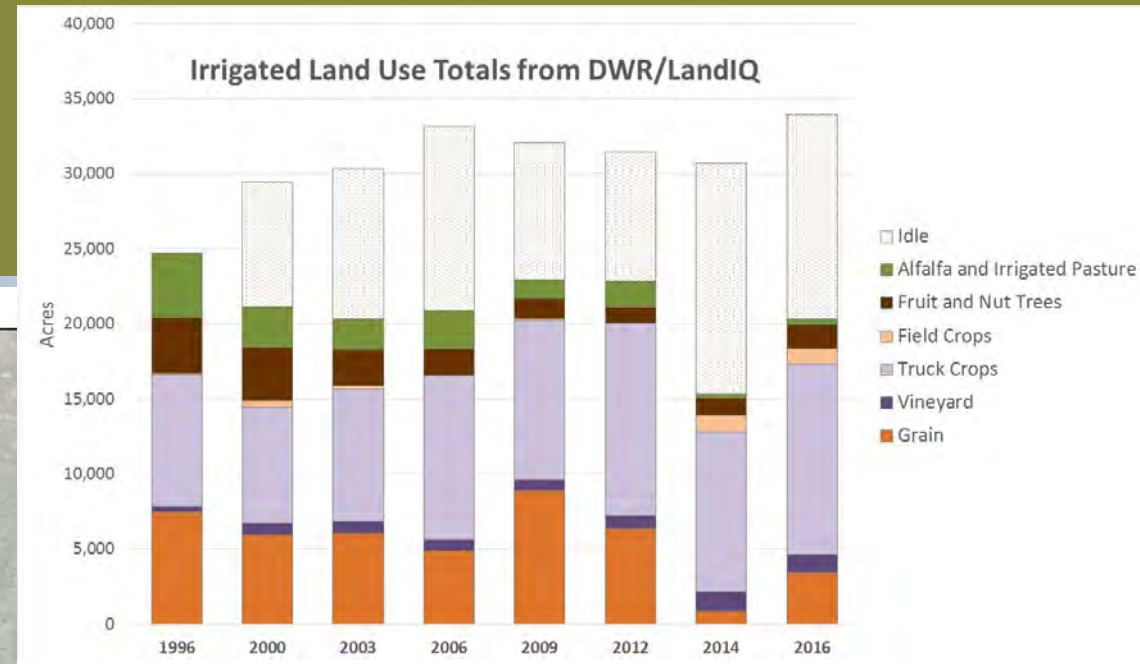
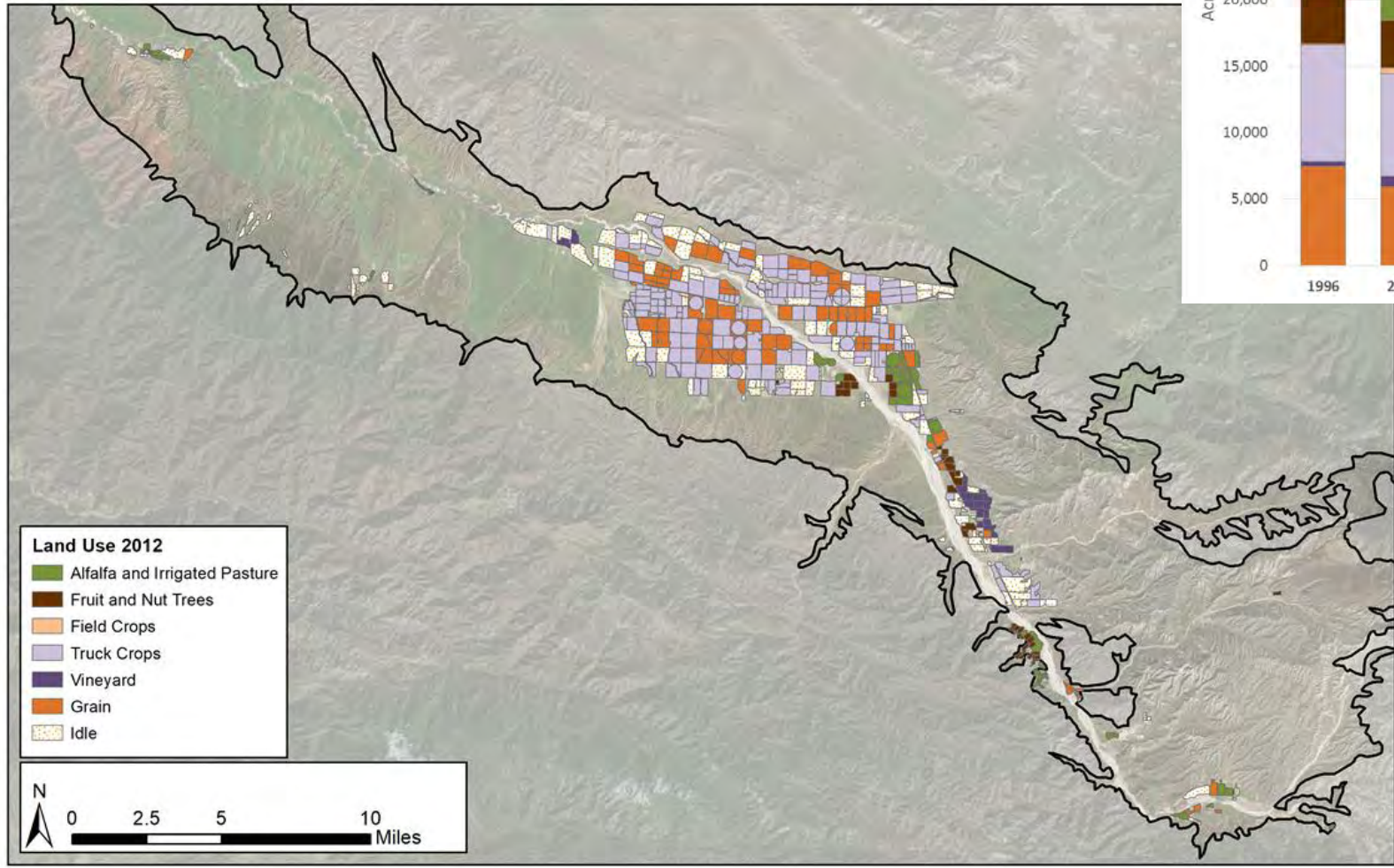
Groundwater Elevation Contours in Spring 2015



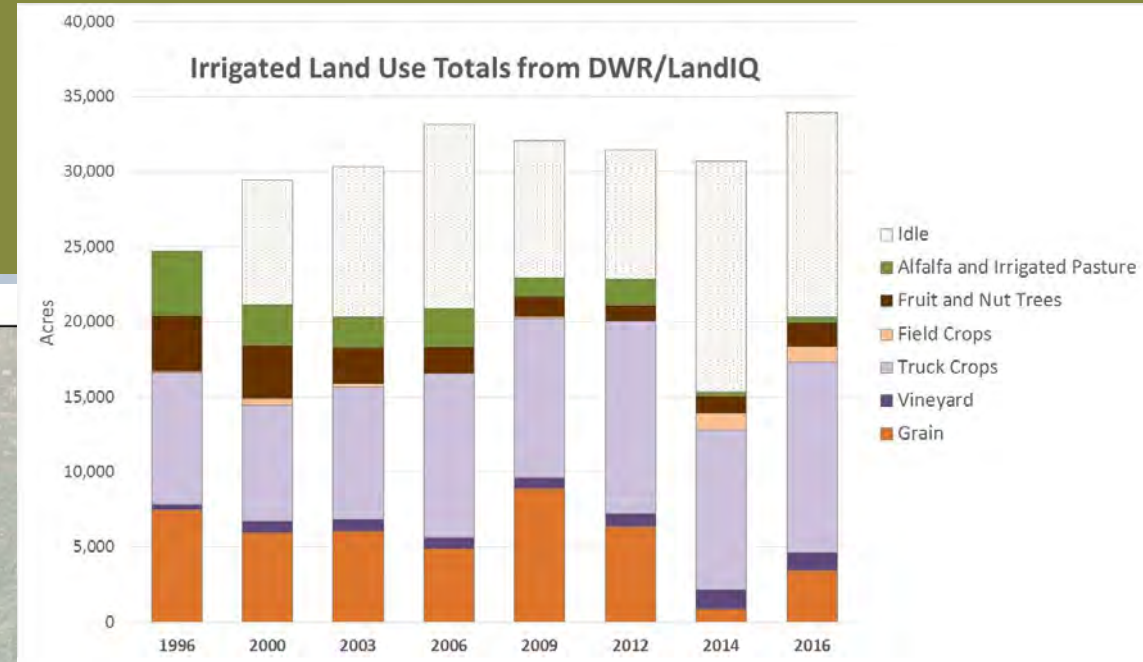
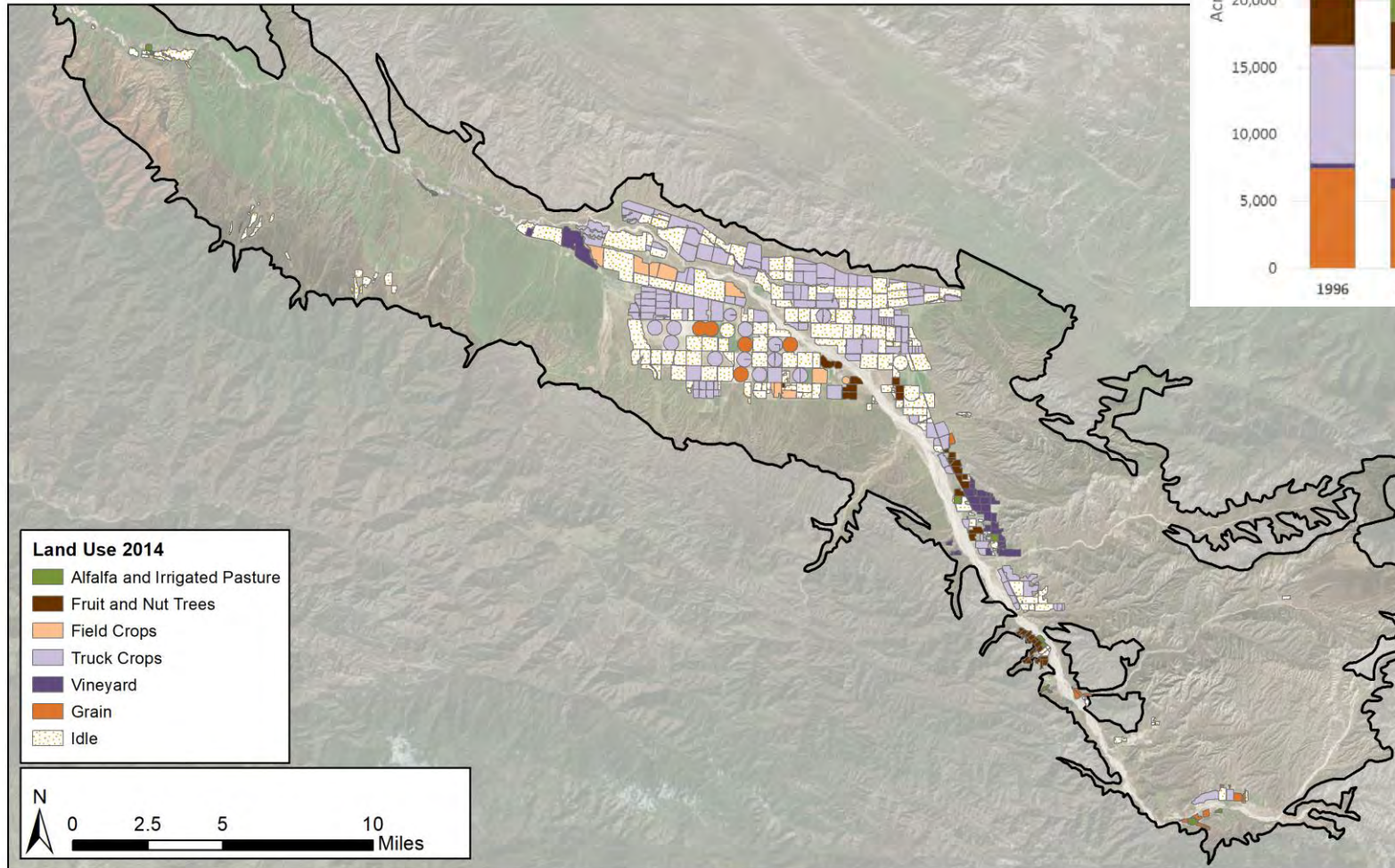
Model Area and Subregions



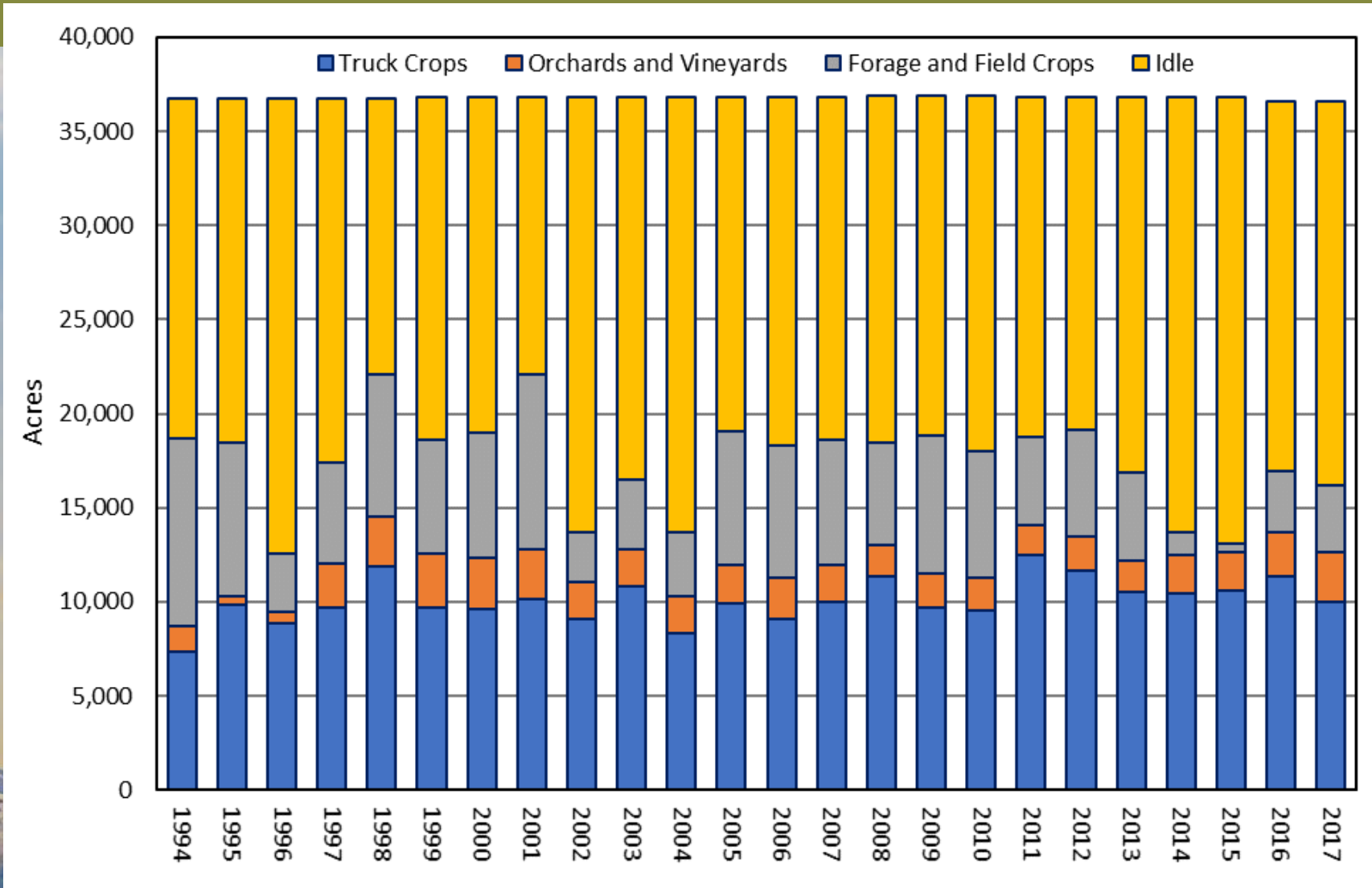
Land Use – 2012 LandIQ



Land Use – 2014 LandIQ

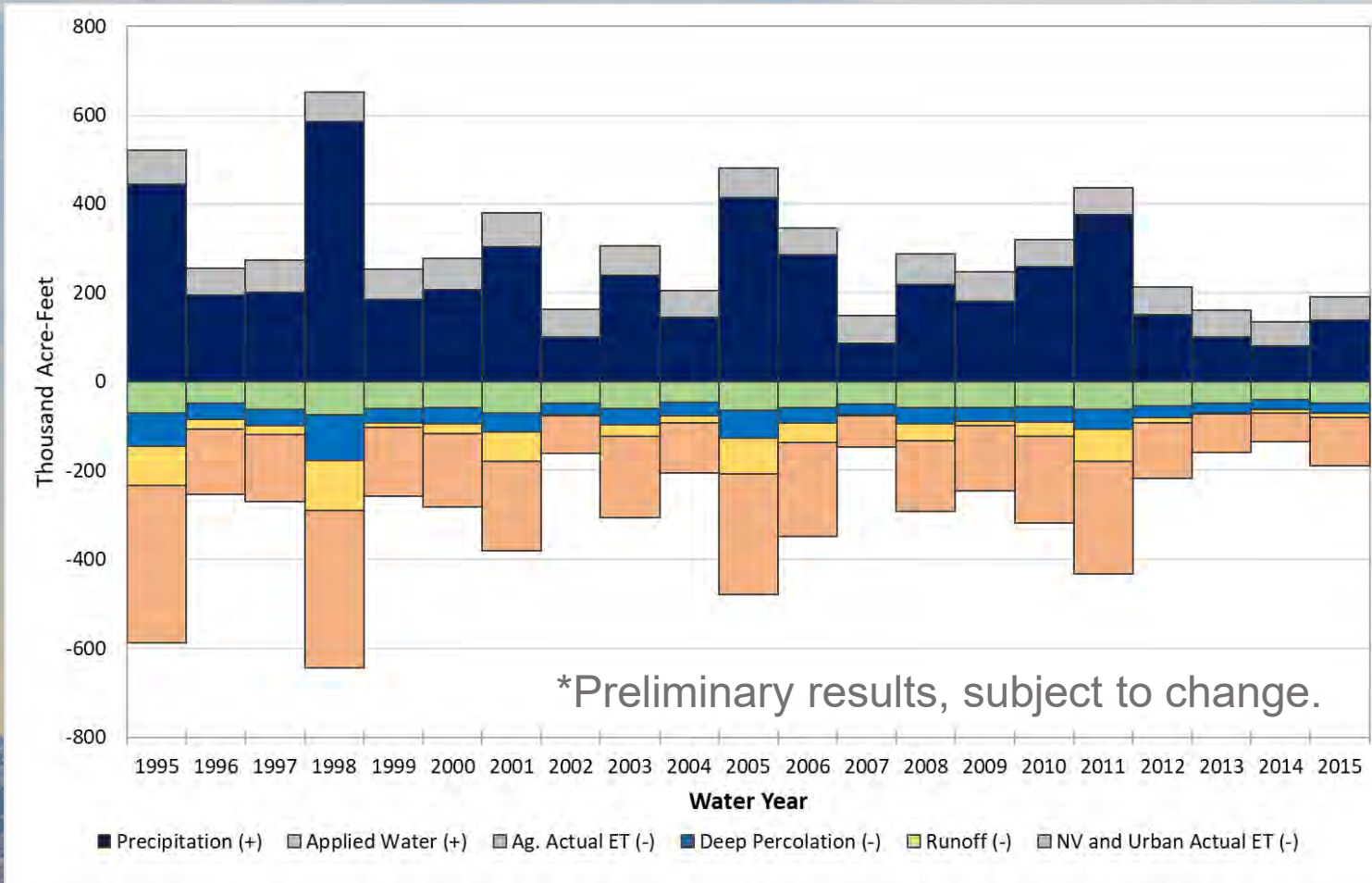


Annual Crop Acreages in Cuyama Valley



Preliminary Land Surface Water Budget: Basin-Wide

Preliminary Draft



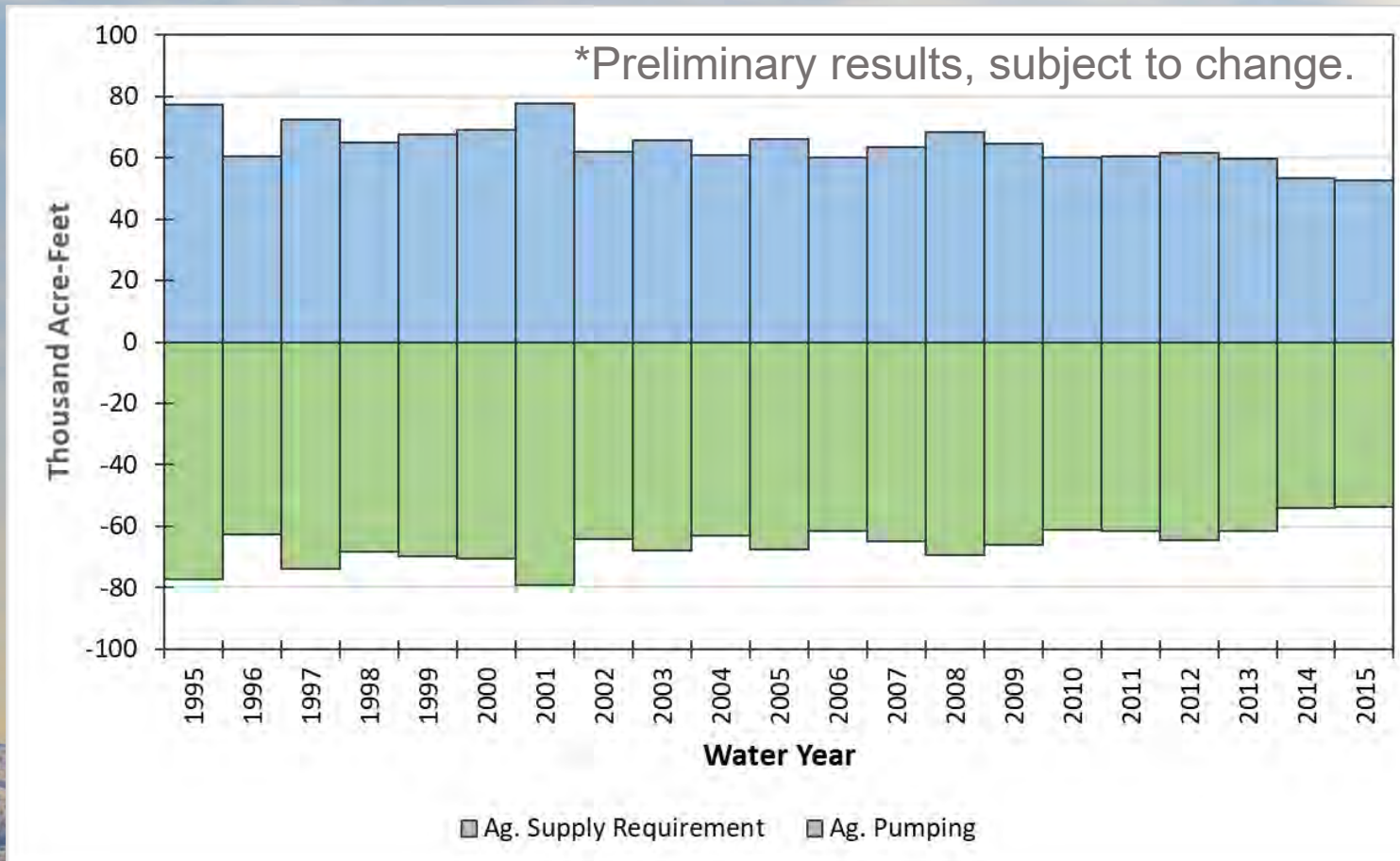
Model Area: 242,000 AC
Developed: 37,000 AC
Undeveloped: 205,000 AC

Average Annual Volumes:

- Precipitation – 223 TAF (~11 in)
- Applied Water – 64 TAF
- Runoff – 30 TAF
- Infiltration – 257 TAF
- Actual ET – 219 TAF
- Deep Perc. – 38 TAF

Preliminary Land & Water Use Budget: Basin-Wide

**Preliminary
Draft**

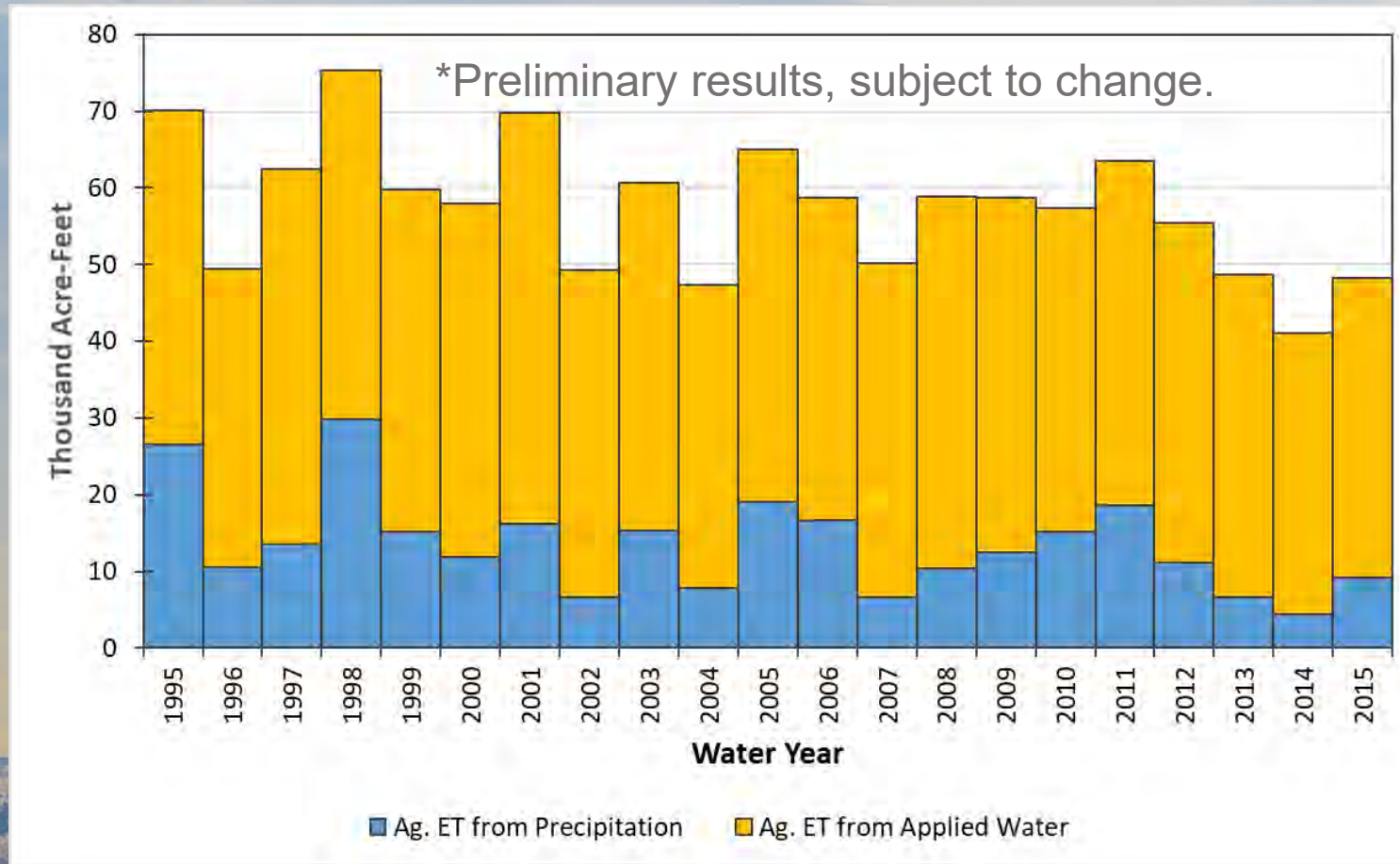


Average Annual Volumes:

- Ag. Supply Requirement: 64 TAF
- Ag. Pumping: 64 TAF

Preliminary Land & Water Use Budget: Basin-Wide

**Preliminary
Draft**

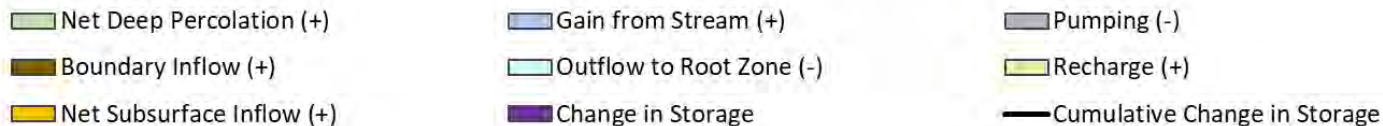
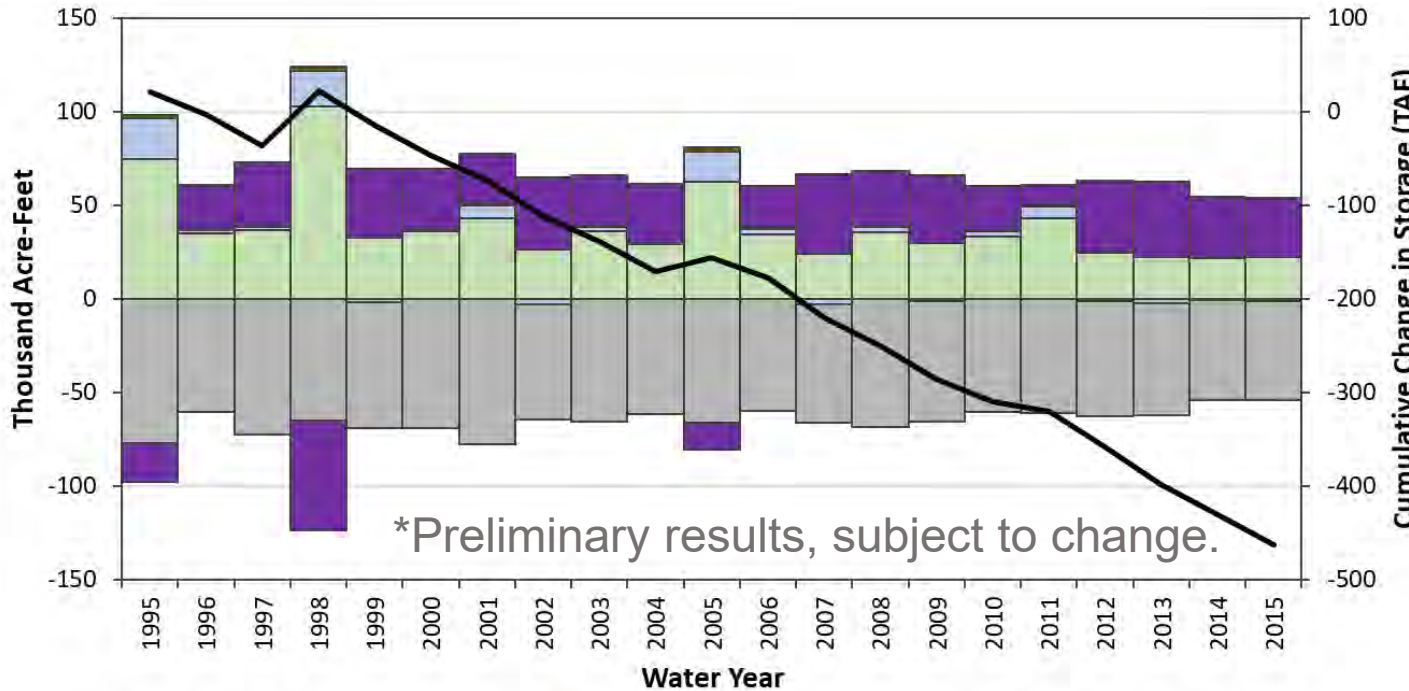


Average Annual Volumes:

- Ag. ETa from Precipitation: 14 TAF (25%)
- Ag. ETa from Applied Water: 44 TAF (75%)

Groundwater Budget: Basin-Wide

**Preliminary
Draft**



Model Area: 242,000 AC

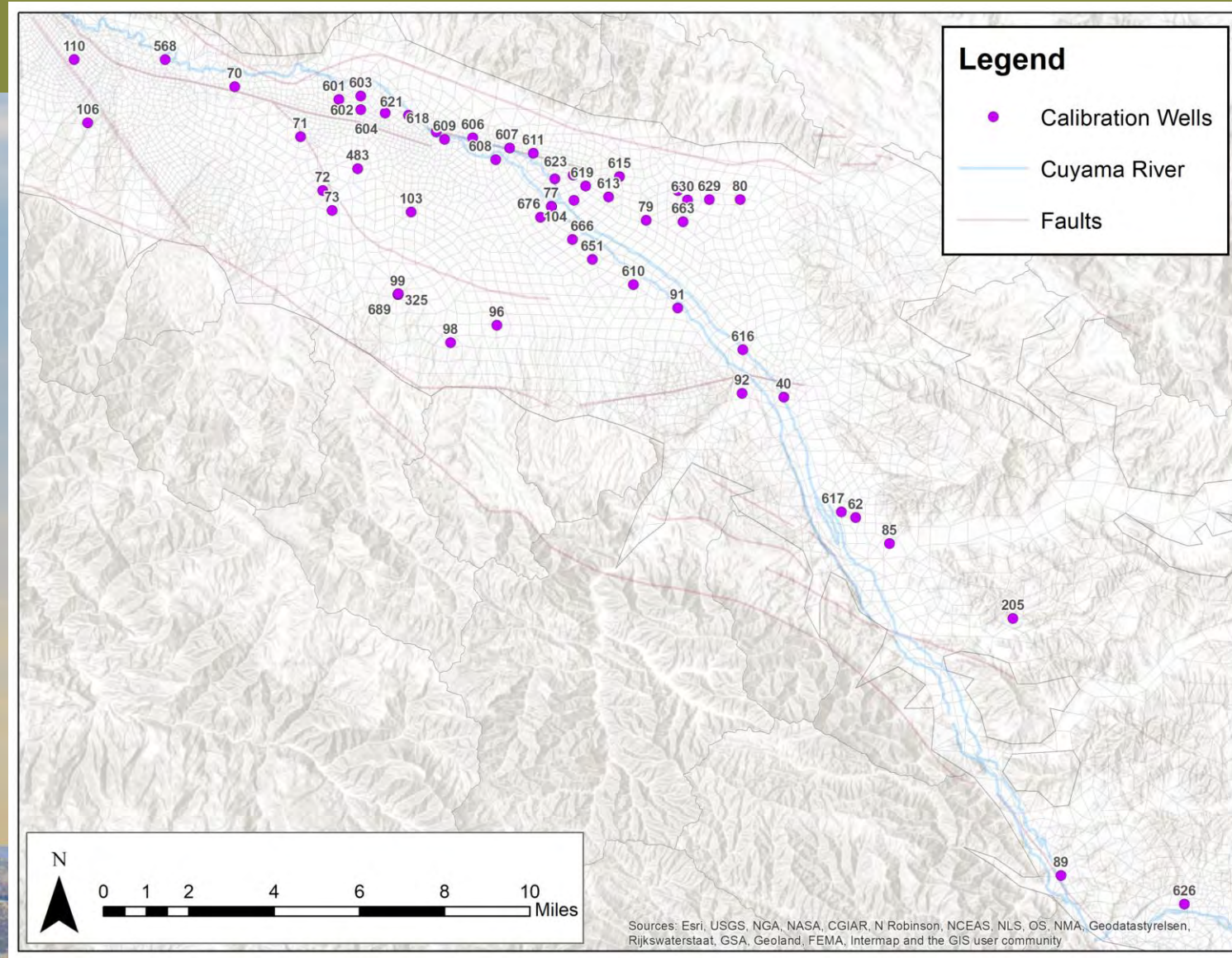
Developed: 37,000 AC

Undeveloped: 205,000 AC

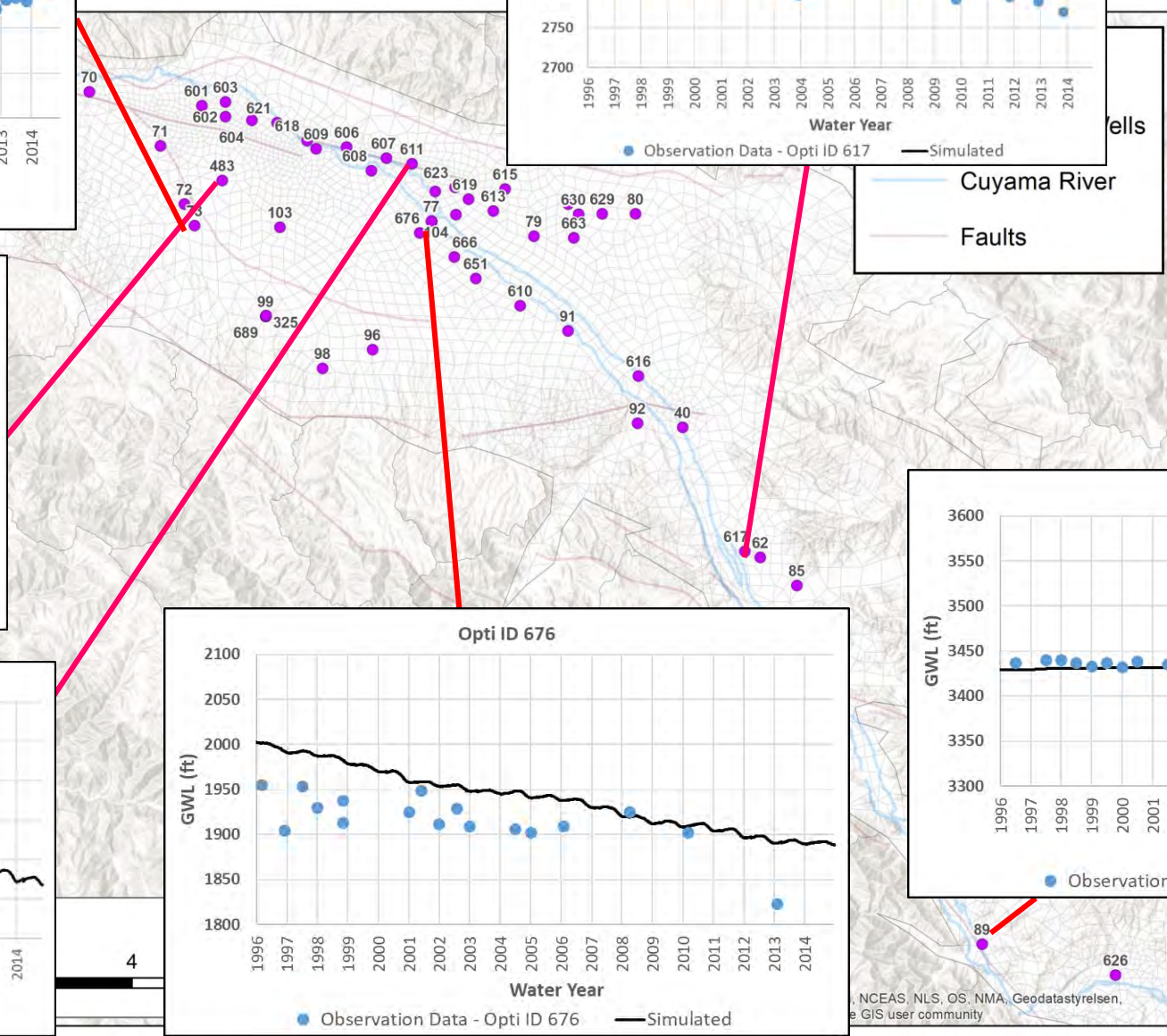
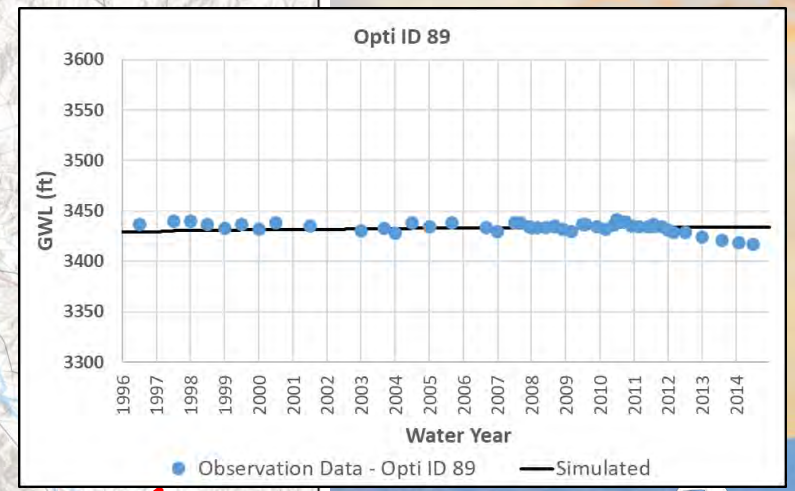
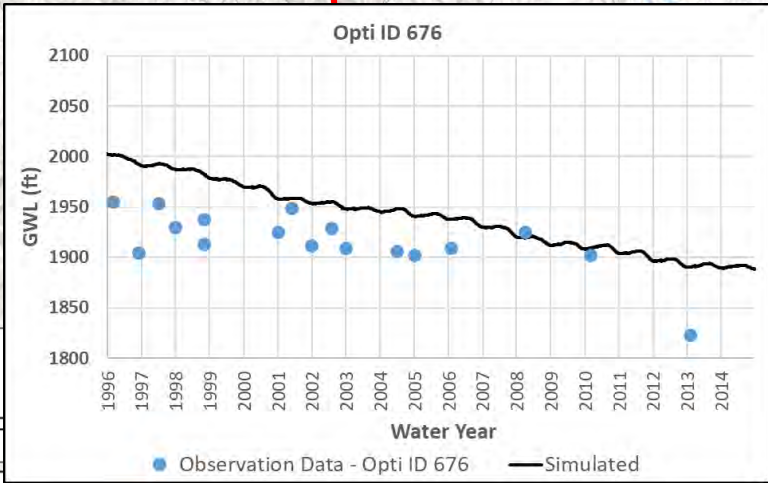
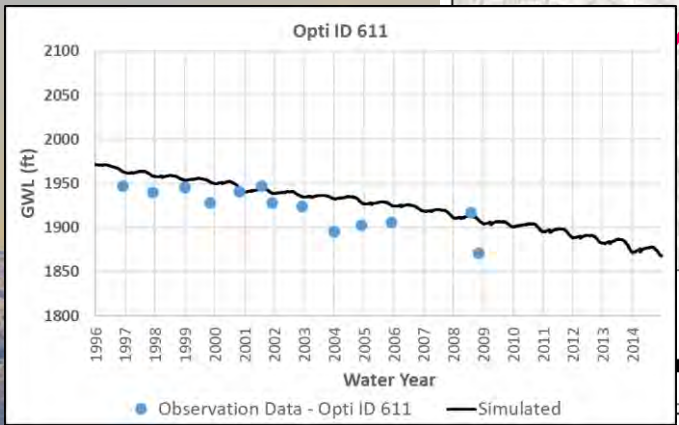
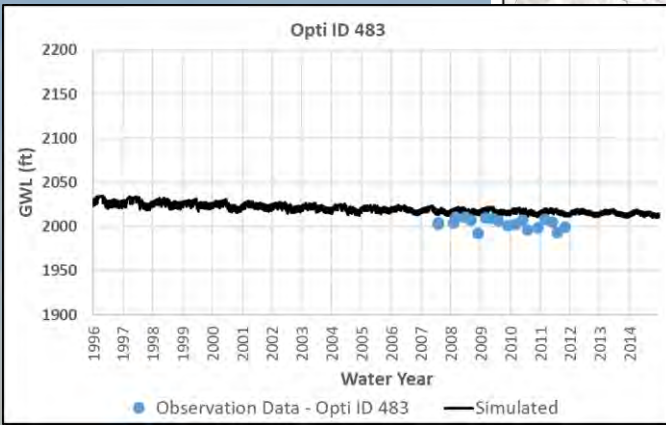
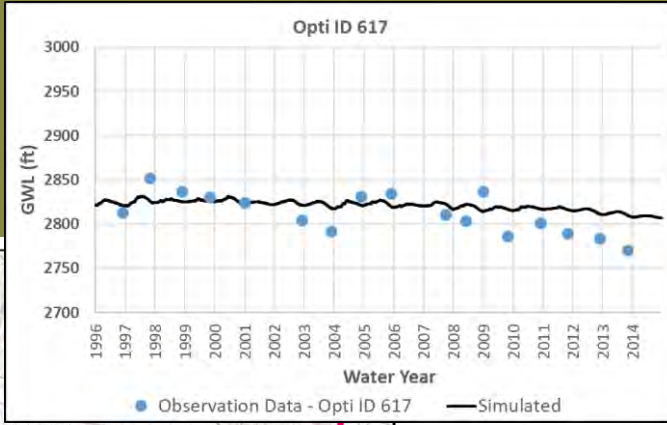
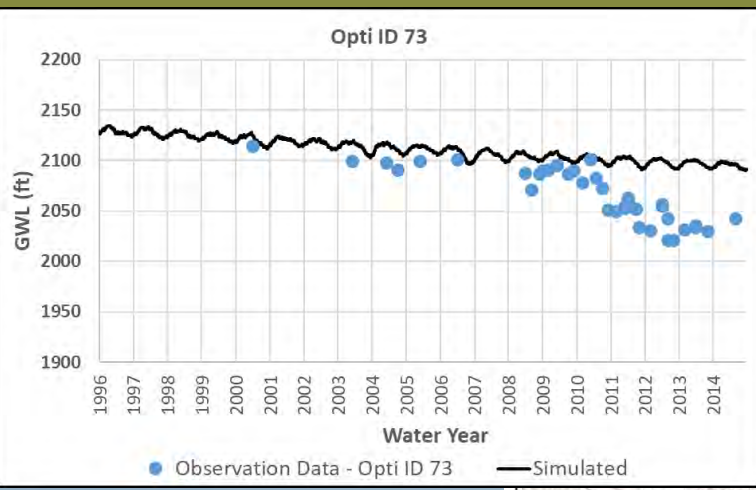
Average Annual Volumes:

- Deep Perc. – 38 TAF
- Pumping – 64 TAF
- Gain from Stream – 3 TAF
- Storage Change – 23 TAF

GW Level Locations



Preliminary Draft



NCEAS, NLS, OS, NMA, Geodatastyrelsen, the GIS user community



Water Budgets - Time Frames

Historical Conditions

Historical hydrology, land use and population (1994-2016)

Current Conditions

2017 land use and population
1967 - 2017 historical hydrology

Future Conditions

Year 2040 land use and population
1967- 2017 historical hydrology
With and without climate change

Modeling of Current and Future Groundwater Conditions

- Purpose: to understand long-term changes to the Basin under current and future conditions
 - Analysis required by SGMA regulations
- Current Conditions Model Scenario
 - Recent historical year (2017)
 - Use long-term historical hydrology (1967-2017)
- Future Conditions Model Scenario
 - Future Year (2040)
 - Long-term historical hydrology (1967-2017)
 - Simulate with and without climate change effects
 - Includes changes to temperature, precipitation and evapotranspiration

Questions and Discussion – Groundwater Modeling

- Clarifying Questions?
 - How the model works
 - Historical conditions and trends
- Are modeling assumptions for the future conditions clear and reasonable to you?
 - Current land uses
 - Projected future conditions
- In addition to what has been presented, what other information from the model would help you understand water resources in the Cuyama Valley?

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Examples of Management Actions and Projects

September 5, 2018



Process for Identifying and Analyzing Management Actions and Projects

- Solicit public input on potential actions and projects (Sep)
- Evaluation and characterization of actions and projects (Sep-Nov)
- Discuss potential actions with SAC and Board (Dec)
- Numerical modeling of management action alternatives (Dec-Jan)
- Present numerical modeling results to SAC and Board (Feb)

Projects and Management Actions to Close the Gap Between Water Supplies and Demands

- Water supply projects to increase available supplies
- Management actions to reduce groundwater demands
- Adaptive management to respond to changes in supplies and demands over time



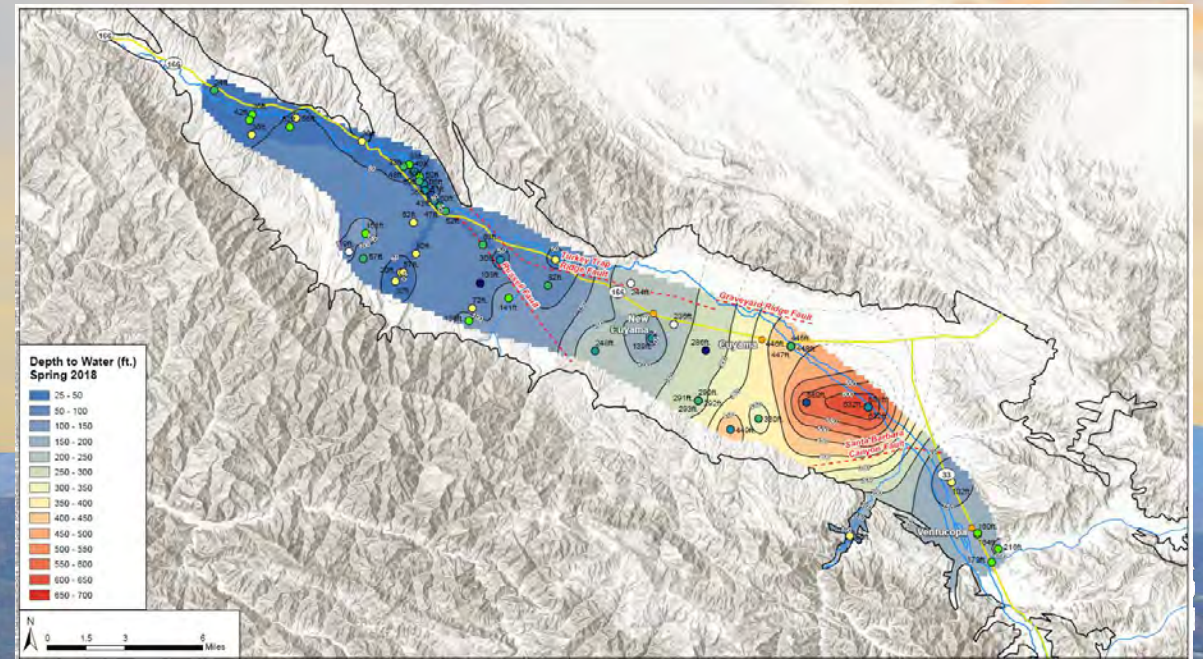
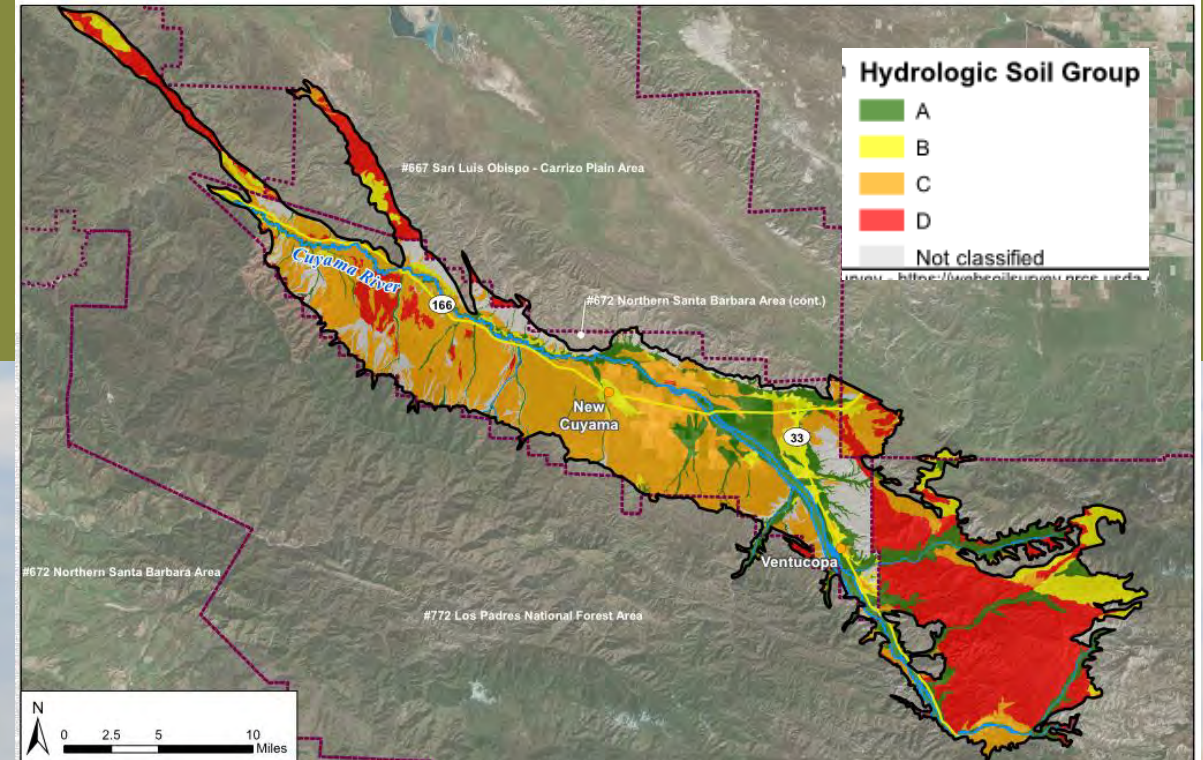
Potential Demand Management Actions

- Potential components of a demand management approach:
 - Pumping restrictions/allocations
 - Water accounting
 - Water metering
 - Water market
 - Fees
 - By pumping amount or acreage
 - Glide path



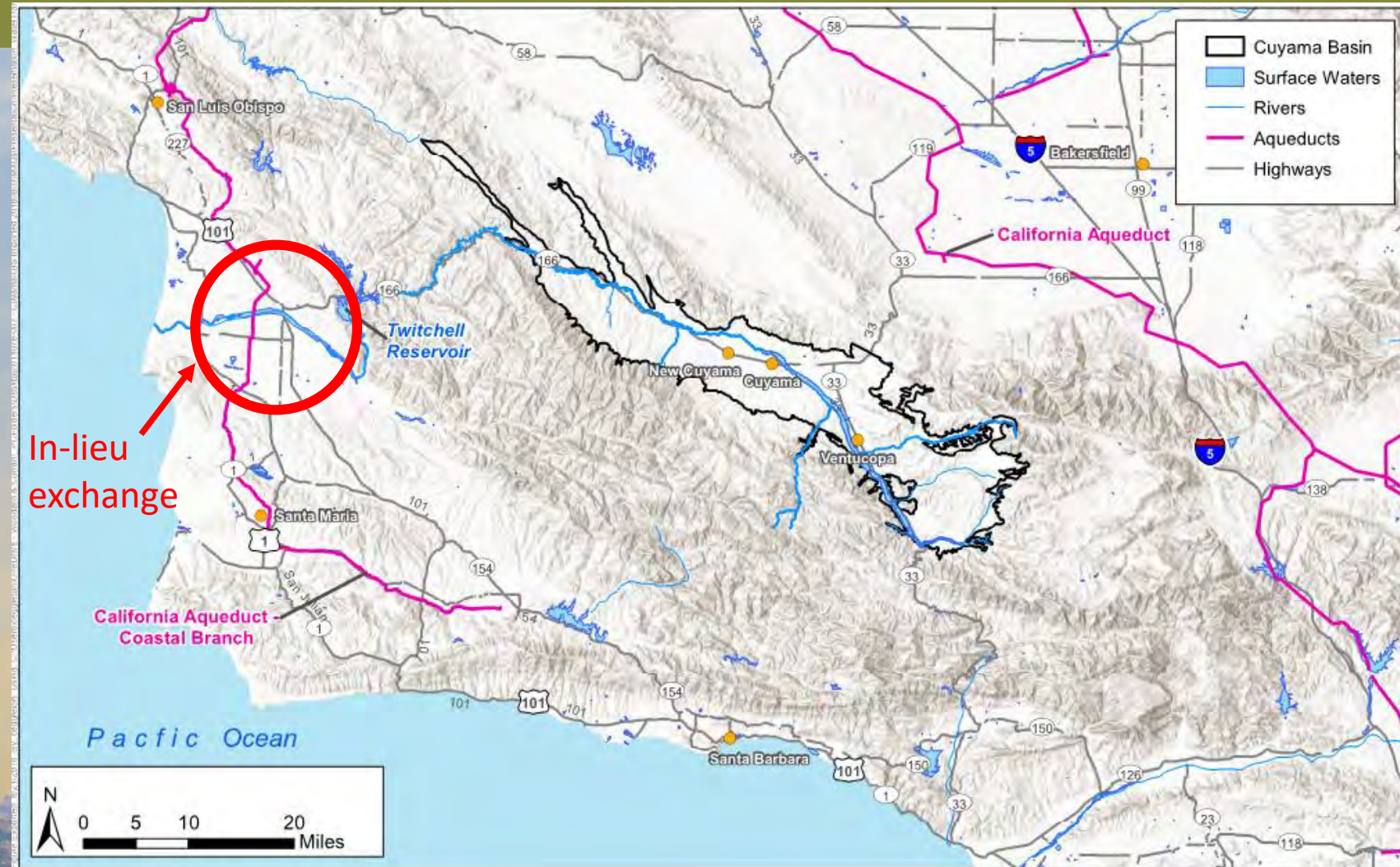
Potential Water Supply Projects

- Storm and Flood Water Capture Projects
 - Capture excess flood flows and recharge into aquifer
 - Select recharge locations selected based:
 - Soil properties
 - Current groundwater conditions in local area
 - Available water for recharge limited by downstream water rights



Potential Water Supply Projects

- Water Supply Imports/Exchanges
 - Purchase water & transport in Coastal Aqueduct
 - Exchange at Twitchell to allow for greater floodwater capture upstream
 - Other water import/exchange possibilities?



Questions and Discussion – Management Actions and Projects

- Clarifying questions?
 - Demand Management
 - Water Supply
- Are there additional actions or projects to consider?

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Options for Management Areas in the Cuyama Basin

September 5, 2018

Process for Defining Management Areas

- Solicit public input (Sep)
- Evaluate the options (Sep-Oct)
- Present recommendation to SAC and Board (Oct)
- Board Adoption (Nov)

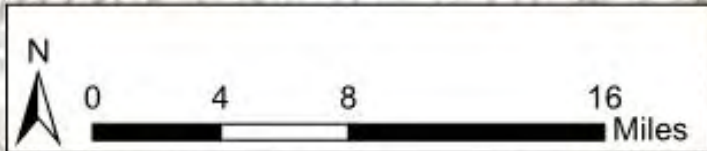
What is a Management Area?

- Management areas are optional but may be established at GSA's discretion
- A management area can be used to:
 - Set different minimum thresholds
 - Set different measurable objectives
 - Set up different density and frequency of monitoring
 - Vary implementation of projects and management actions

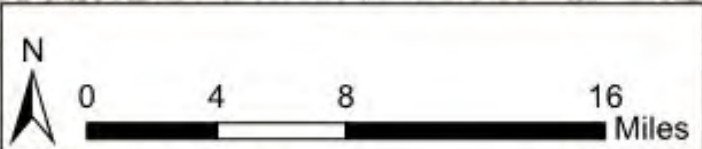
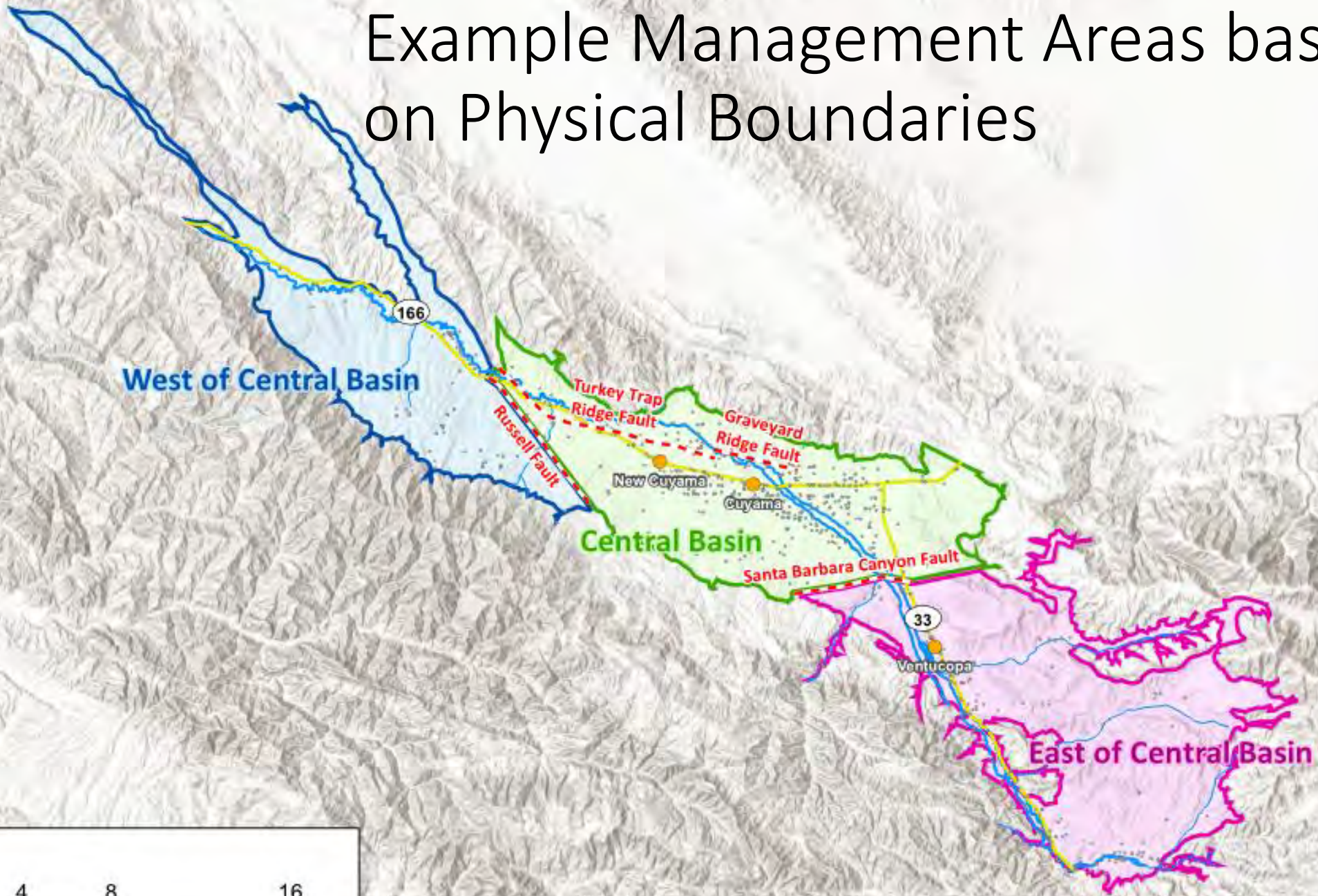
Options for the Cuyama Groundwater Basin

- Potential Jurisdictional Boundaries
 - Cuyama Community Services District
 - Cuyama Basin Water District
 - Areas Outside Both Districts
 - Four Counties
- Potential Physical Boundaries
 - Russell Fault
 - Santa Barbara Canyon Fault
- Current Basin Conditions
 - Based on current groundwater levels

Example Management Areas based on Jurisdictional Boundaries



Example Management Areas based on Physical Boundaries



Example Management Areas based on Current Basin Conditions

West of Central Area

New Cuyama

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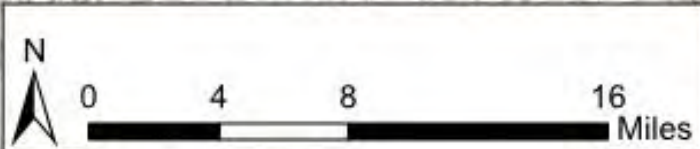
Cuyama

Central-Basin Area

East of Central Area

Ventucopa

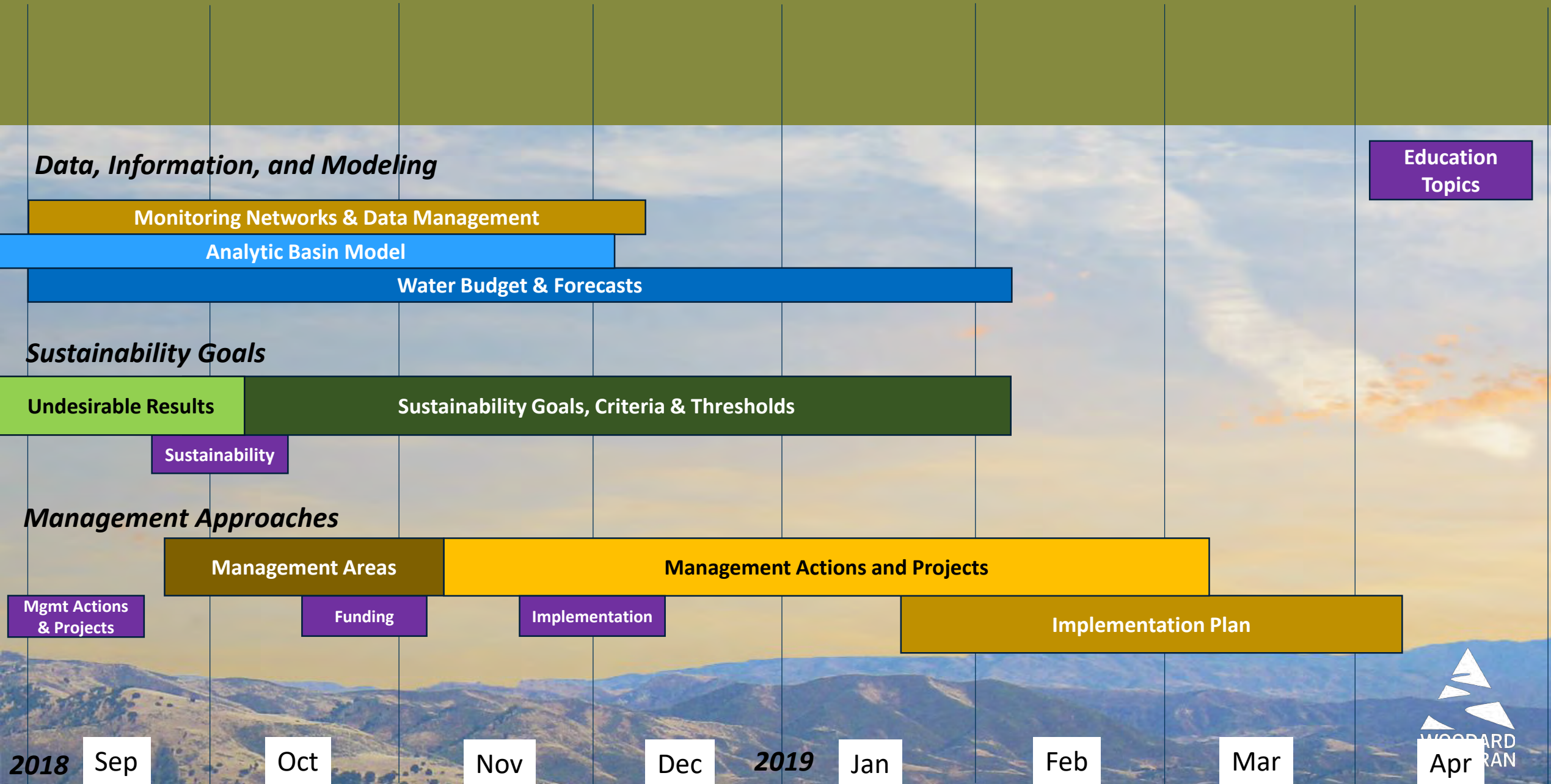
South East Area



Questions and Discussion – Management Areas

- Clarifying questions?
 - Advantages and limitations of Management Areas
- Do you have preferences that the GSA Advisory Committee and Board should consider?

Cuyama Basin Groundwater Sustainability Plan – Discussion Topics



Cuyama Basin Groundwater Sustainability Agency

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