

# Fillmore and Piru Basins: Groundwater Model Progress

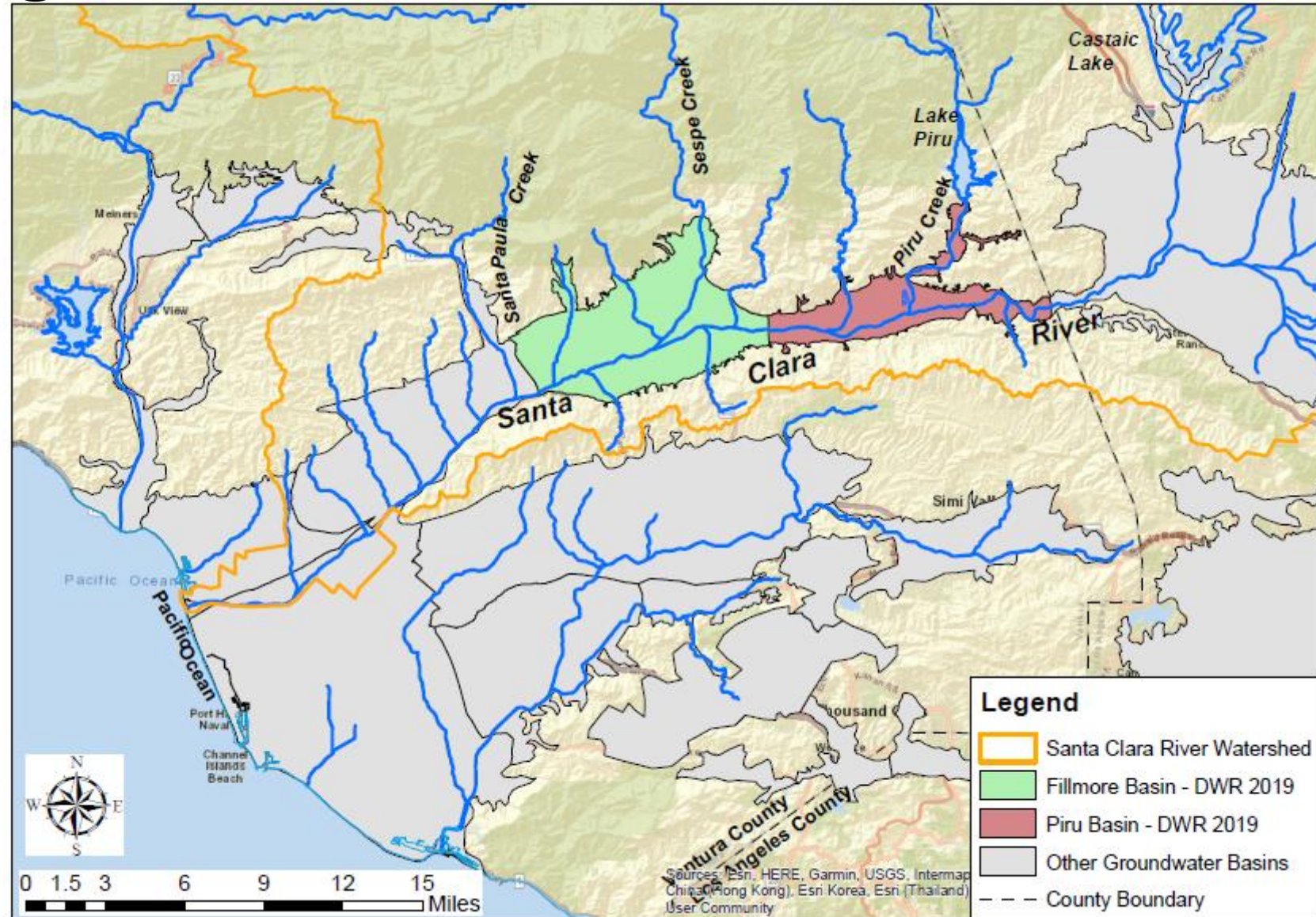
**Zach Hanson**, PhD, Assistant Hydrogeologist, United Water

**Dan Detmer**, PG, CHG, Supervising Hydrogeologist, United Water

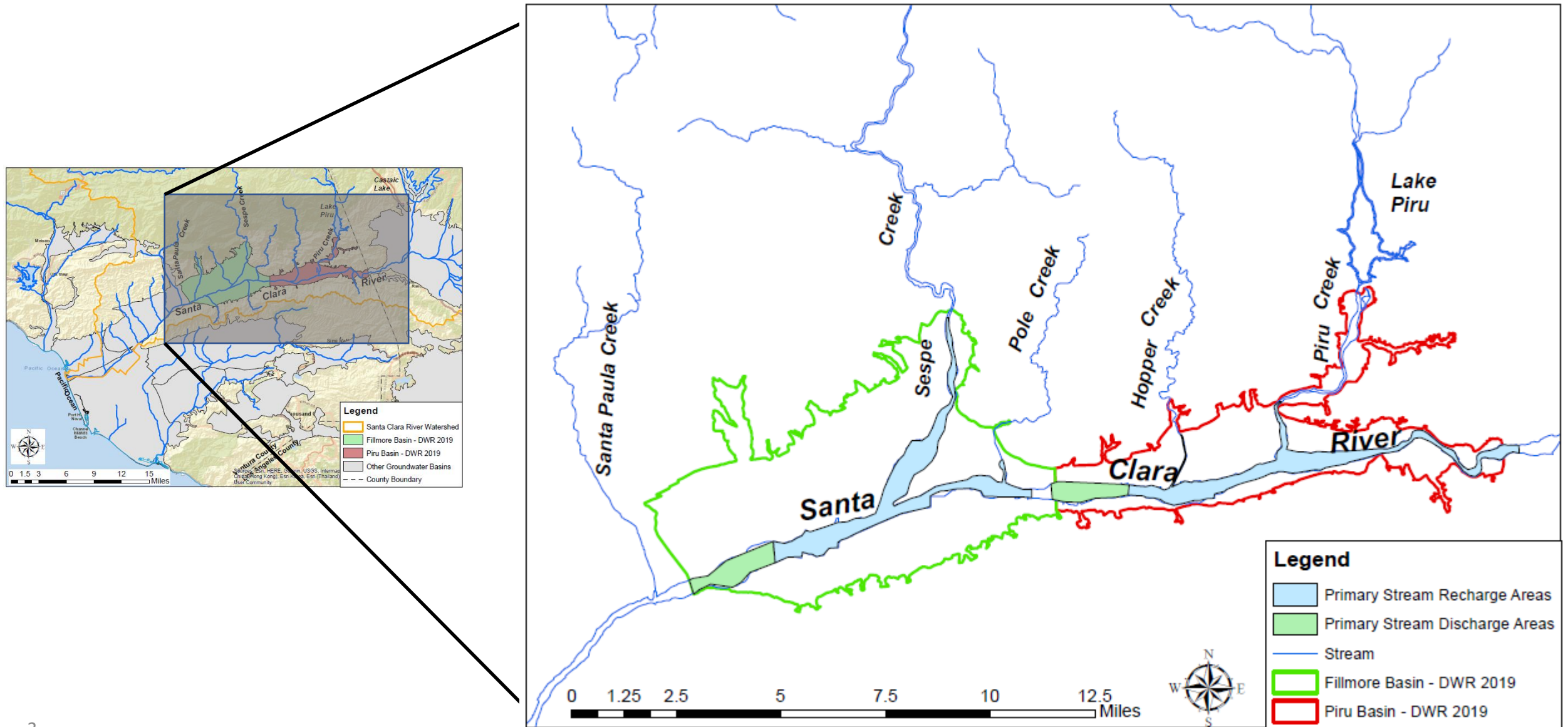
Fillmore and Piru Basins GSA Board of Directors Meeting

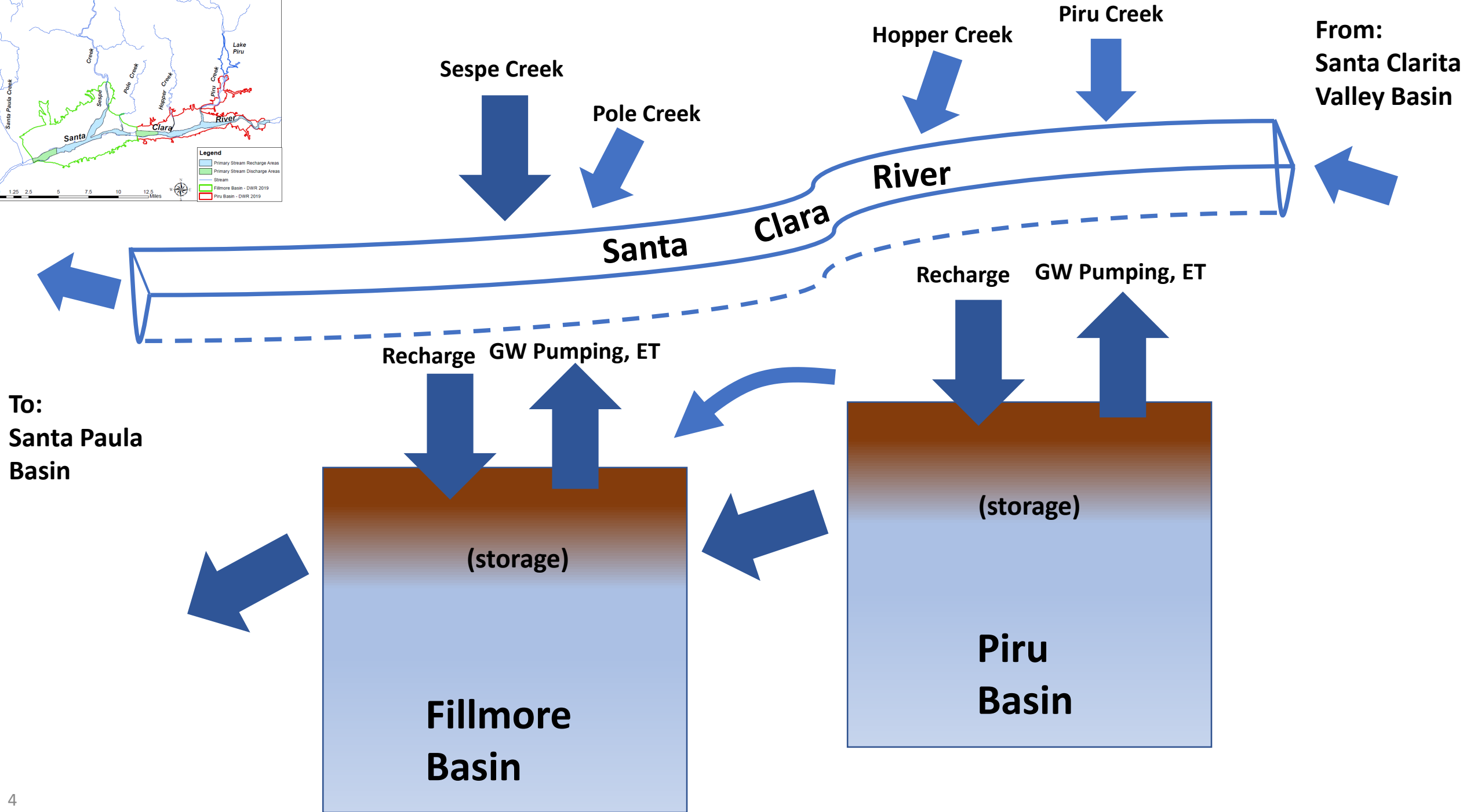
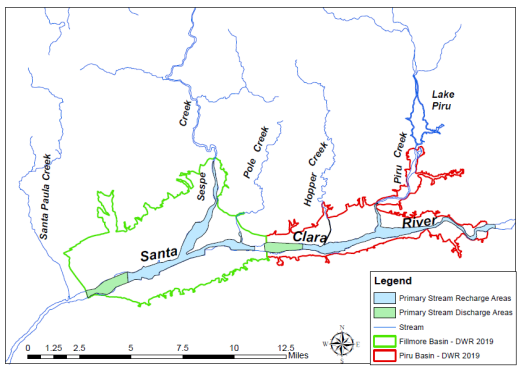
Friday, September 27, 2019

# Regional Setting



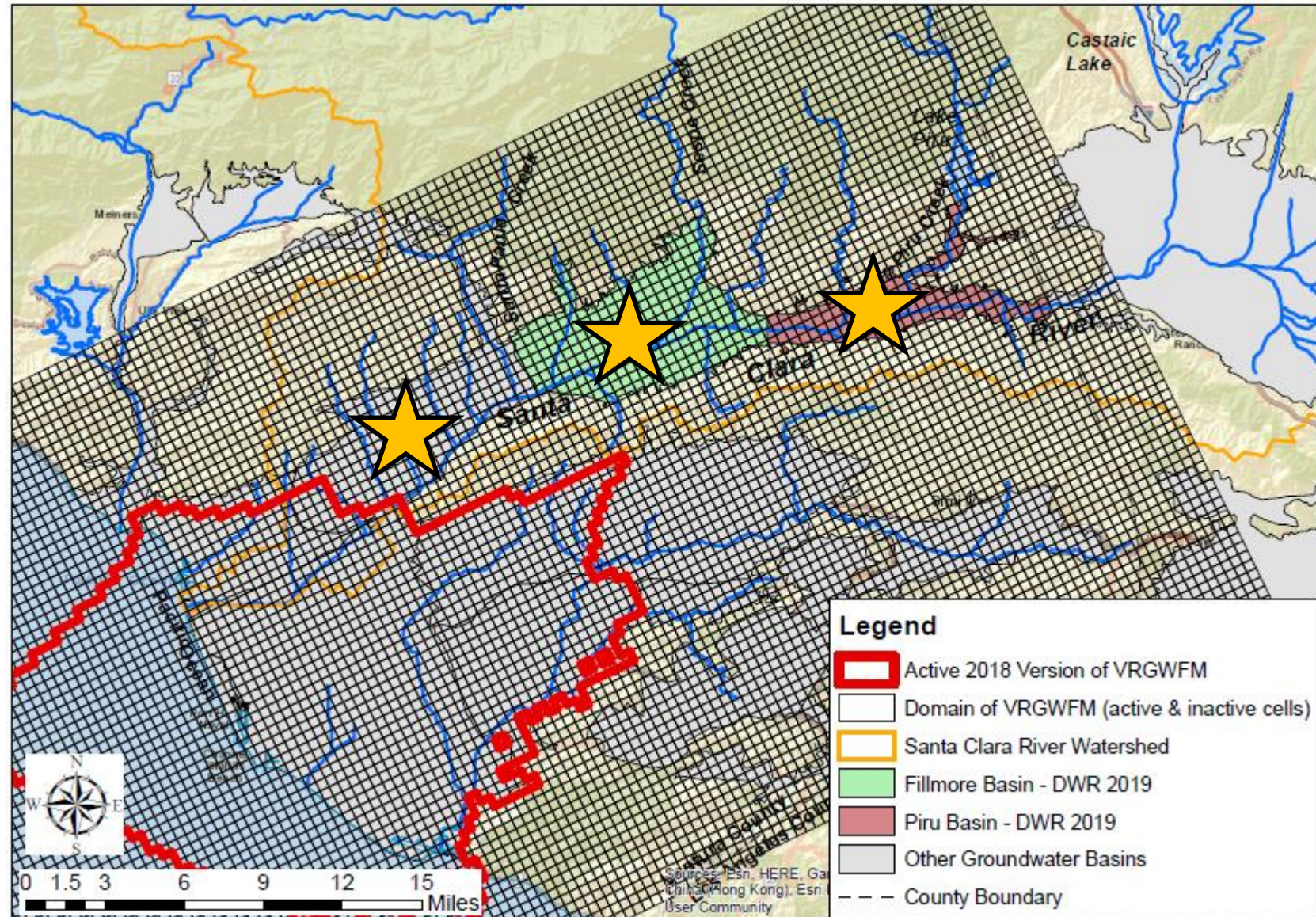
# Fillmore & Piru Basins





# Numerical Modeling

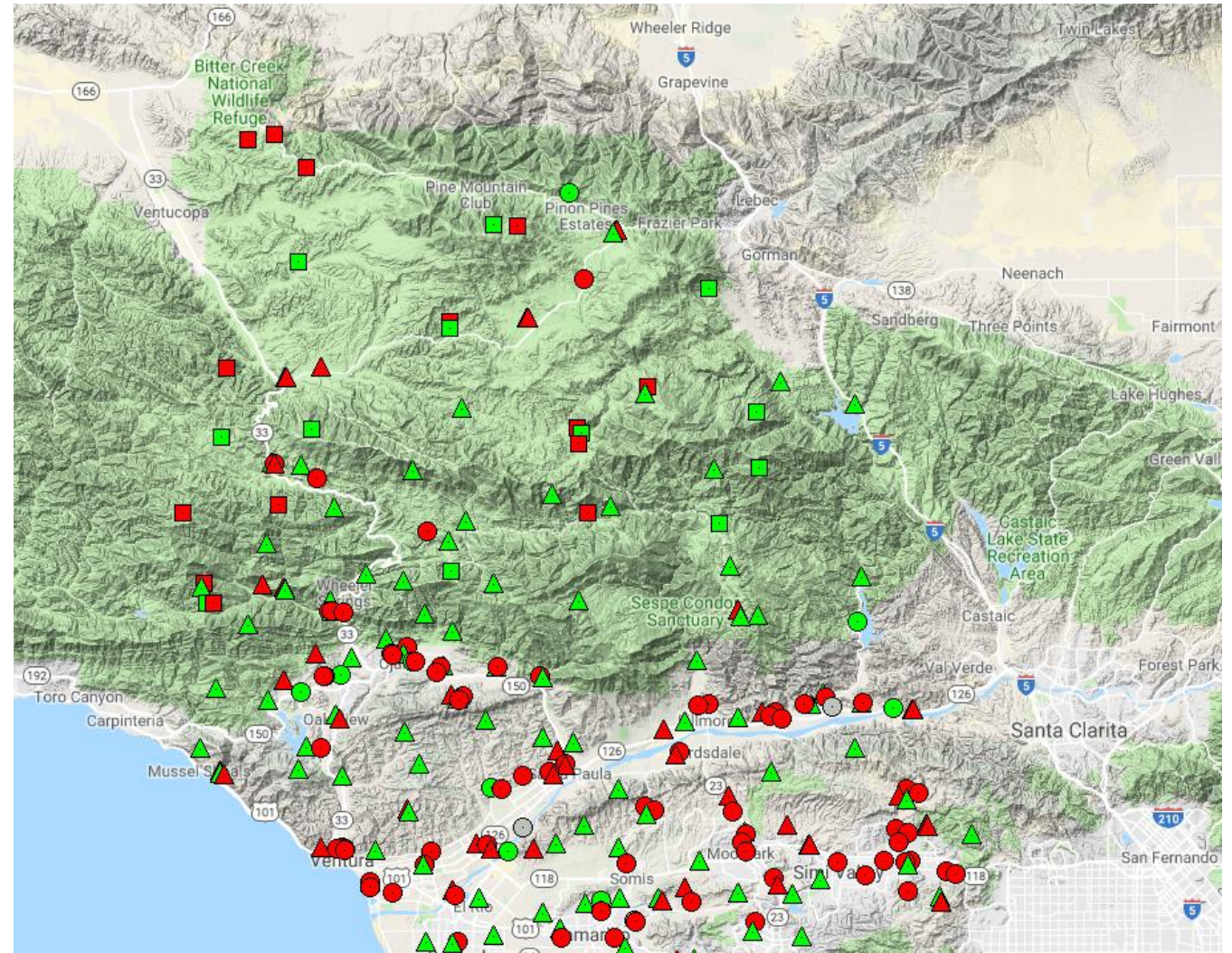
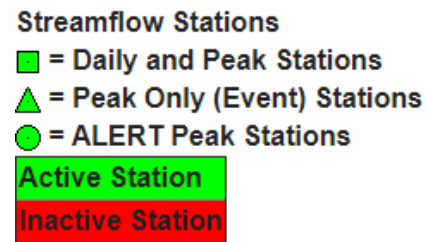
- Extension of coastal plain model (2018)
  - Dr. Jason Sun
- Modeling Period
  - 1985 – 2015
- Validation Period
  - 2016 - 2019



# Model Inputs

# Model Inputs - Precipitation

- Precipitation Gages
  - Ventura County
  - Los Angeles County
  - US Geological Survey
  - United Water
  - Research database products



Ventura County Precipitation Gage Network

# Model Inputs - Recharge

- Groundwater Recharge to Aquifers
  - Precipitation (minus Evapotranspiration)
  - Return flows

**Fillmore Ag Land Use (United, 2016)**

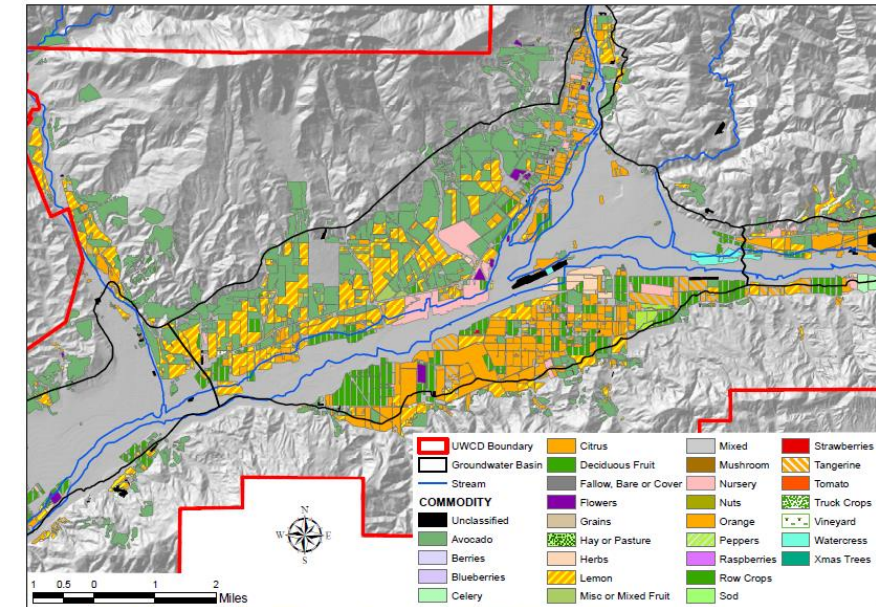


Figure 48. Fillmore basin agricultural land use map for 2016 (Ventura Co. Ag Commissioner) with hillshade base.

**Piru Ag Land Use (United, 2016)**

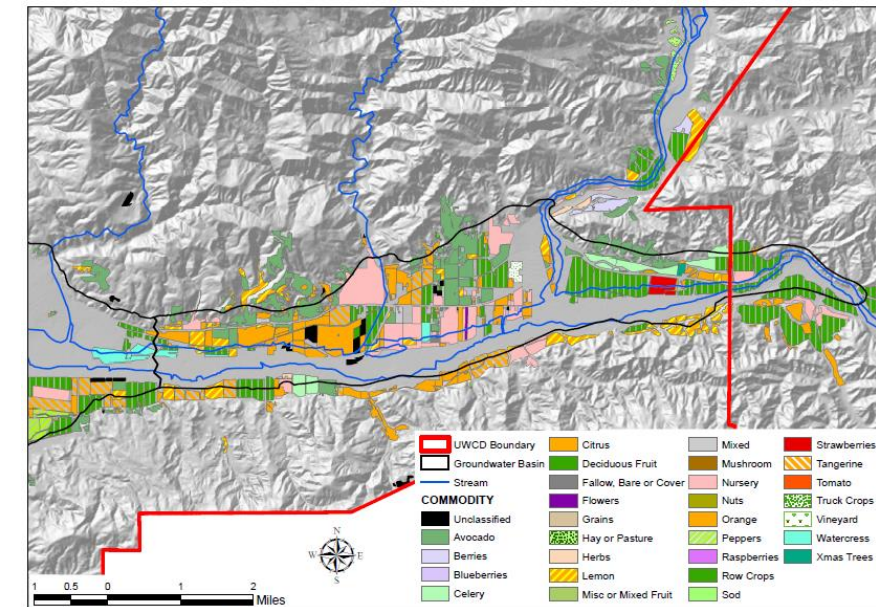
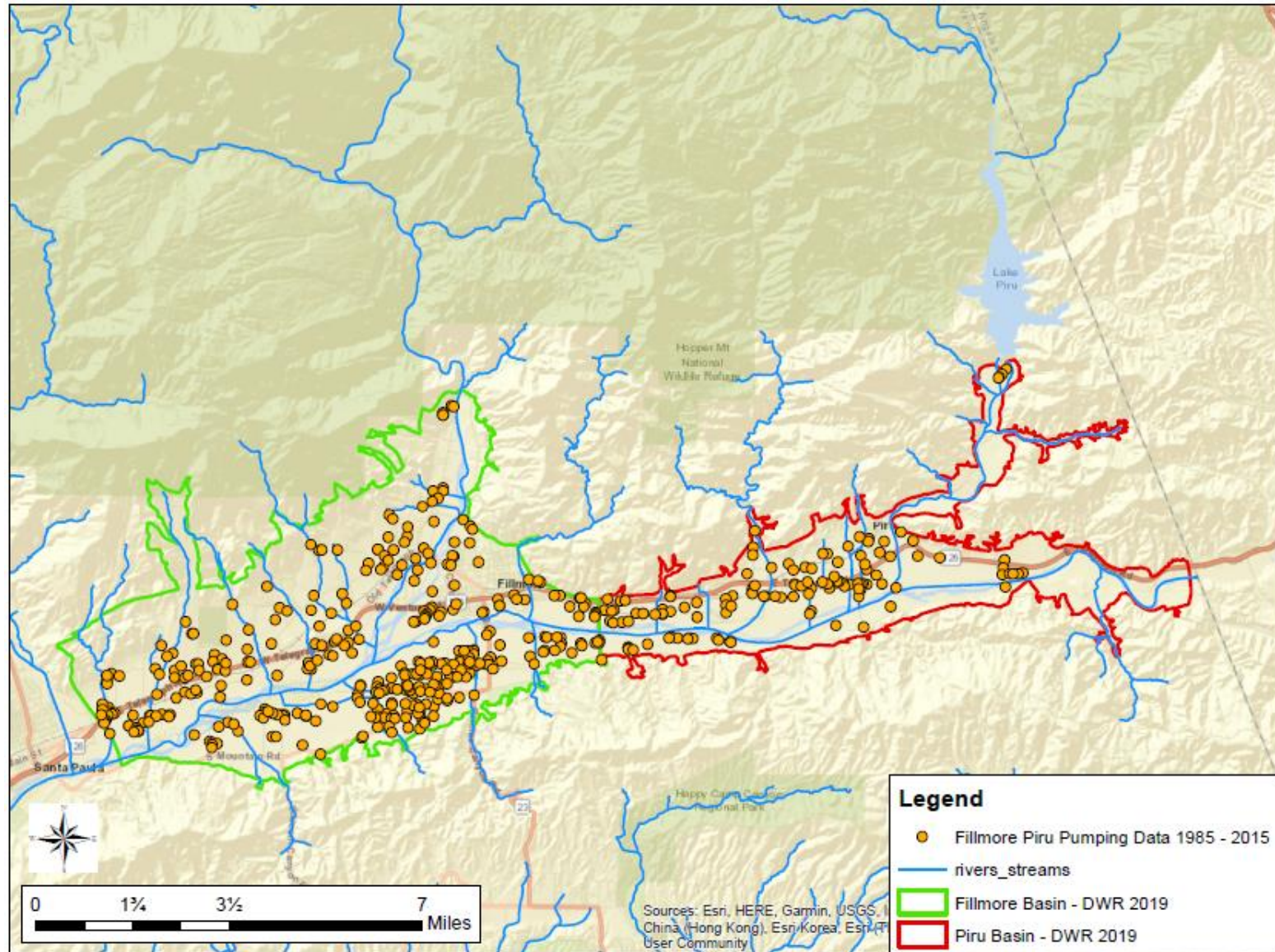


Figure 46. Piru basin agricultural land use map for 2016 (Ventura Co. Ag Commissioner) with hillshade base.



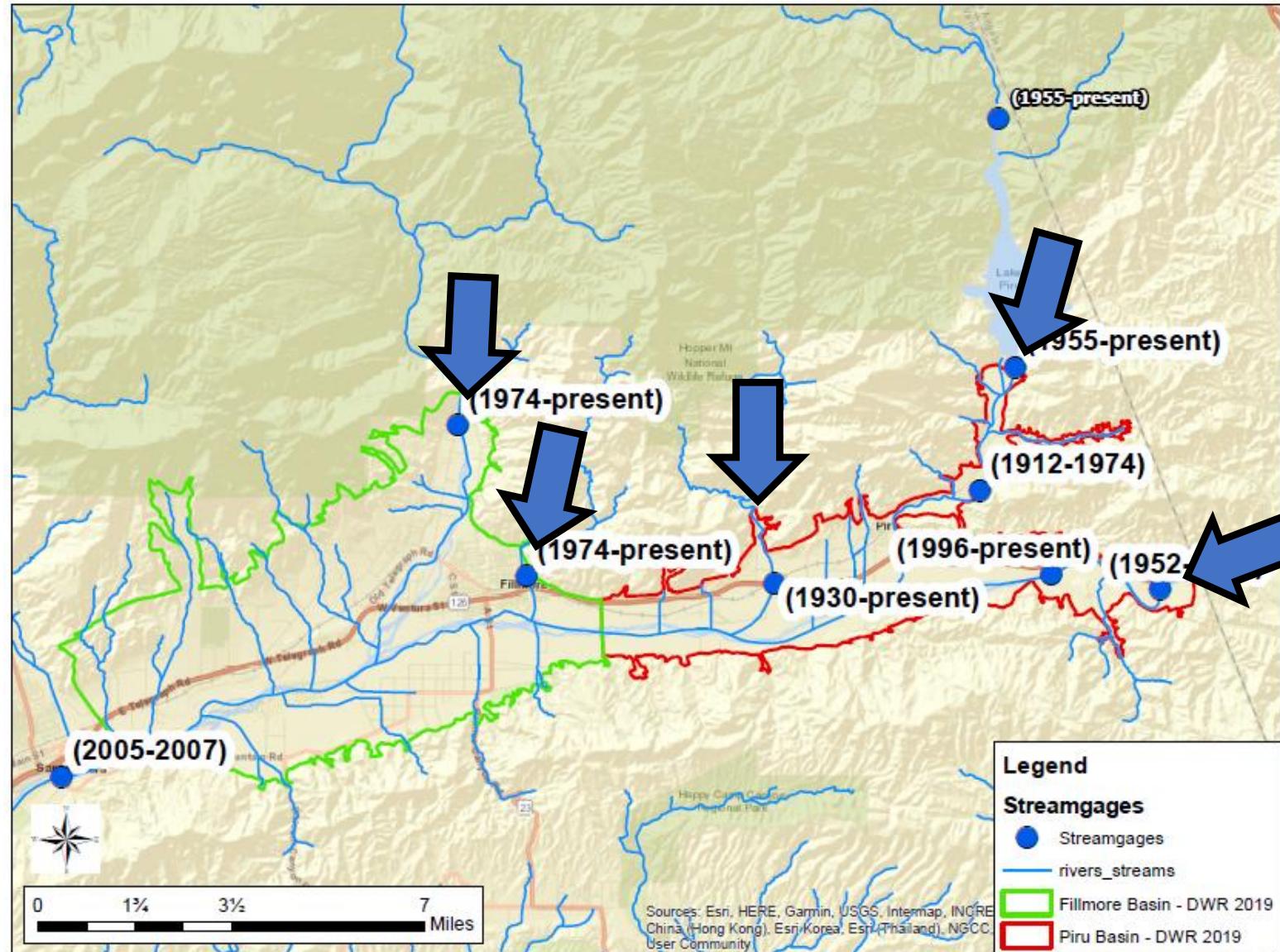
# Model Inputs – Groundwater Pumping

- ~500 wells with records
  - 1985 - 2015



# Model Inputs – Boundary inflows

- Streamflow gaging sites
  - 9 USGS and Ventura County gages
  - Daily average discharge
  - Decades of data
- Mountain Front Recharge

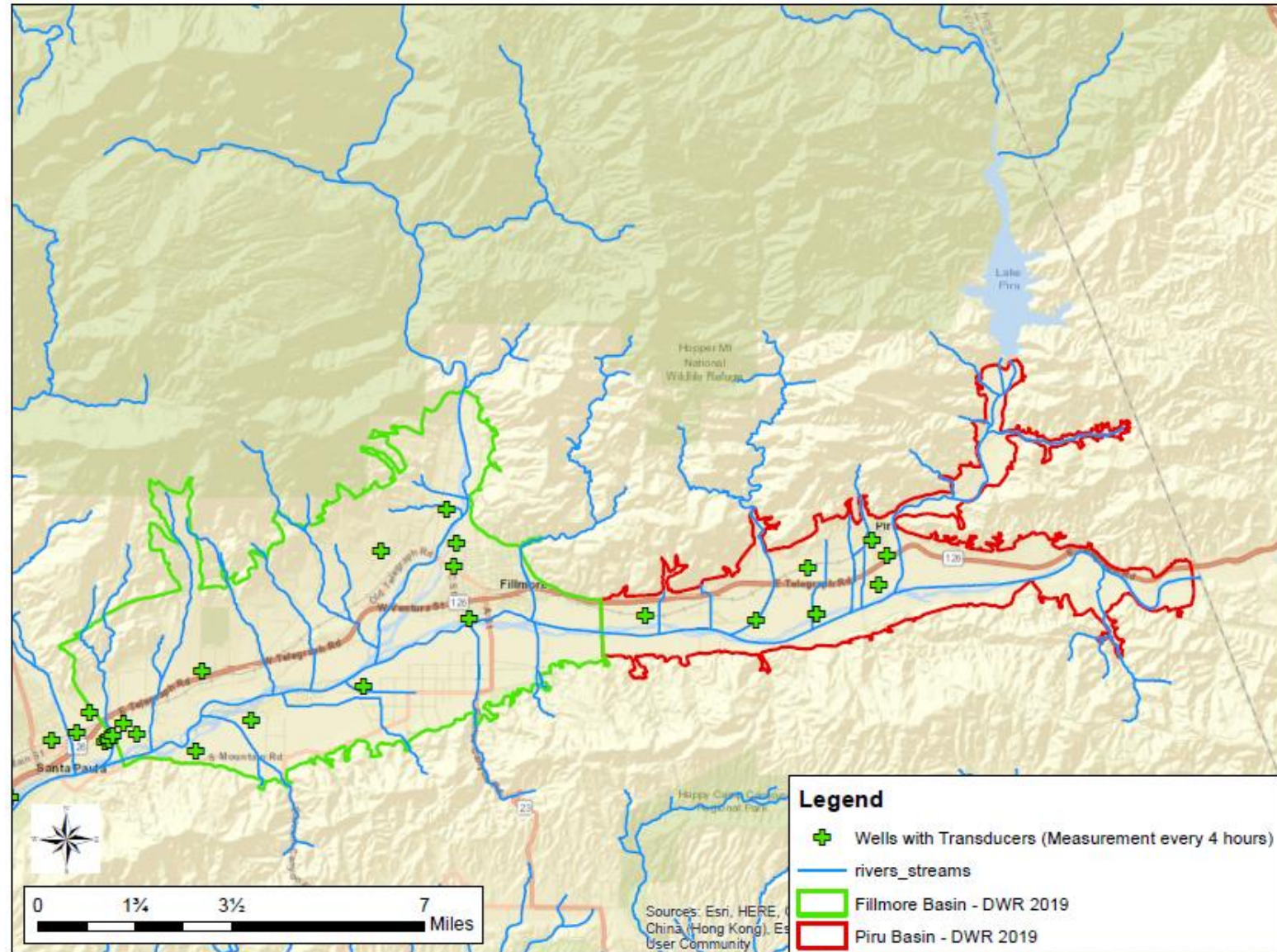


# Model Development



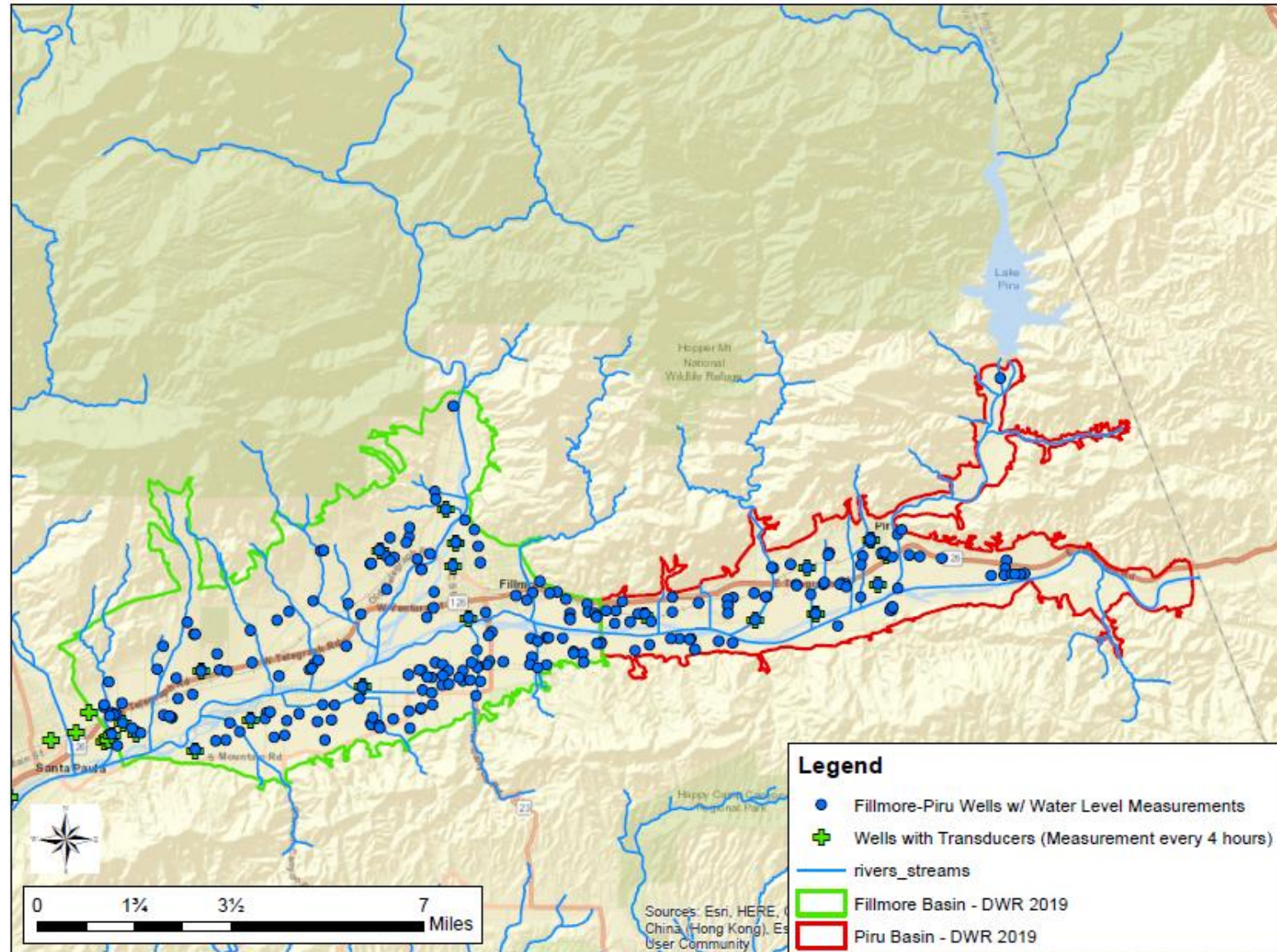
# Model Development – Groundwater Levels

- Pressure Transducers
  - 4-hour intervals
  - 23 wells
  - 260,000+ records



# Model Development – Groundwater Levels

- Pressure Transducers
  - 4-hour intervals
  - 23 wells
  - 260,000+ records
- Water Level Elevations
  - Single measurements
  - 254 wells
  - 23,000+ records



# Model Inputs (continued)

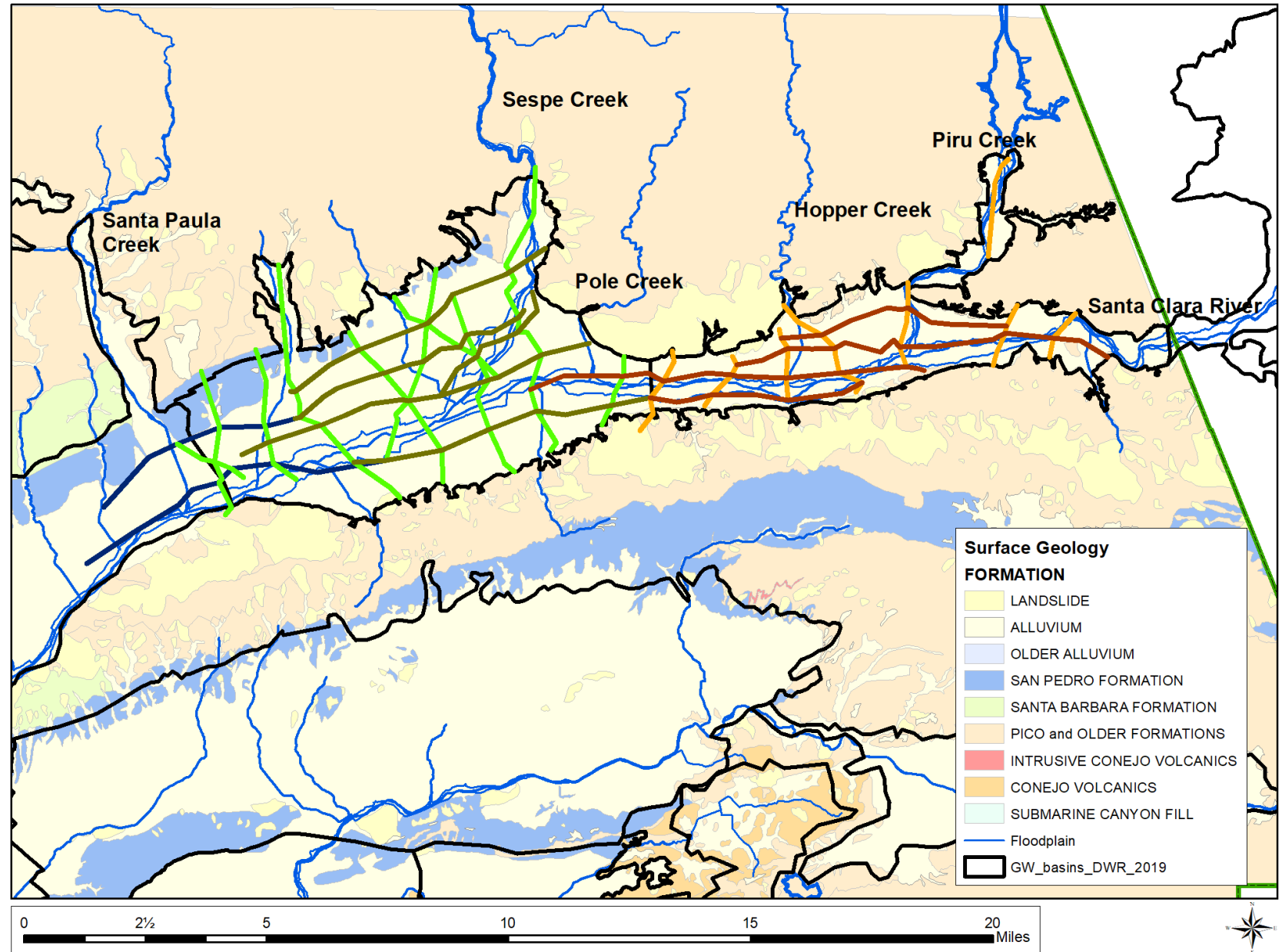
# Mapping of Hydrostratigraphic Units

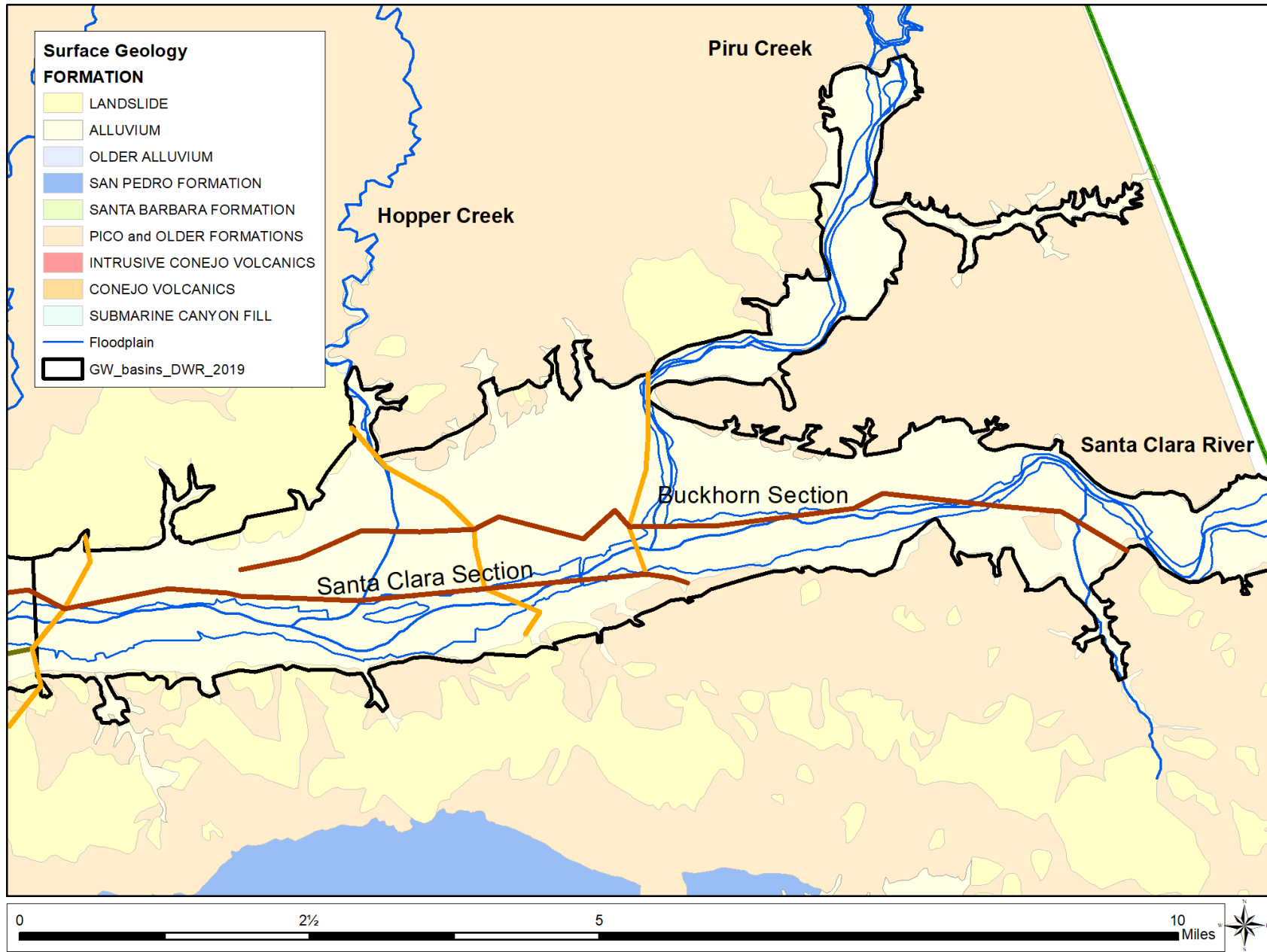
- United staff also needed to map subsurface hydrostratigraphic units (aquifers)
- Used information from existing water and oil wells
  - Geophysical well logs
  - Description of lithology (sand, cobbles, silt, clay)
  - Well construction information (screened zones)
  - Other information (water levels, well production)

This mapping of units forms the framework/architecture of the groundwater flow model



# Section lines in the Piru and Fillmore basins

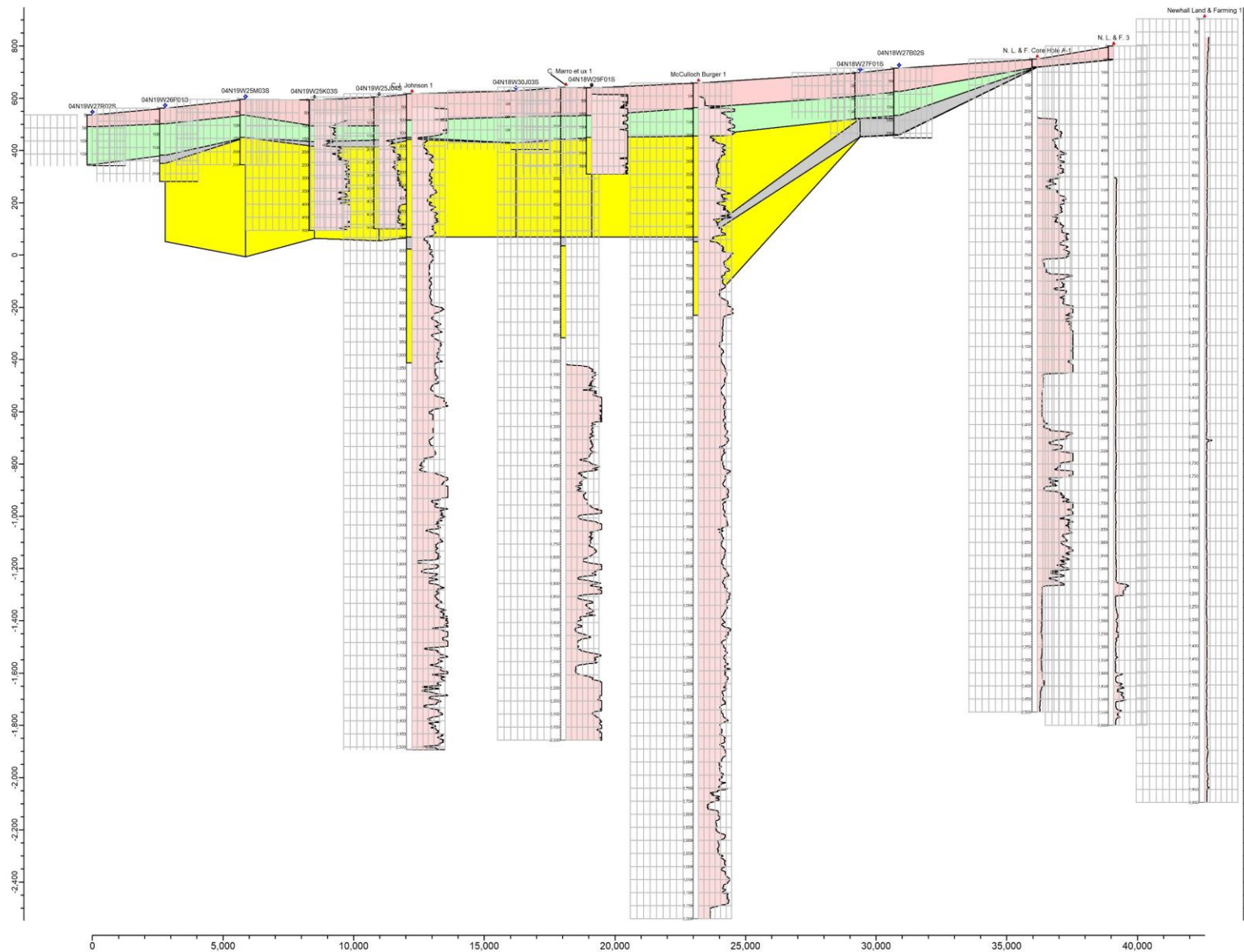




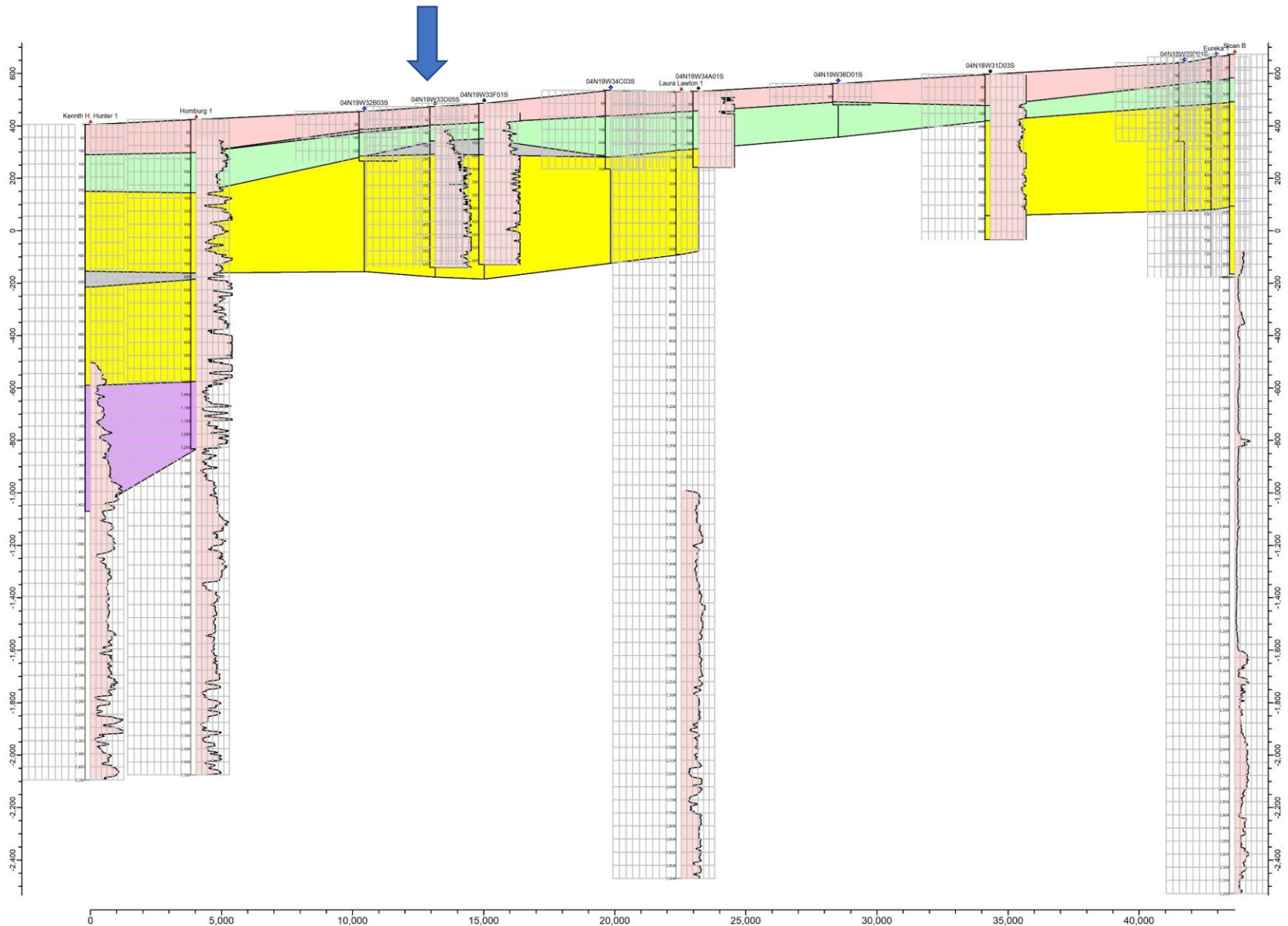
Cross-Section FP Buckhorn (10x VE)  
DRAFT

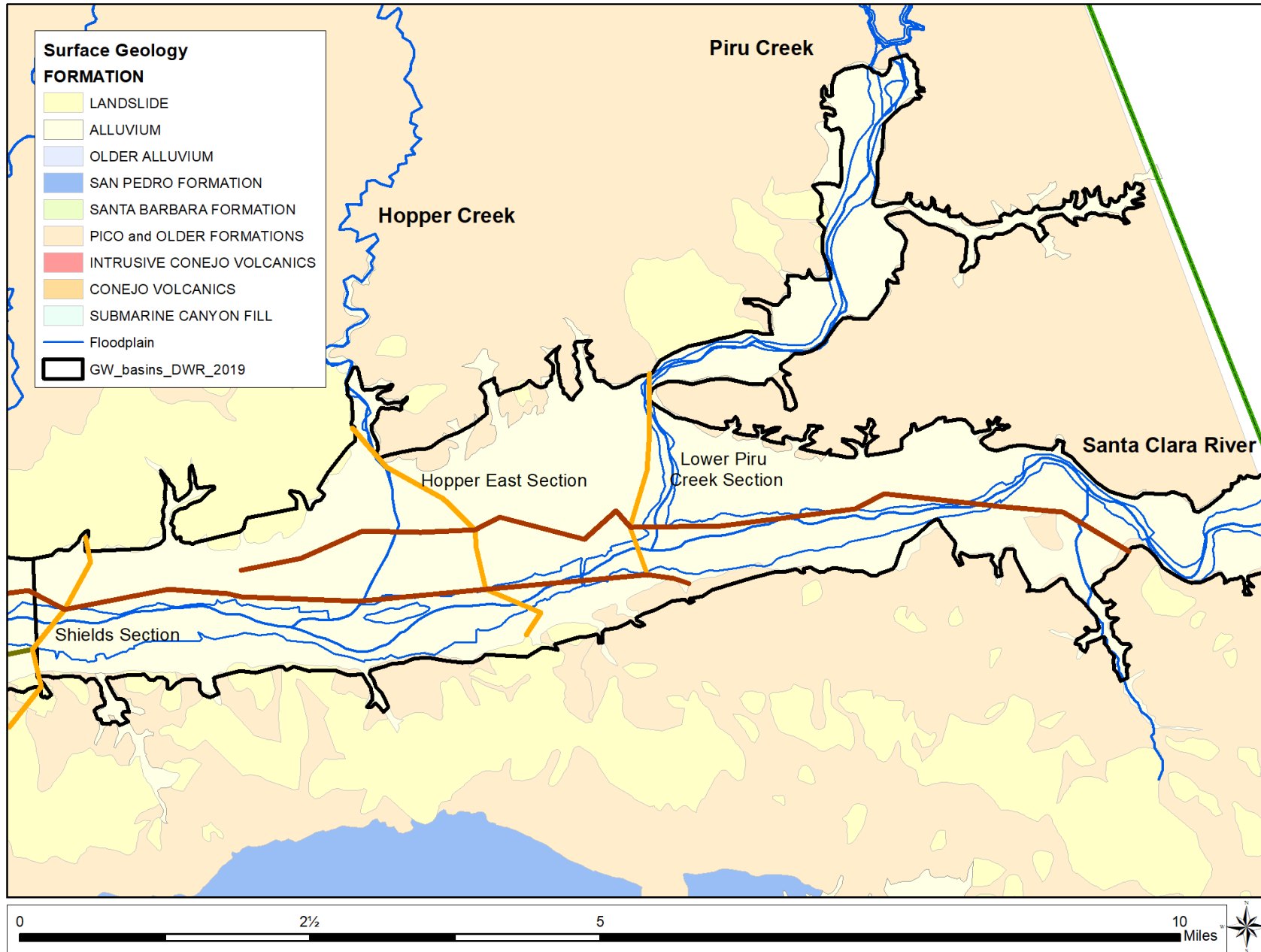
W

E



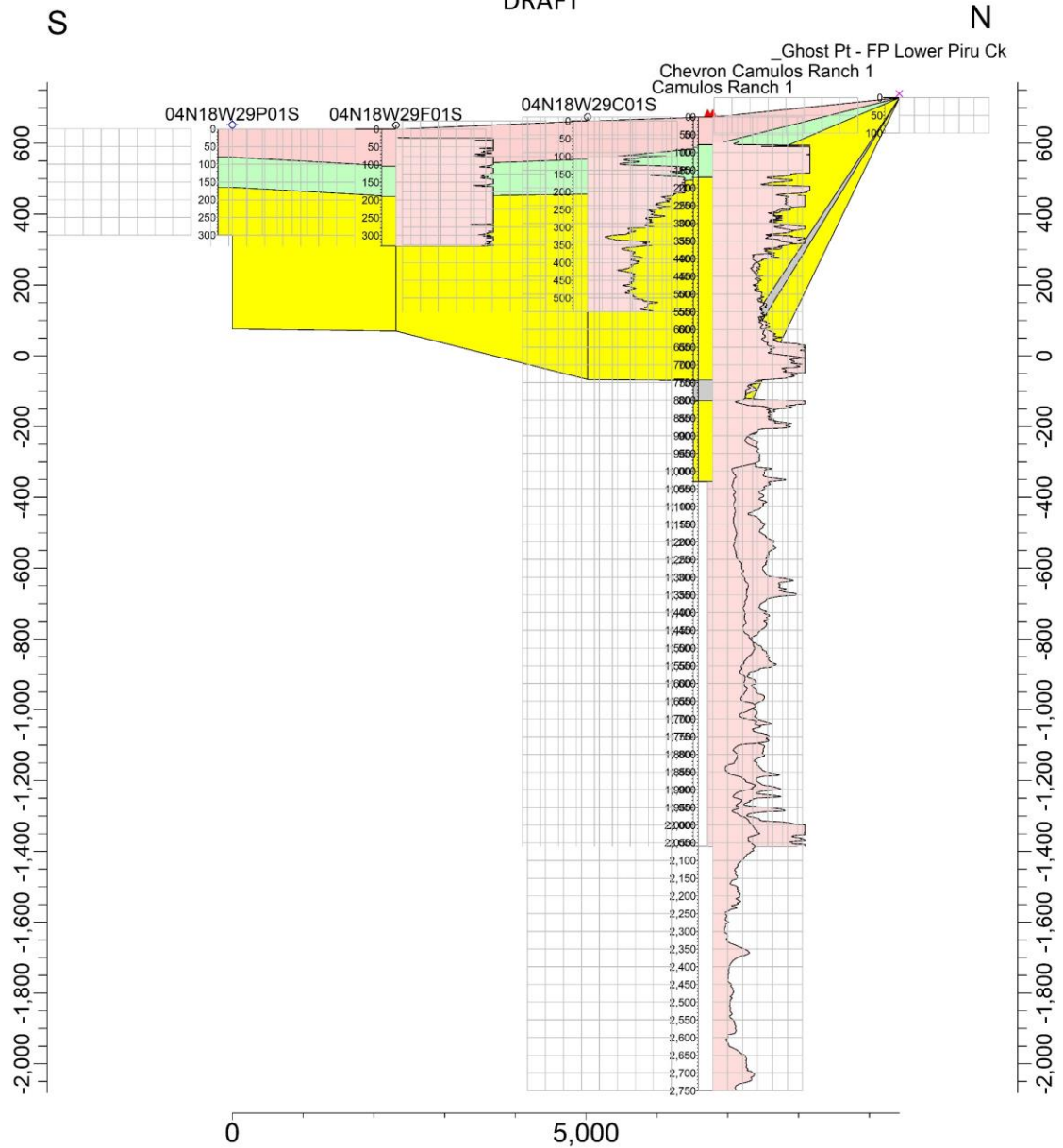
W Basin Boundary Cross-Section FP Santa Clara (10x VE) DRAFT E





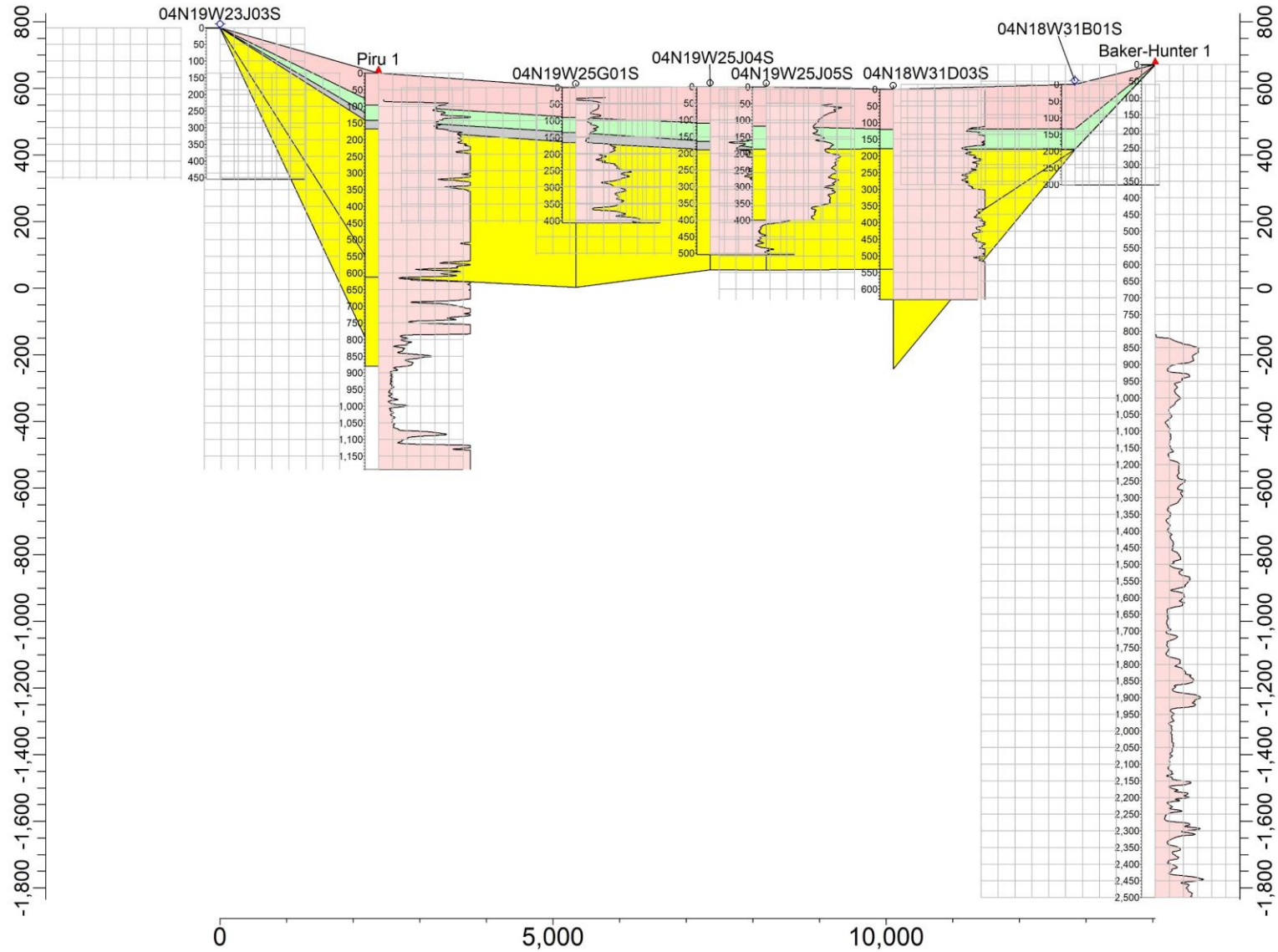
# Cross-Section FP Lower Piru Creek (5x VE)

DRAFT

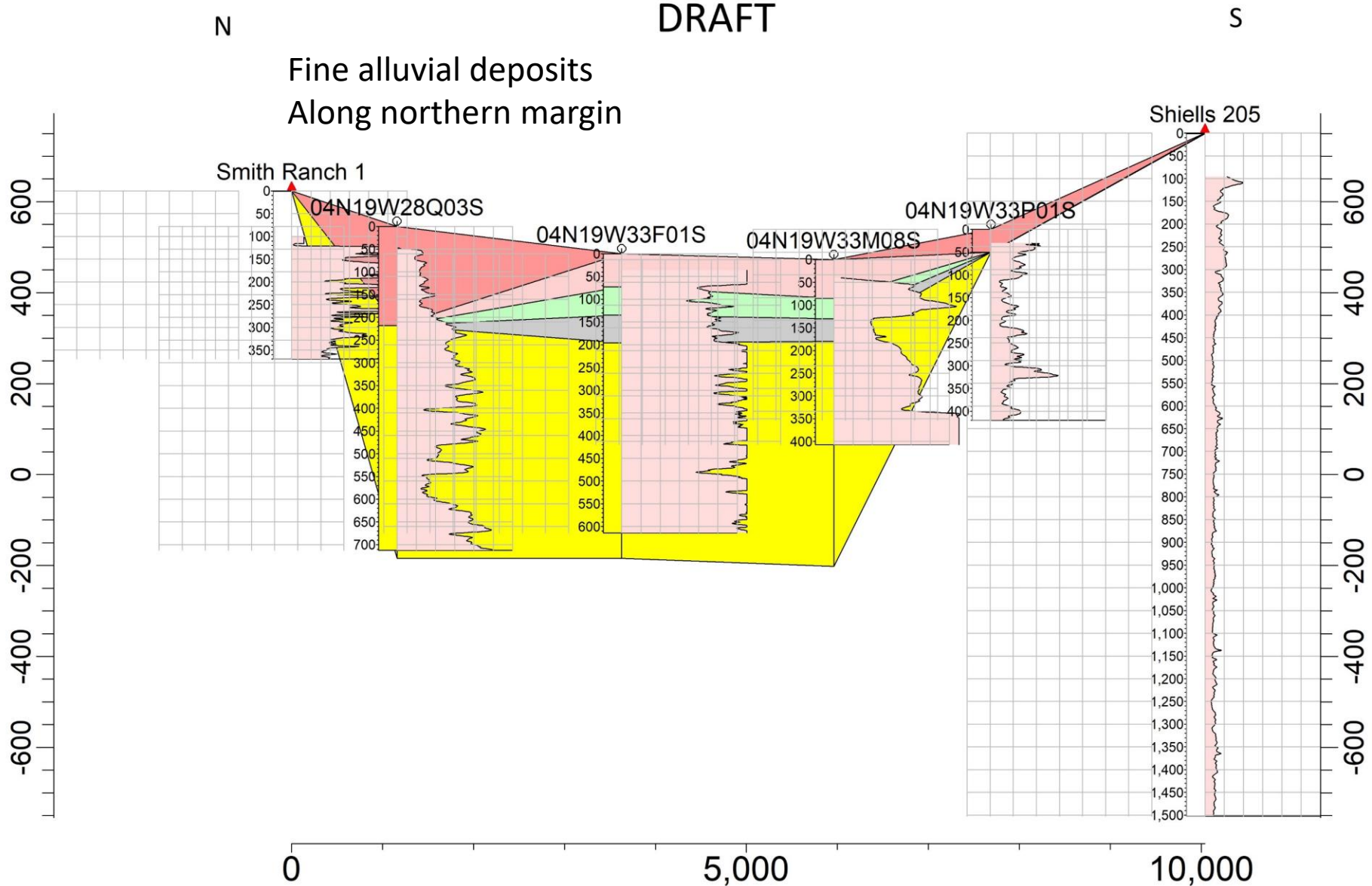


# Cross-Section FP Hopper East (5x VE)

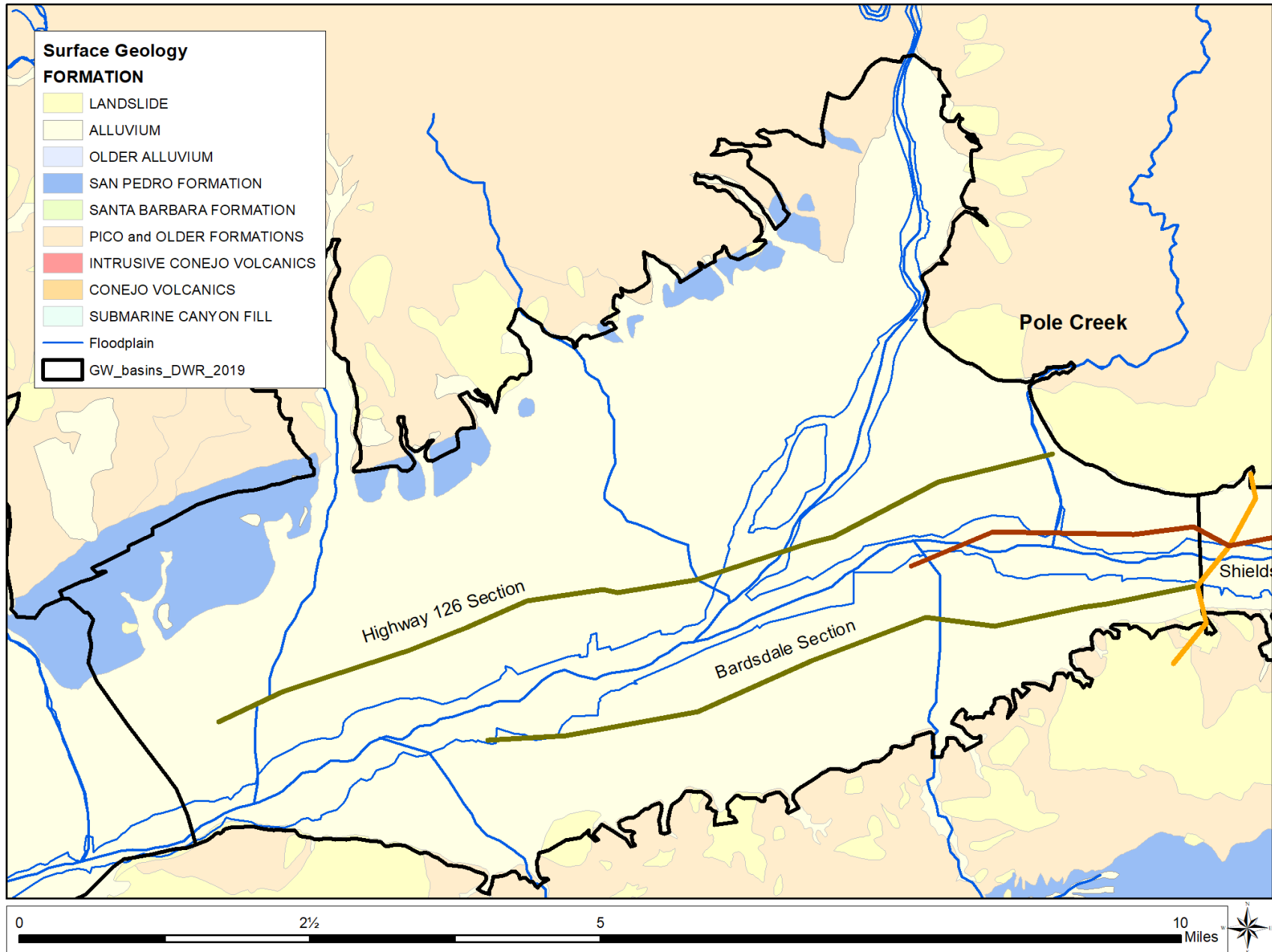
NW DRAFT SE



# Cross-Section FP Shields (5x VE)







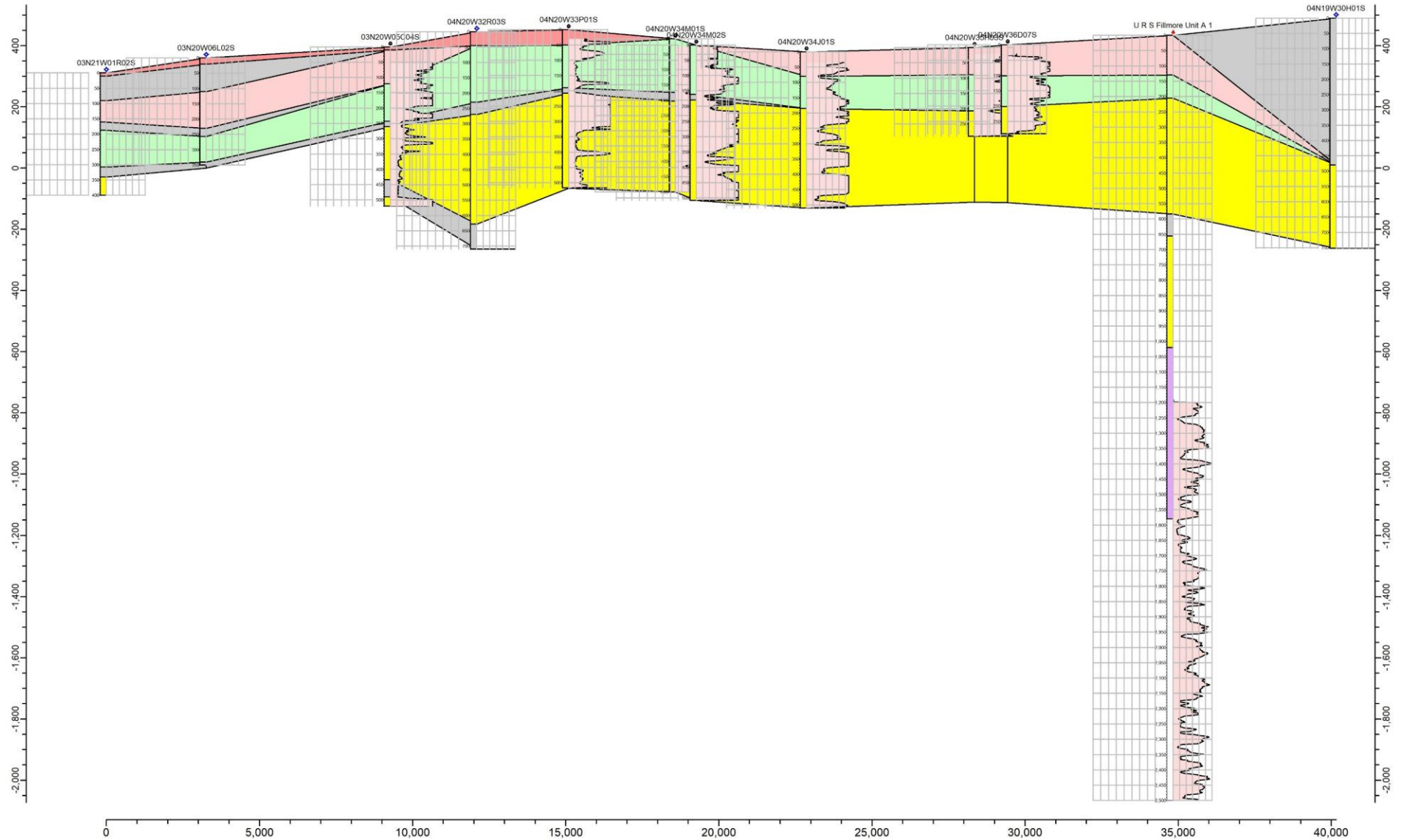
Cross-Section FP Hwy 126 (10x VE)

DRAFT

W

E

Structural uplift

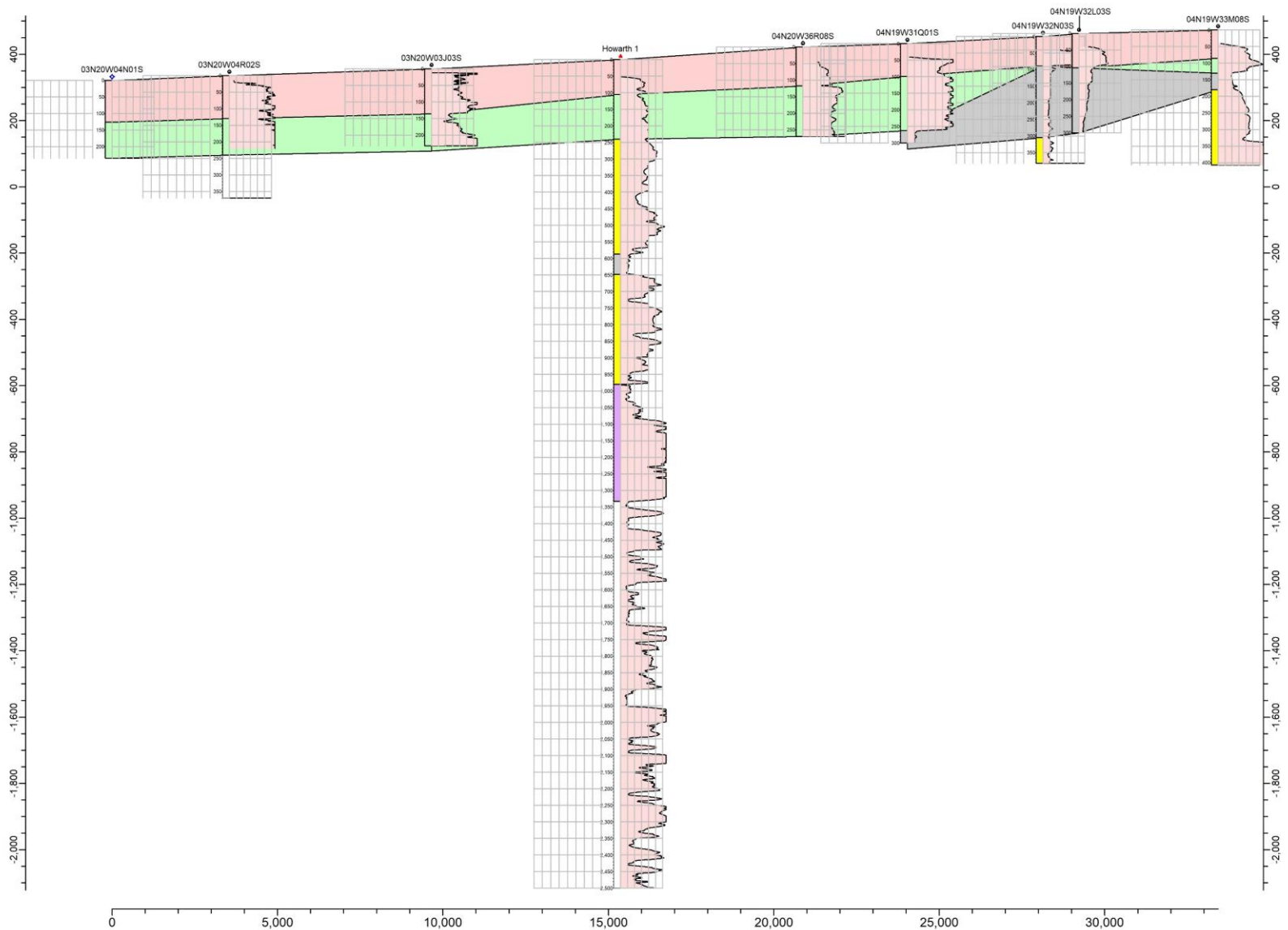


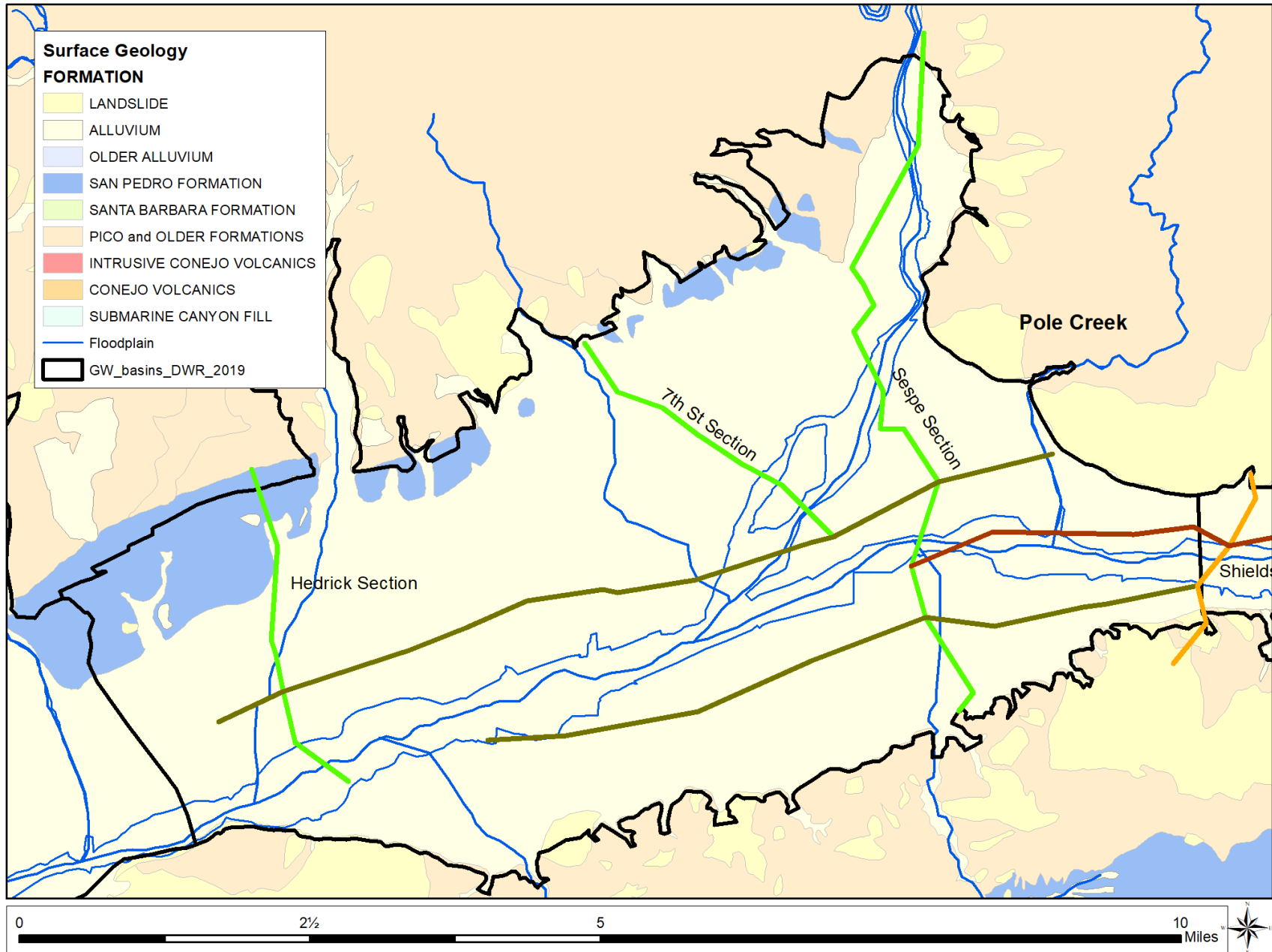
# Cross-Section FP Bardsdale (10x VE)

W

DRAFT

E



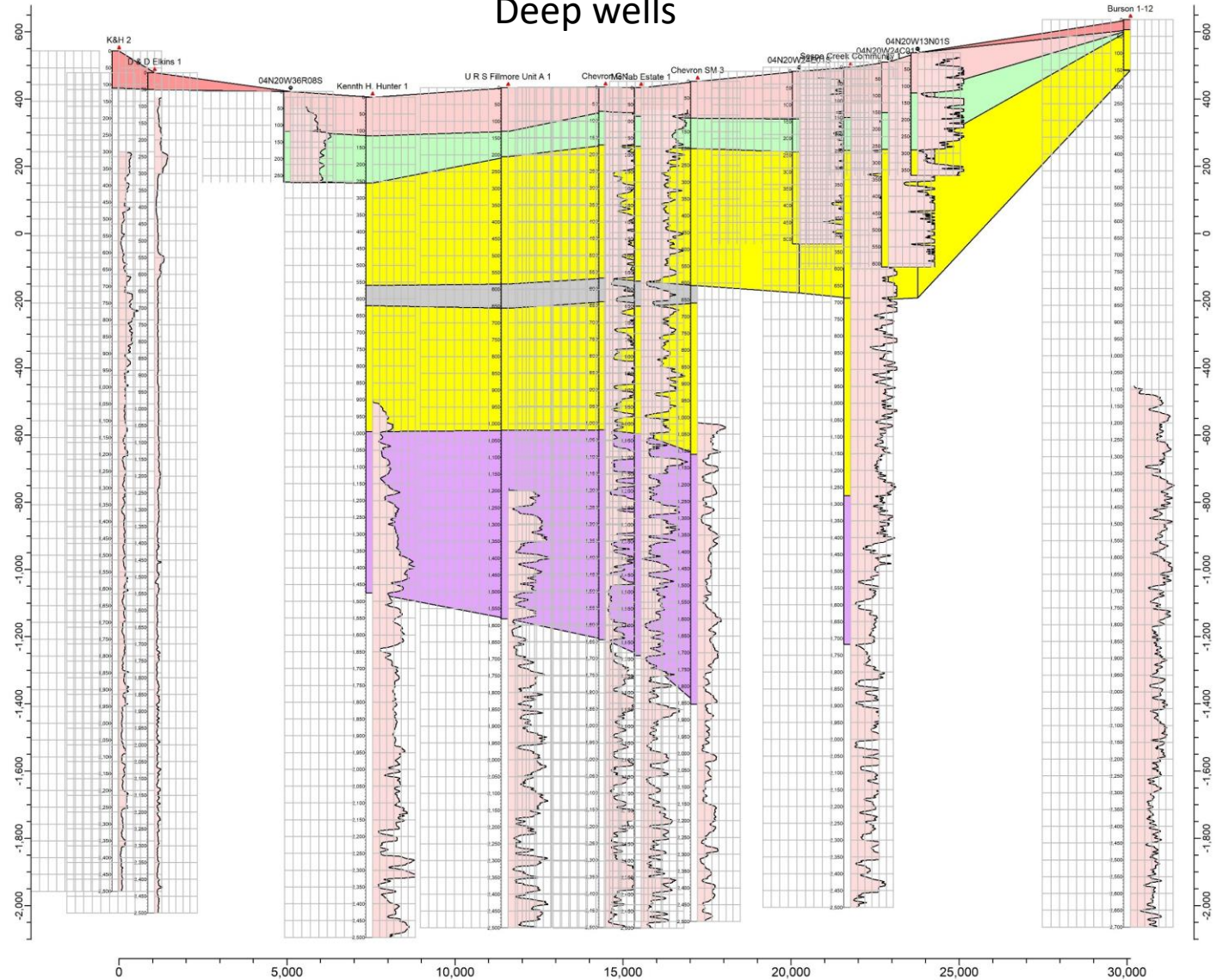


Cross-Section FP Sespe (10x VE)  
DRAFT

S

N

Deep wells

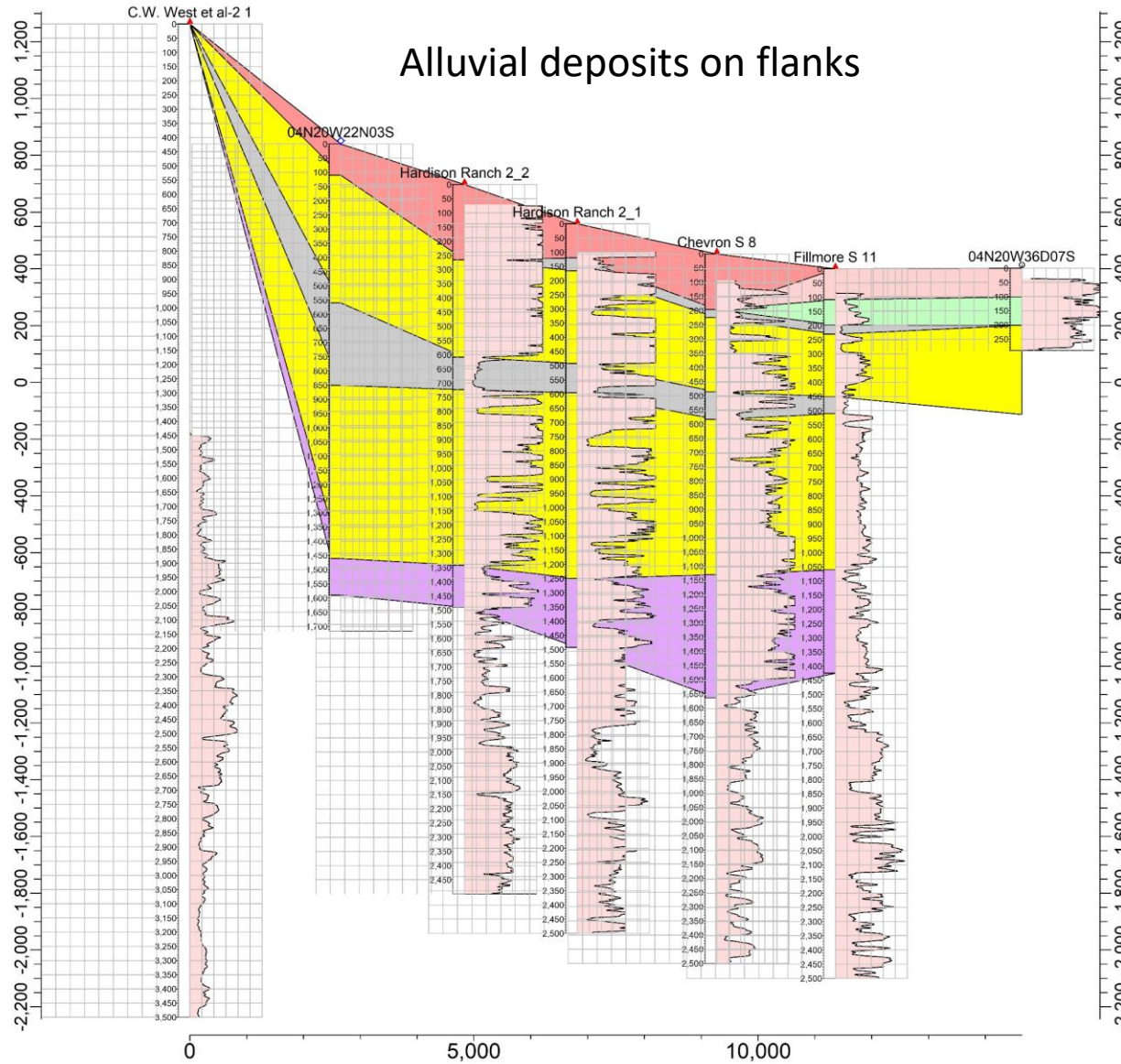


# Cross-Section FP 7th St (5x VE) DRAFT

NW

SE

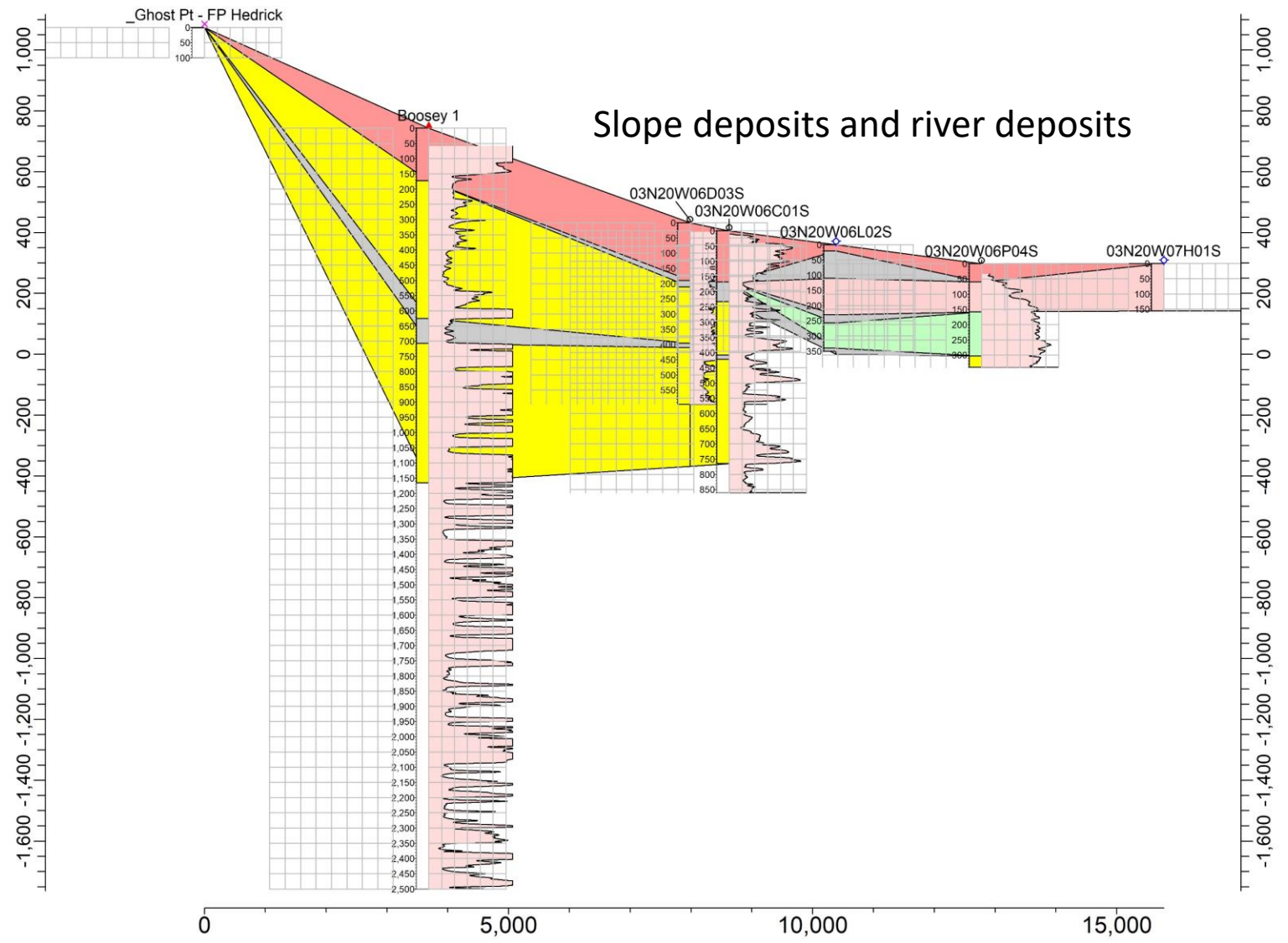
## Alluvial deposits on flanks



# Cross-Section FP Hedrick (5x VE) DRAFT

N

S



Questions?