Owens Lake Master Project Groundwater and Habitat Work Groups Meeting

February 4, 2021

LA DWP Los Angeles Department of Water & Power

Stantec

H&H Water Resources

M2 Resource Consulting

Formation Environmental

GSI Environmental

LCI

Hydrogeologic Conceptual and Numerical Models of Owens Lake

Outline:

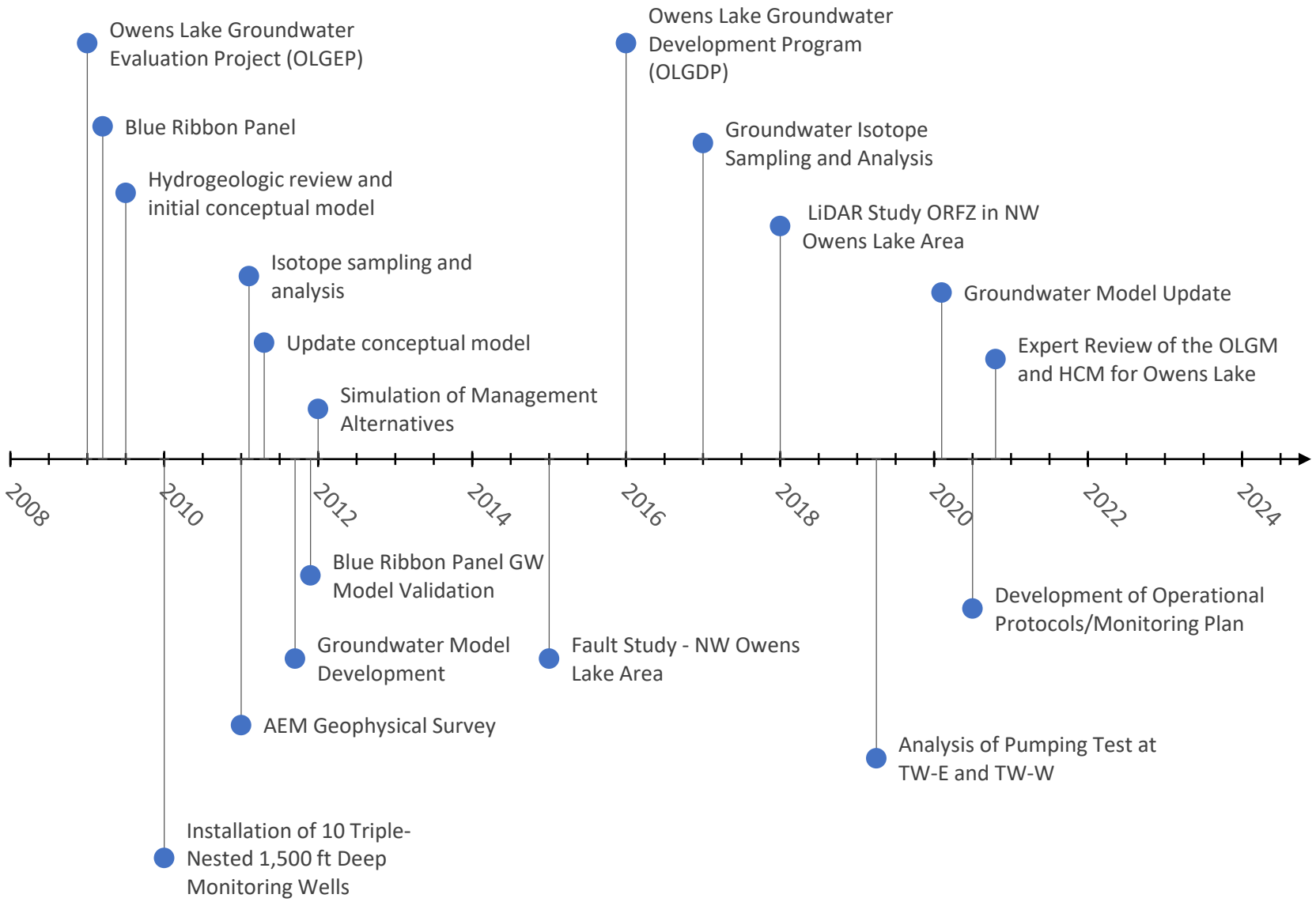
- Owens Lake HCM and Numerical Model Evolution and Understanding
- Expert Collaboration
  - Stratigraphy/Structural Geology
  - Geophysical Re-Interpretation
  - Numerical Model
- Owens Lake Model Focus Areas
- Utilization of ETa Data
- Water Budget Refinement

Continuous Improvement

Adaptive Management

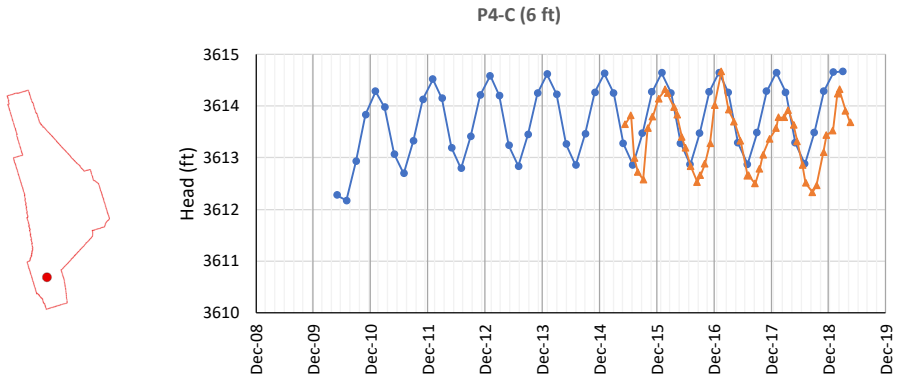
- New data continues to be acquired
  - Remote Sensing – ETa data
  - New well data
  - Recent publications and technical reports
- Incorporation of new data leads to *improvements* in the Blue Ribbon Panel vetted model
  - Hydrogeologic Conceptual Model
  - Numerical Model

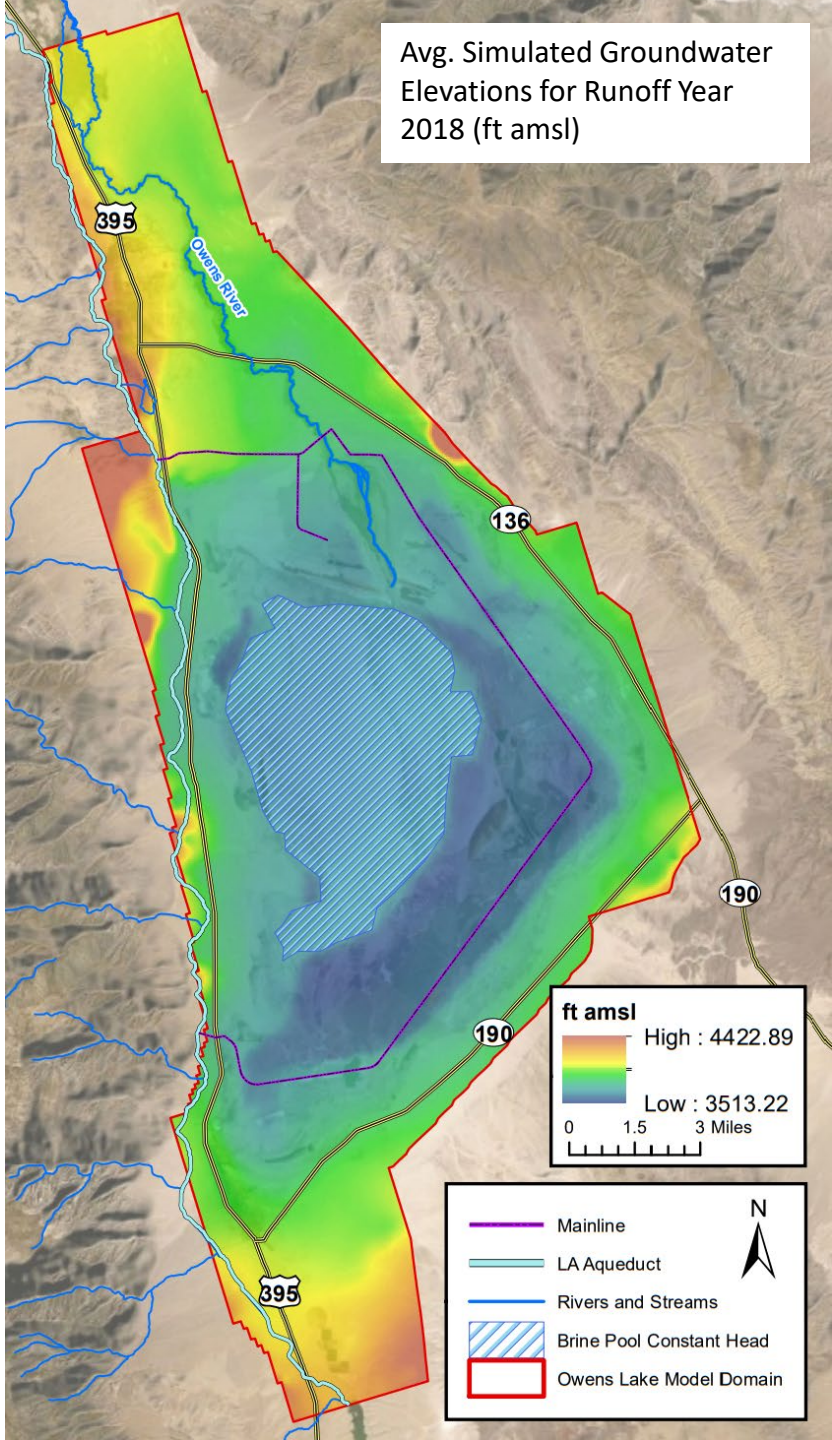
Adaptive Management Timeline



Owen Lake Groundwater Model 2020 Update

- Incorporated Testing Wells TW-E and TW-W
- Simulated short duration tests of testing wells
- Utilized new monitoring wells for stratigraphy and calibration
- Reduced stress period length to two months
- Simulated seasonal variability in shallow aquifer
- Modified southern boundary





Expert Collaboration

Independent review, information sharing, workshops, discussion and recommendations

Geophysics/AEM

Ted Asch, PhD, PG, PGp

Structural Geology/Stratigraphy

Scott Lindvall, MS, PG

Numerical Modeling

Sorab Panday, PhD

Focus Areas

(1) Northwest Area*

- OVFZ
- Bedrock
- Stratigraphy
- Boundary Flows

(2) Lone Pine Area

- ORFZ
- Down Valley Flow

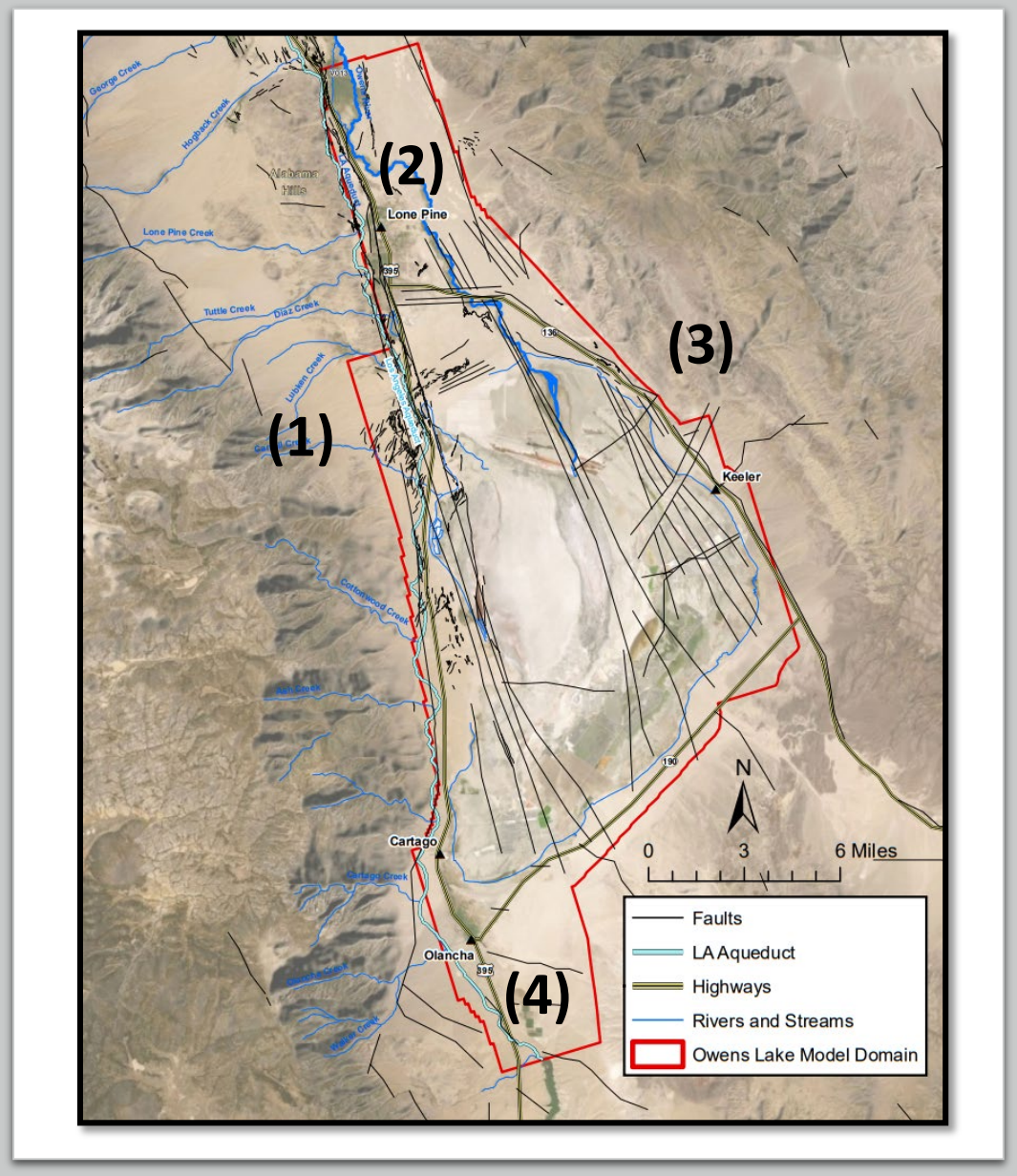
(3) Northeast Area

- Fault Representations
- Boundary Flows

(4) Haiwee Dam/Southern Area*

- Bedrock Elevation
- Flow From Haiwee

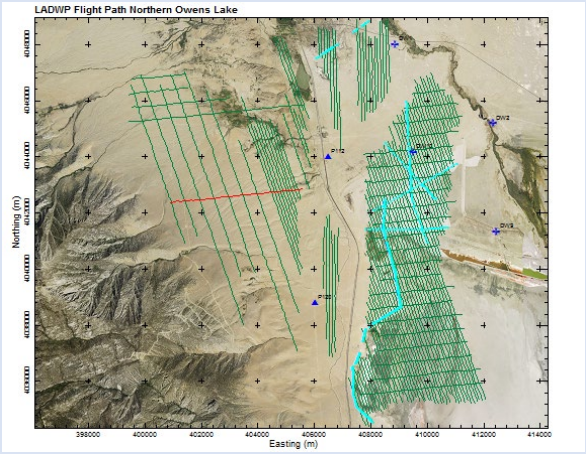
*Examples to follow

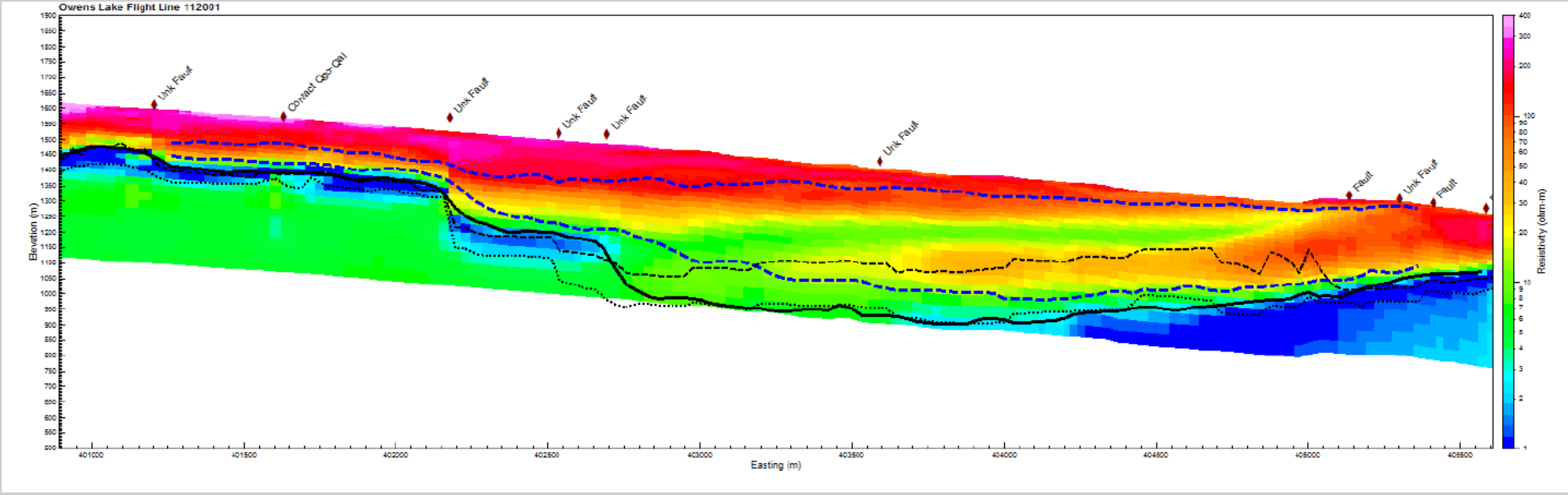


Reinterpretation of AEM Data (NW Area Example)

- New well data available
- Review of bedrock surface exposures
- Revise subsurface interpretation

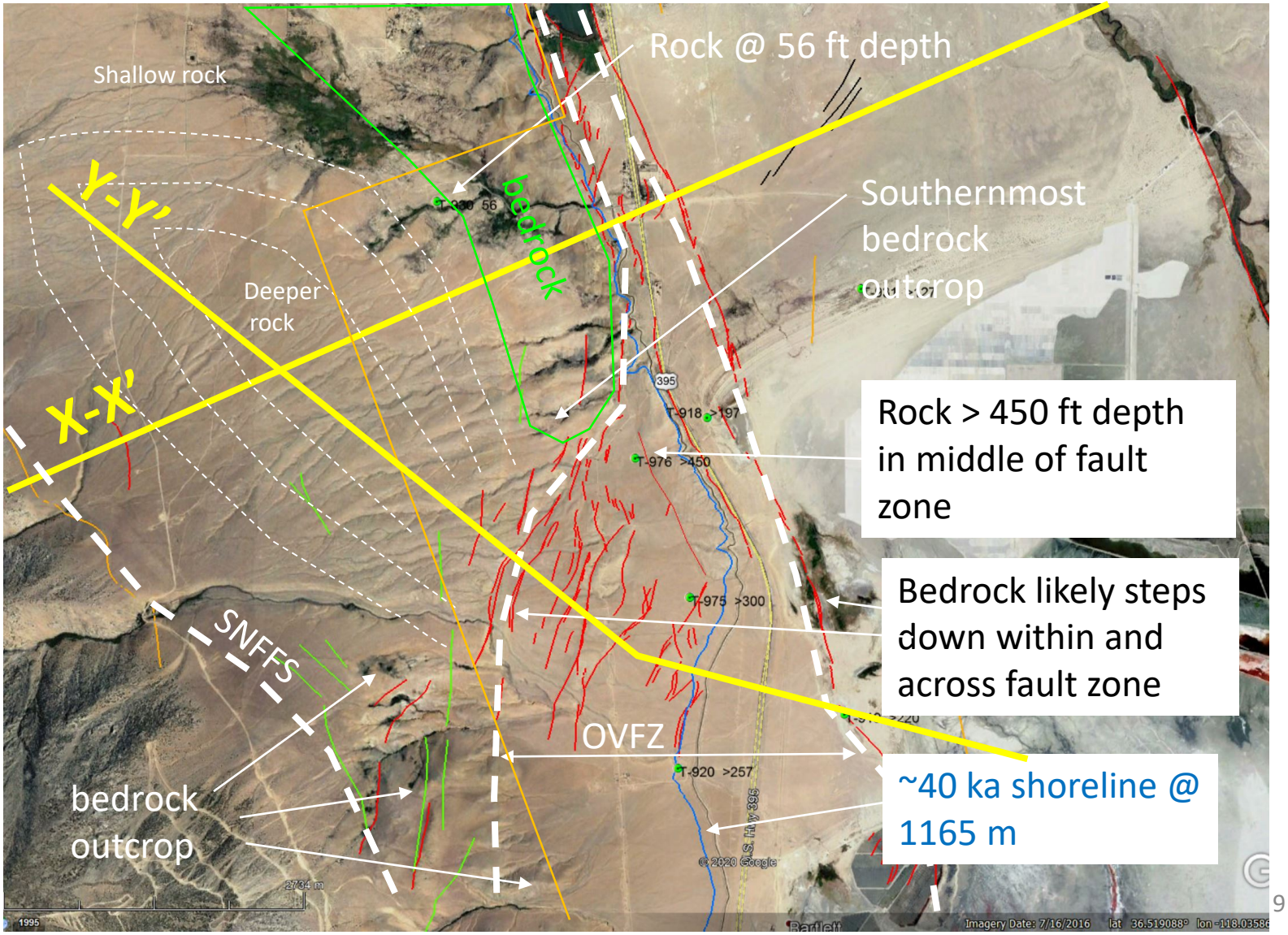
AEM Flight Line



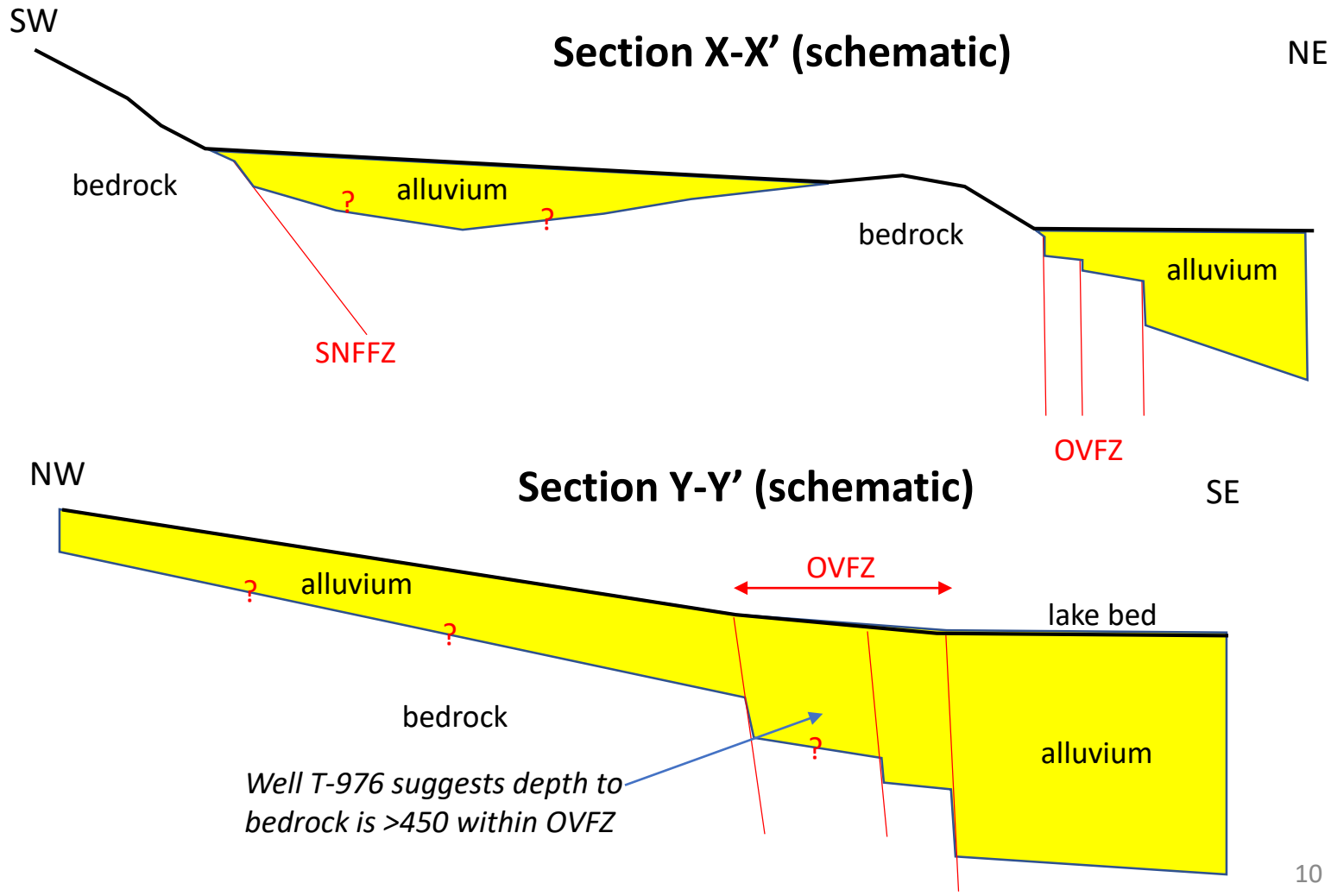


AEM Flight Line Inversion Results

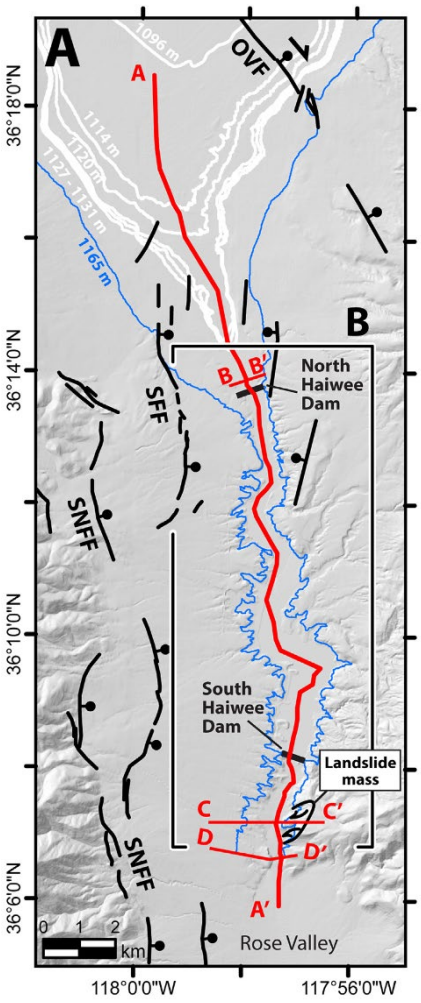
Interpretation of NW Area

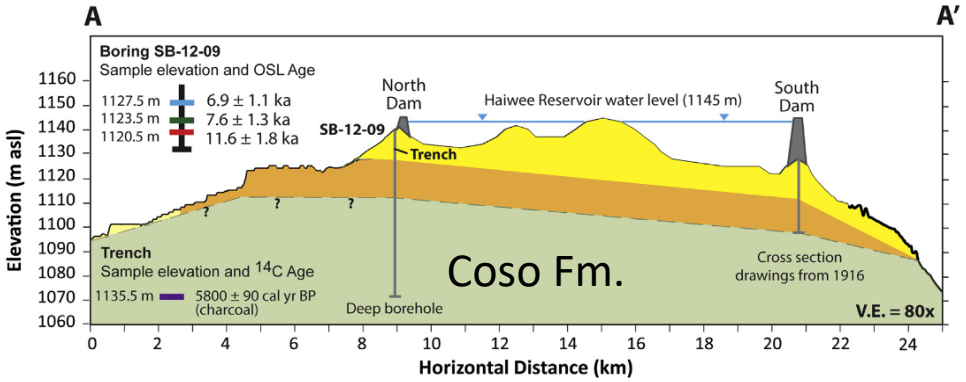


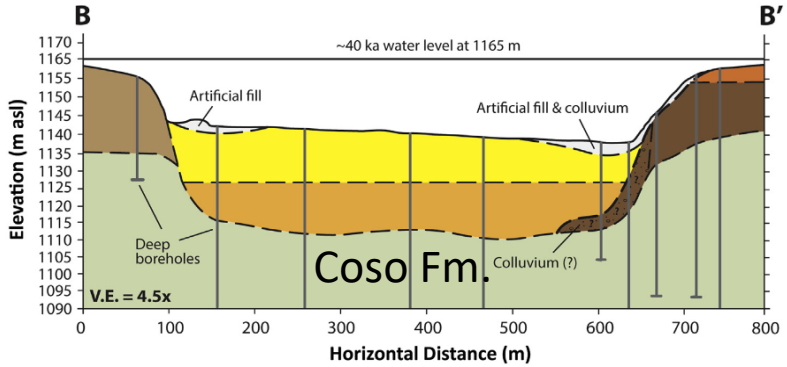
Schematic sections depicting possible bedrock surface



Haiwee Dam and Southern Area







Geologic Units

Lacustrine and alluvial deposits: <3.5 ka at and below an elevation of 1108 m from ^{14}C and post-IR IRSL ages (Bacon et al., 2018).

Alluvial deposits: <6.9 ± 1.1 ka from ^{14}C and OSL ages.

Lacustrine, fluvial, and alluvial deposits on 1112.8 ± 2.7 m strath terrace:
11.6 ± 1.8 to 6.9 ± 1.1 ka from OSL ages, base of section likley older.

Fluvial terrace deposits: Inferred age of ~100 ka based on stage IV carbonate development; locally modified by 1165 m shoreline (~40 ka).

Alluvial fan deposits: Inferred age of >100 ka based soil-geomorphology; locally modified by 1165 m shoreline (~40 ka).

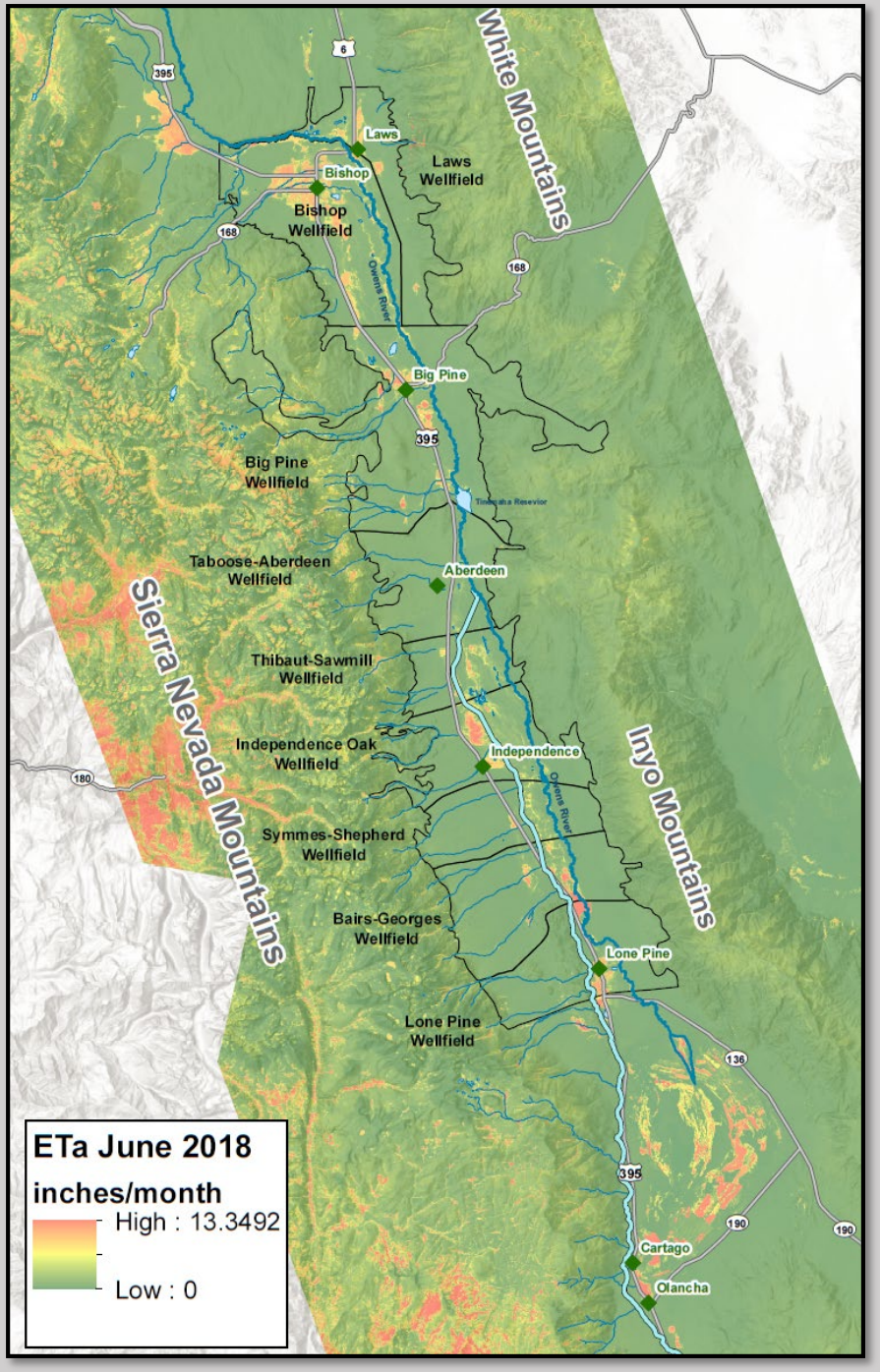
Alluvial fan deposits: Older alluvium; possible colluvium dervied from unit shown with query mark.

Coso Formation: ~3-6 Ma alternating sequences of indurated and gently dipping lacustrine sandstone and siltstone with volcanic tuff and flow rocks.

Bacon et al. (2020), LCI (2021), Black & Veatch (2018), North Haiwee Dam Replacement

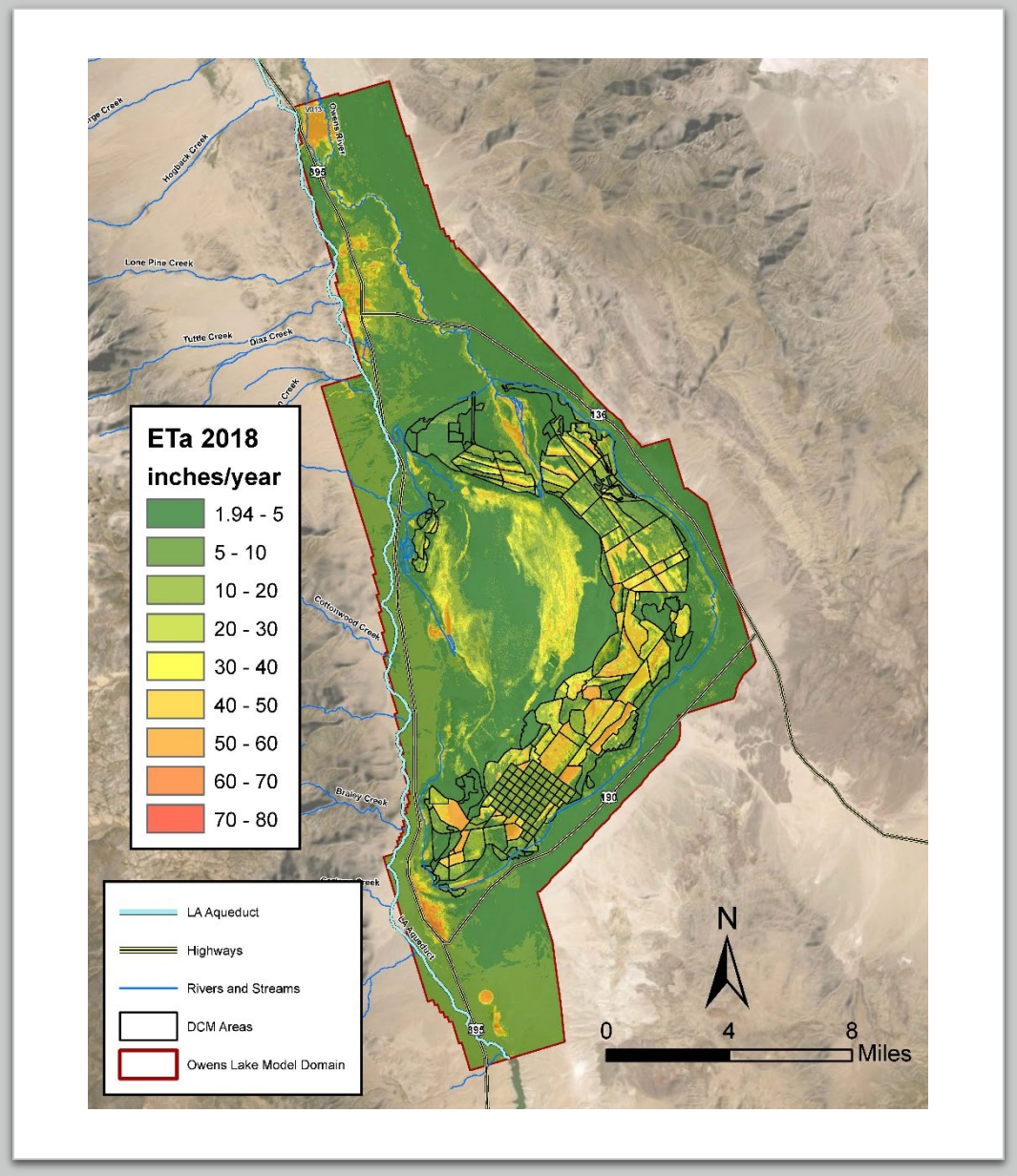
Owens Valley ETa Data

- Monthly from:
  - January 1985 to December 2019
- 30 Meter Resolution
- Provides spatial evapotranspiration data
- Currently utilized in Bishop/Laws Model Pilot Study
- Will be utilized in Owens Lake modeling



Water Budget/ETa Utilization

- Provides new data and approach to water budget
- Allows for direct calculation of groundwater loss to ETa
- Presents insight into groundwater dependent areas
- May be utilized directly in the Owens Lake Groundwater Model



Thank You
Questions and/or Comments?