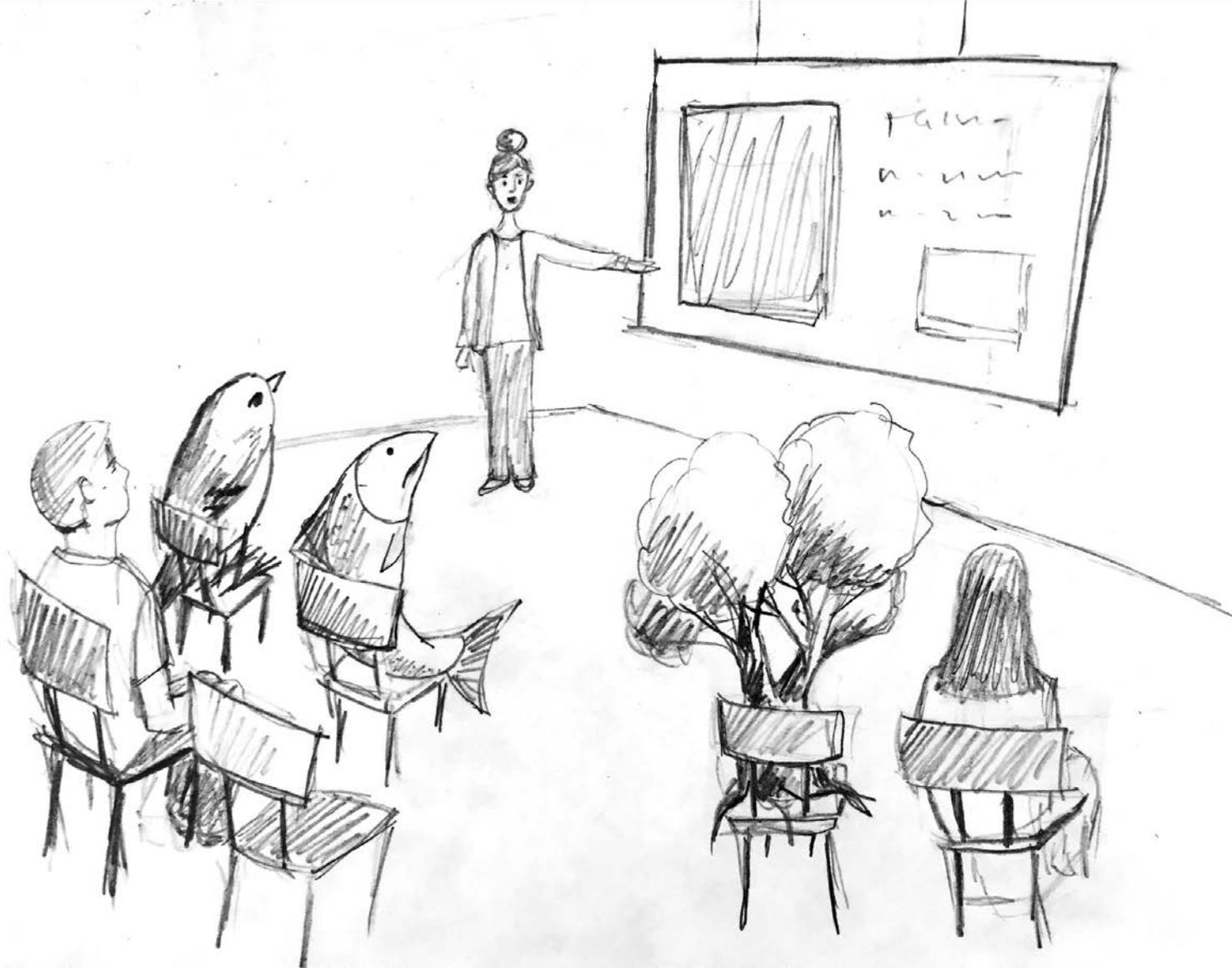




# Mapping and Monitoring Groundwater Dependent Ecosystems in Napa County

Napa County Watershed Symposium  
May 15, 2019

# NATURE NEEDS GROUNDWATER TOO



## DEFINITIONS:

### Groundwater-Dependent Ecosystems:

Ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface

### Interconnected Surface Water:

Surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted

*Source: California Department of Water Resources Groundwater Sustainability Plan Regulations § 351(m, o)*



# GROUNDWATER DEPENDENT ECOSYSTEMS (GDEs)

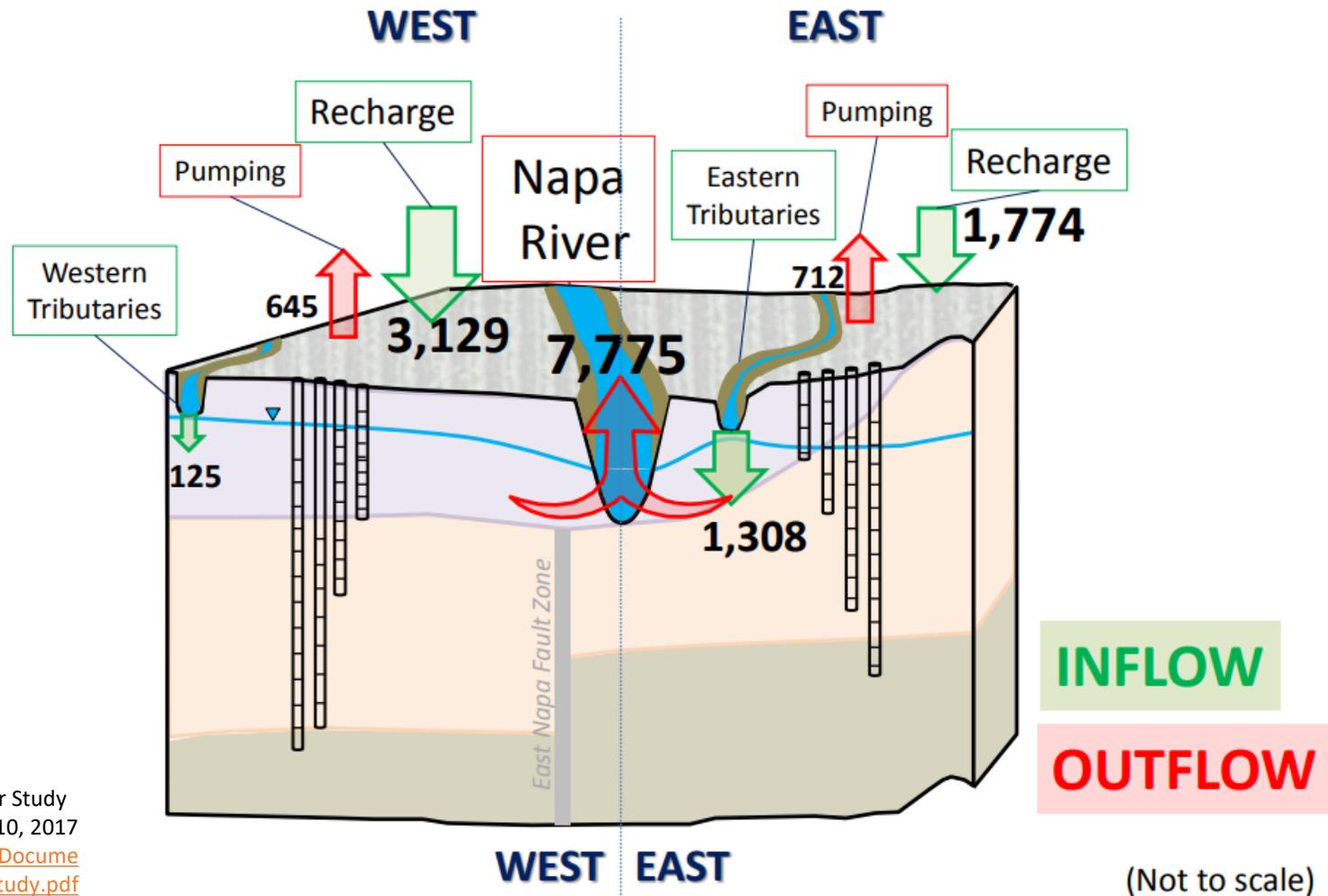


# GROUNDWATER DEPENDENT ECOSYSTEMS (GDEs)

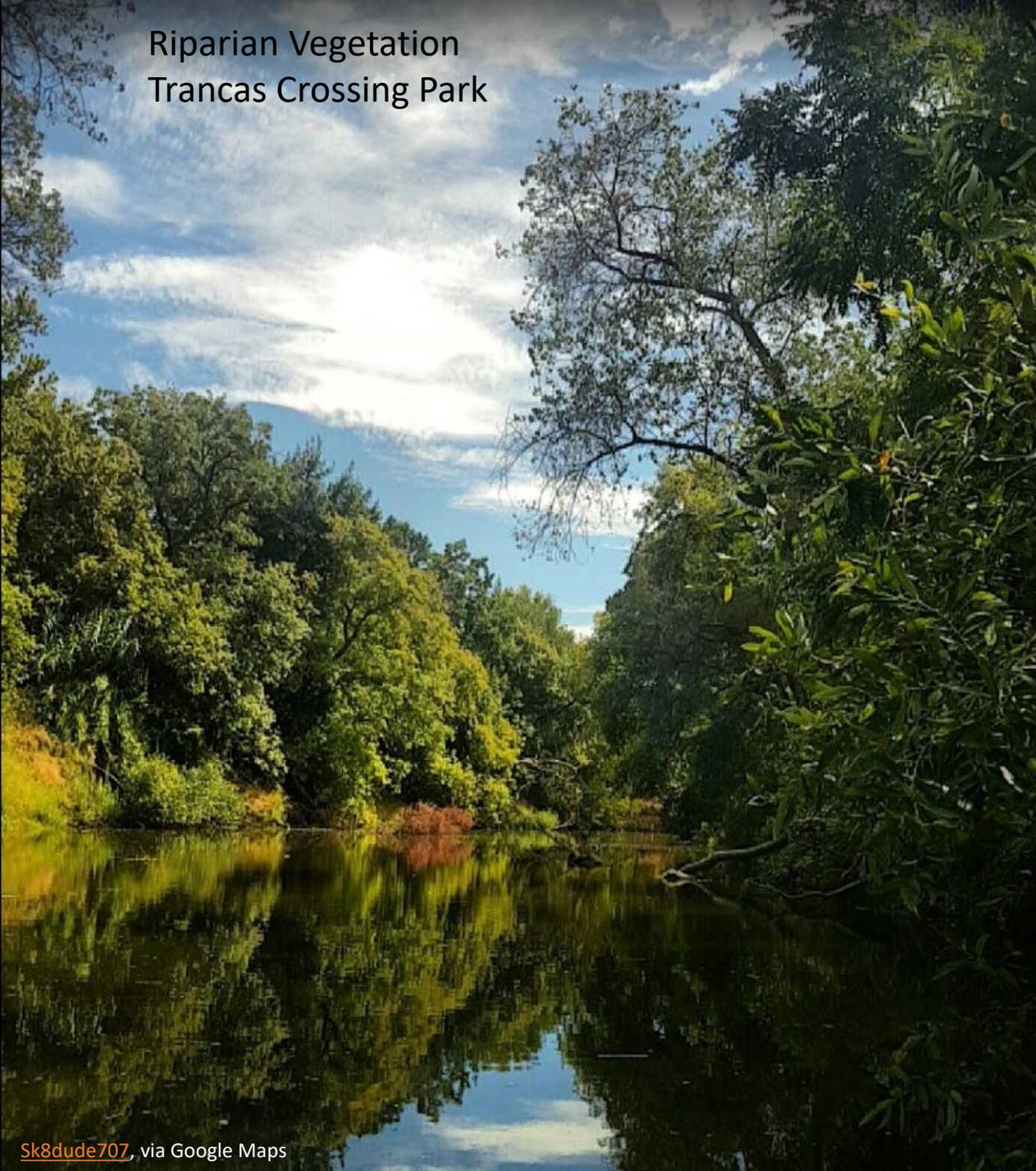


# NAPA RIVER FLOWS DEPEND ON GROUNDWATER

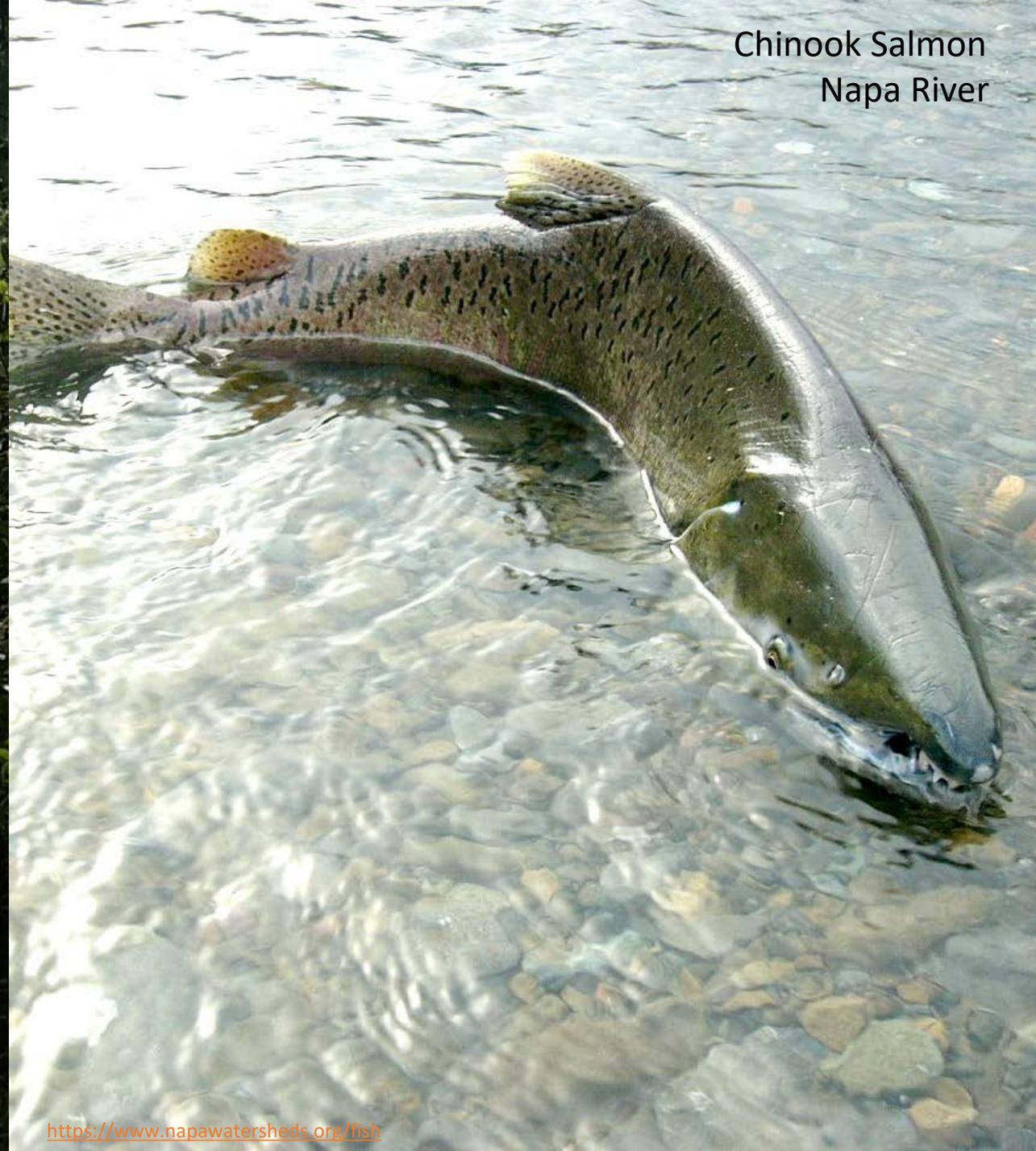
## Select Average Baseline Water Budget Components (AFY)



Riparian Vegetation  
Trancas Crossing Park



Chinook Salmon  
Napa River



## GDE MAPPING CORE TEAM



ROY HULL  
AMY LYONS



KRISTAL DAVIS-FADTKE  
TODD KEELER-WOLF

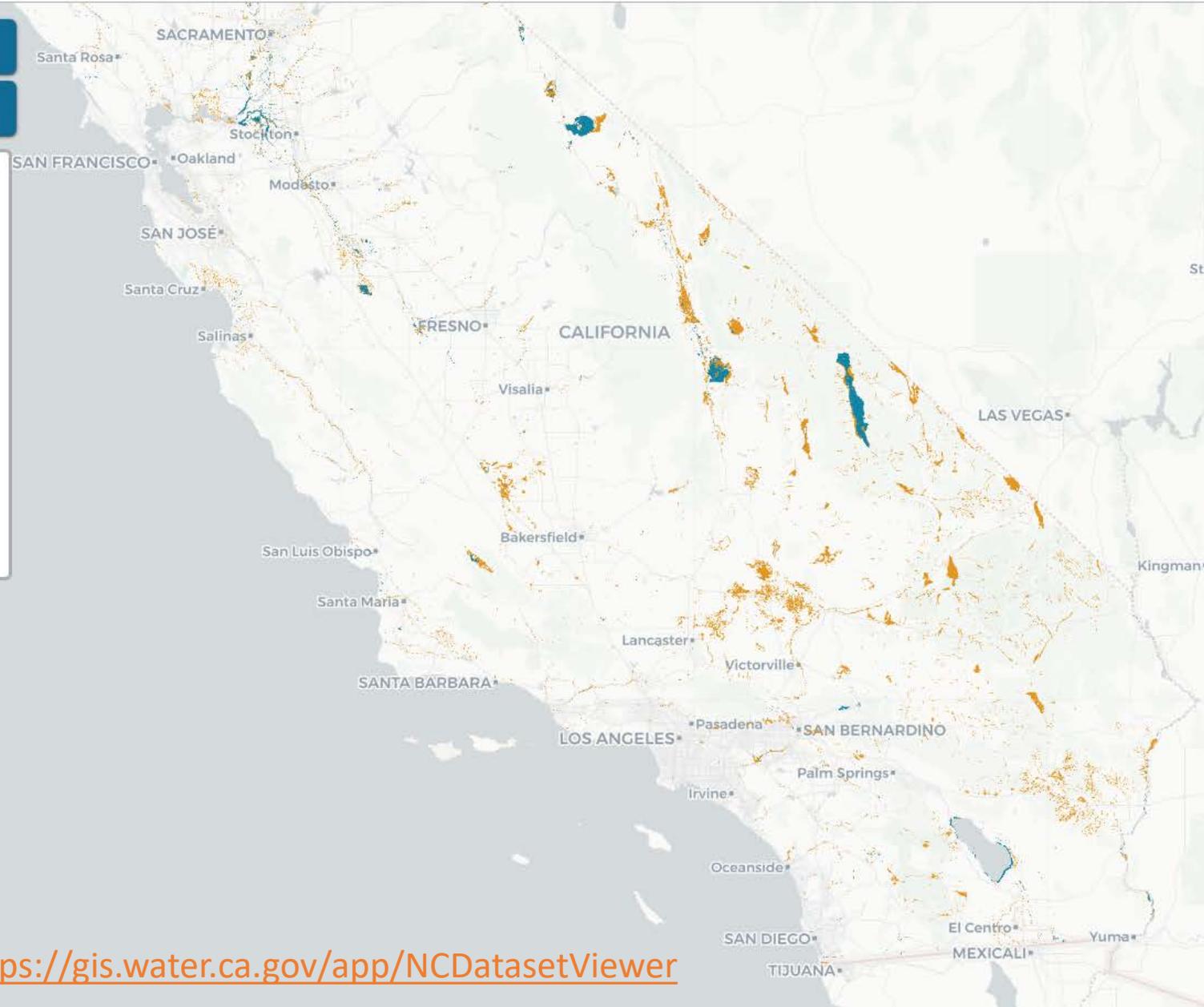


KIRK KLAUSMEYER  
JEANETTE HOWARD

**NC Dataset Viewer**  
CADWR Sustainable Groundwater Management

Search... 🔍 📍 📄 🗑️ 📶 ⓘ

- NC Dataset**
- ⓘ NC Dataset Layers
    - Vegetation
    - Wetlands
- NC Dataset Sources**
- ⓘ VegCAMP
  - ⓘ CALVEG
  - ⓘ FVEG
  - ⓘ NWI Riparian
  - ⓘ NWI Wetlands
  - ⓘ NHD Springs & Seeps
- Reference Layers**
- ⓘ B118 Groundwater Basins
    - B118 Groundwater Basins
  - ⓘ Crop Mapping 2014



<https://gis.water.ca.gov/app/NCDatasetViewer>



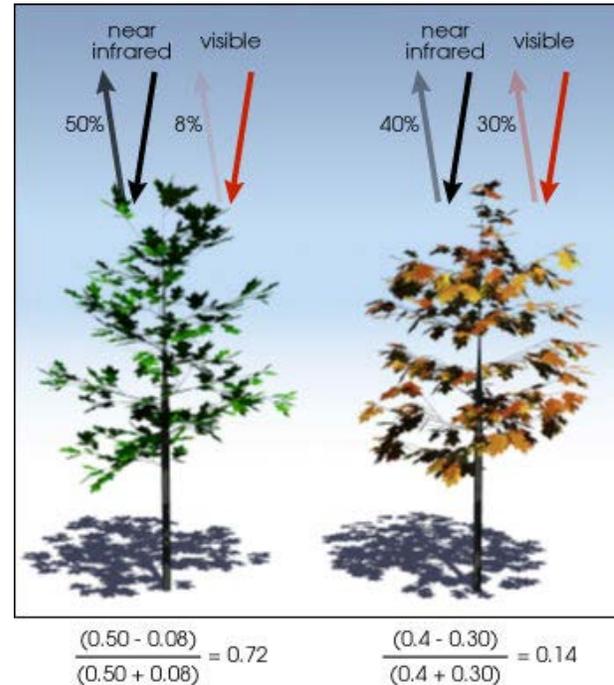
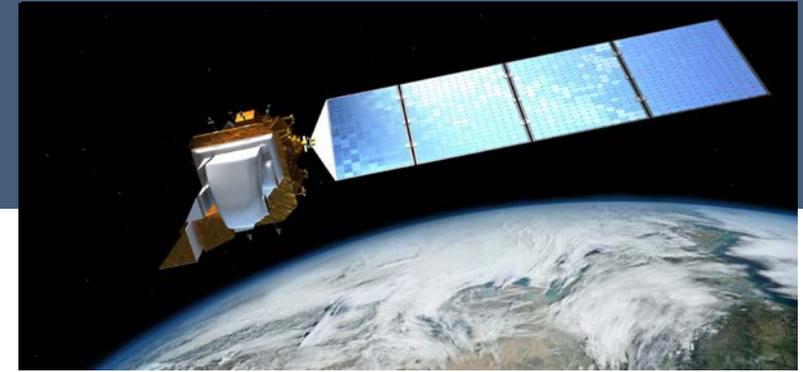


## GDE PULSE PROJECT GOAL

To provide groundwater sustainability agencies (GSAs), agencies, and conservation organizations trends of proxies for groundwater dependent ecosystem (GDE) health to identify possible connections to groundwater levels and encourage sustainable groundwater management.



# VEGETATION INDICES



NDVI: Normalized Difference Vegetation Index

0 = Bare soil

0.5 = Moderate canopy, moderate vegetation vigor

1 = Full canopy, high vegetation vigor

NDMI: Normalized Difference Moisture Index

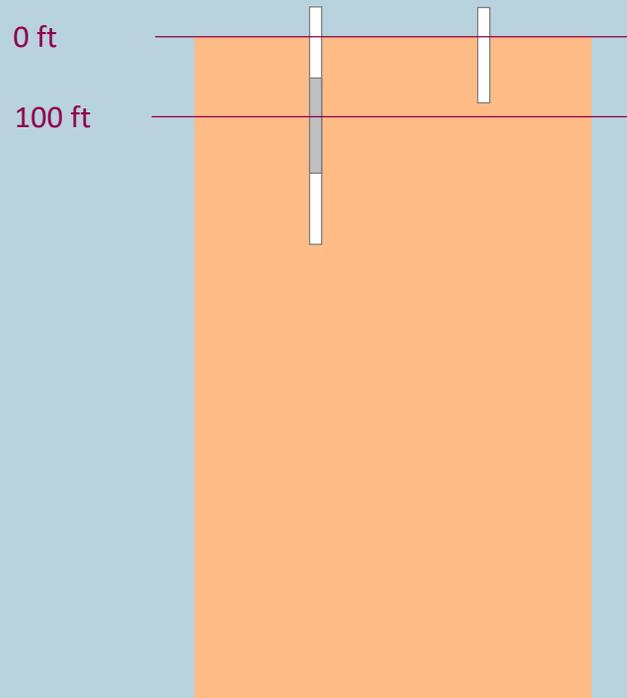
-1 = Bare soil

0 = Moderate canopy, high water stress

1 = Full canopy, low water stress

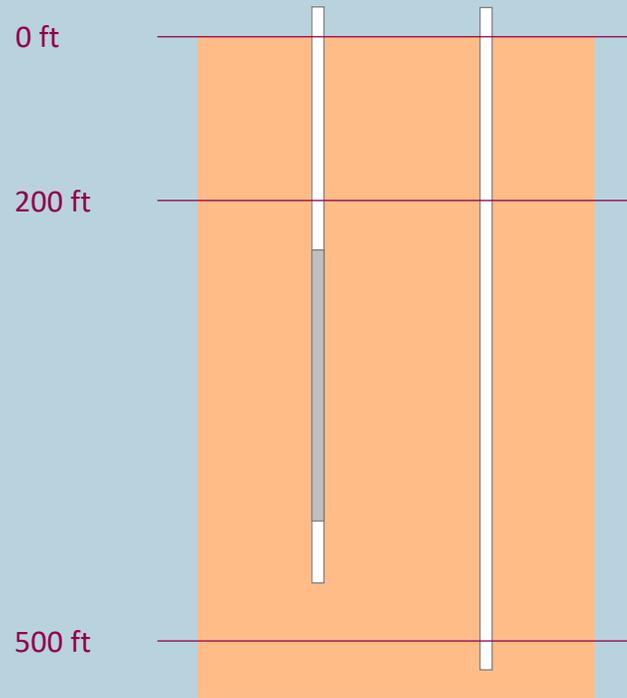
# GROUNDWATER WELLS

## Shallow



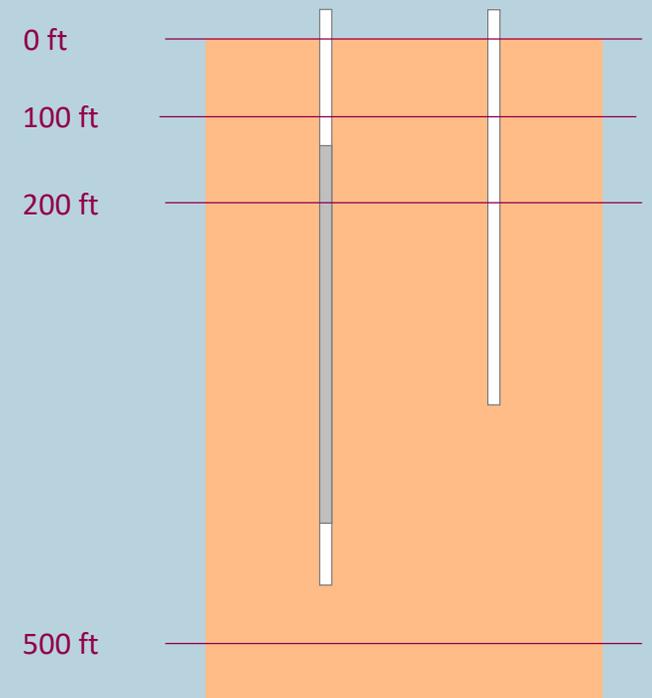
- 1) Top of the perforation  $\leq 100$  ft deep OR
- 2) Total depth  $\leq 100$  ft deep

## Deep



- 1) Top of the perforation  $> 200$  ft deep OR
- 2) Total depth  $> 500$  ft deep

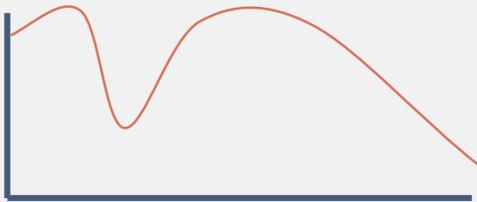
## Uncertain



- 1) Top of the perforation  $> 100$  and  $\leq 200$  ft deep OR
- 2) Total depth  $> 100$  and  $\leq 500$  ft deep OR
- 3) Well perforation and depth data missing

# RELATIONSHIPS

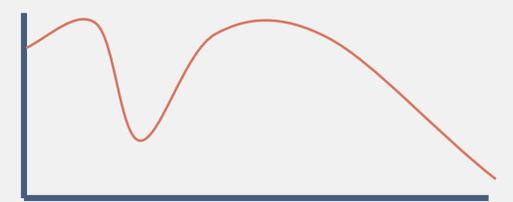
NDVI



NDVI



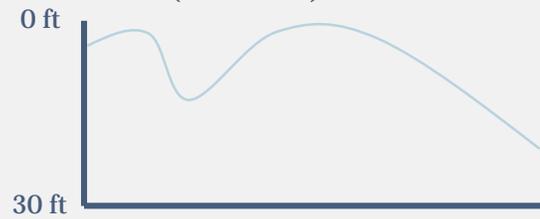
NDVI



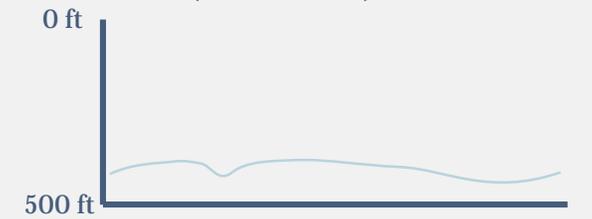
Well (Shallow)



Well (Shallow)



Well (Uncertain)



- Highly correlated
- Declining trend
- Minimize pumping near GDE

- Poorly correlated
- Stable trend
- Continue to monitor
- Watch for thresholds

- Poorly correlated
- Declining trend
- Install shallow wells



