

# Coupled vegetation and sediment changes along the San Juan River arm of Lake Powell Reservoir

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## Reservoir Draw-Down on the San Juan River ~ 3 Main Take-Aways:

- 1) **Native plants (cottonwood, willow) dominate**
  - Likely due to very dynamic erosion of reservoir sediments
- 2) **“Marooned” vegetation covers large areas in wide, fold-parallel river segments**
  - Continued downcutting may result in both more stranding and more new bank habitat for native plants
- 3) **Plant succession occurs in two directions**
  - Not just from older upriver to younger downriver; also laterally

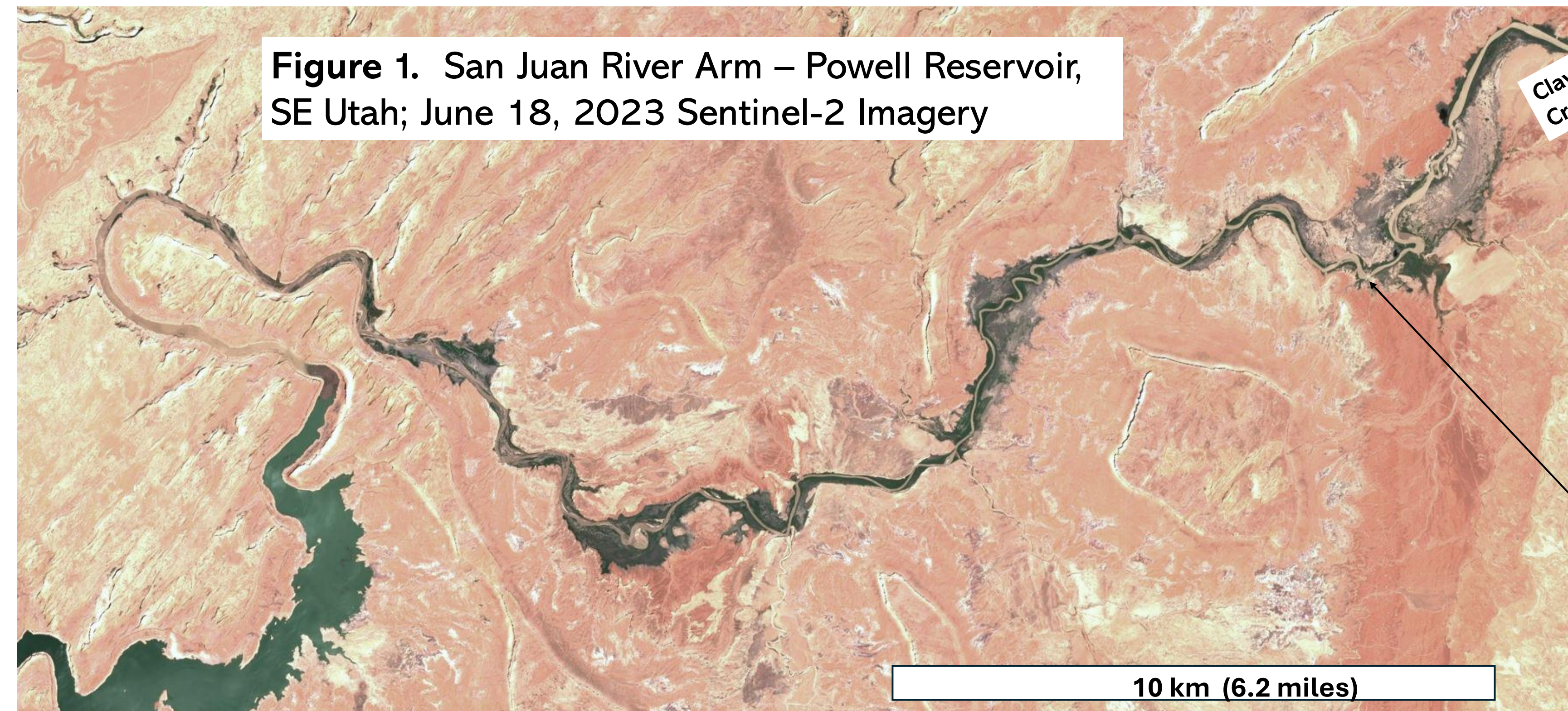


Figure 1. San Juan River Arm – Powell Reservoir, SE Utah; June 18, 2023 Sentinel-2 Imagery



Clay Hills Put-In, April 2023 RRP trip



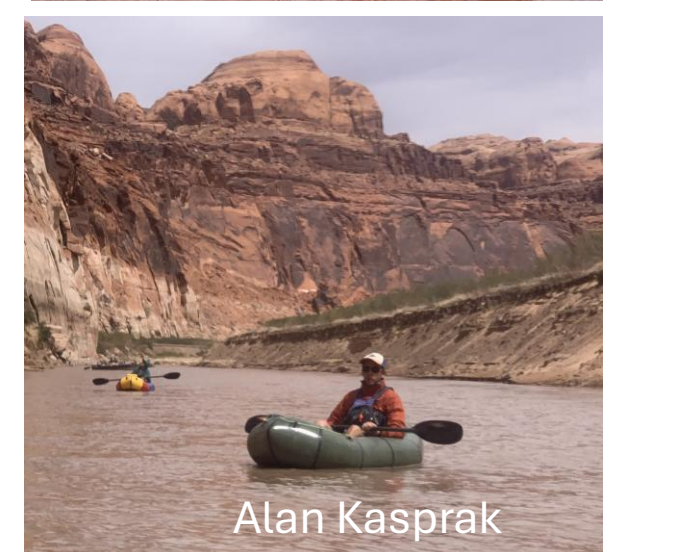
Fatt Falls Portage, March 2024 RRP trip



Cynthia Dott



Gary Gianniny



Alan Kasprak

### 1) Native Plants Dominate – Surprise!

- Along the newly formed river corridor, colonizing plants are mainly **native species**:
  - Coyote willow
  - *Baccharis* species
  - Fremont cottonwood
  - Gooddings willow

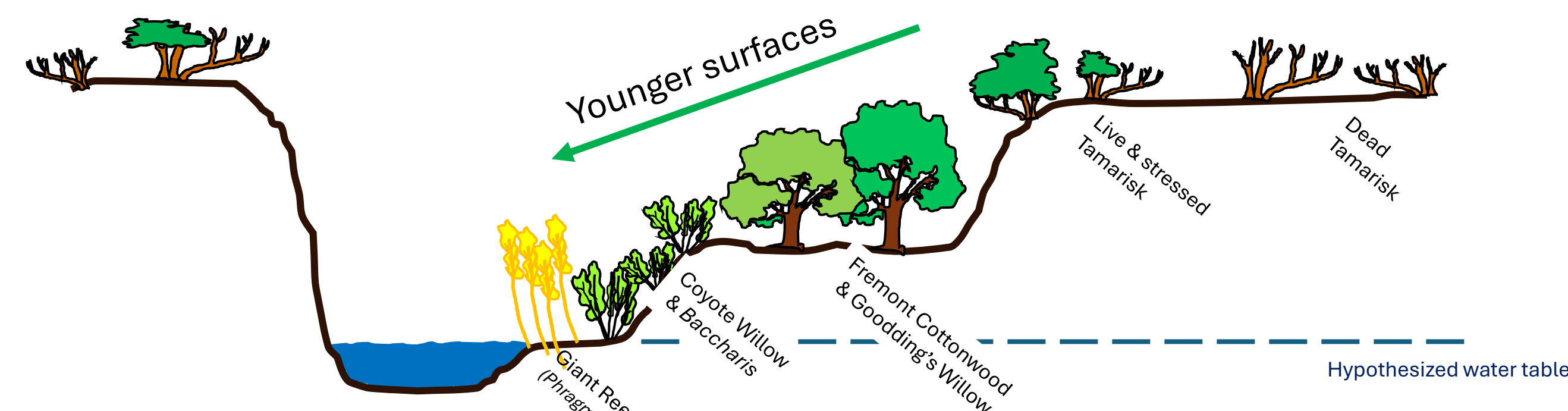


Figure 2 (above). Schematic channel and floodplain cross-section showing typical vegetation zones observed along the San Juan arm as the river progressively cuts down through thick reservoir sediments.



Figure 4. High, dry terrace dominated by stressed and dead vegetation, including tamarisk.

### 2) “Marooned” Vegetation: Left High & Dry

- River channel very dynamic
- Rapid down-cutting of erodible reservoir sediments lowers the water table and “maroons” large areas of previously moist habitat (Figure 2).
- On the San Juan arm, the wider valley exists due to geologic fold-parallel valleys and more easily erodible bedrock strata. These wider valley segments with more extensive Dominy Fm. deposits create large areas of drought-stressed habitat. (see today's talk by Alan Kasprak!)
- Tamarisk is especially prevalent in these areas, and is now often stressed and dying, leaving land open to other invasive weeds.

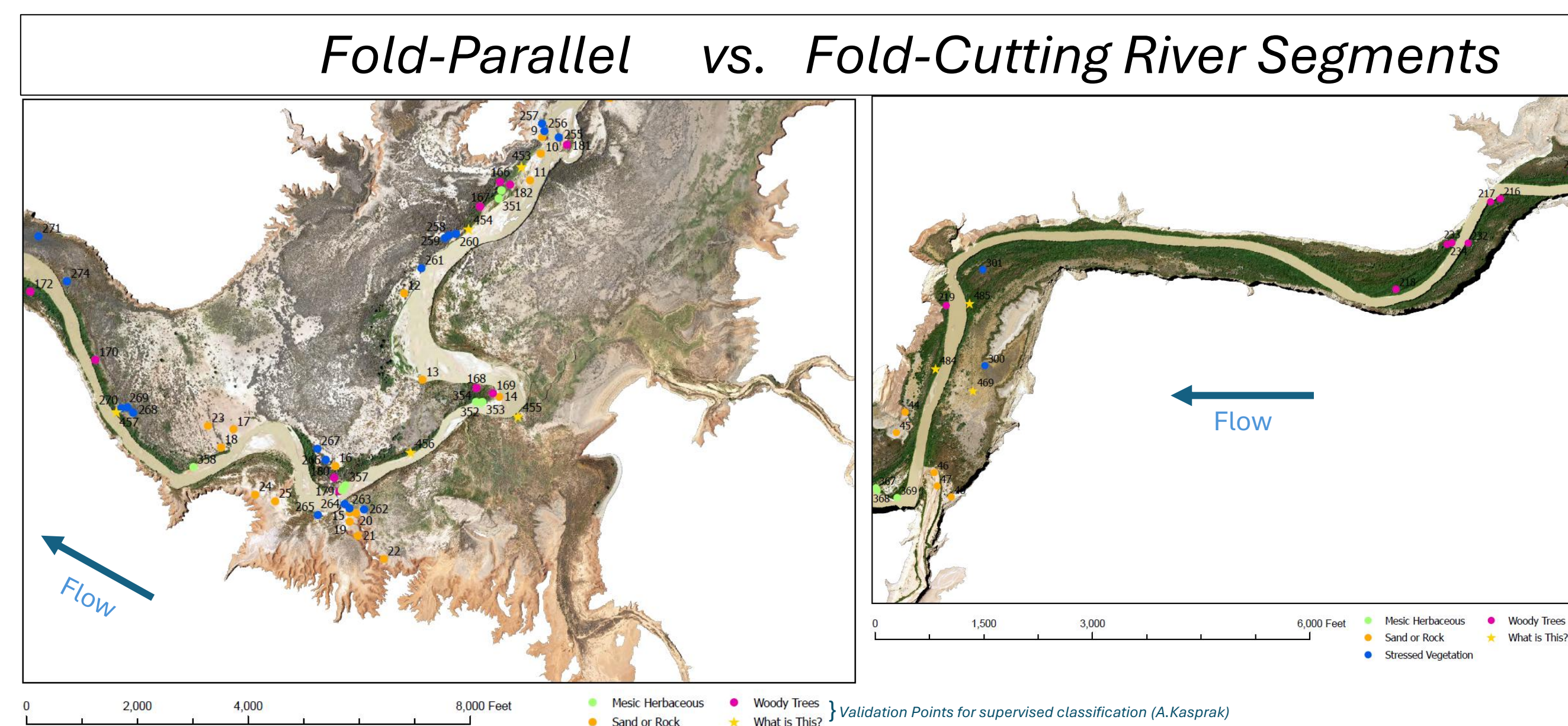


Figure 5. Extent of reservoir sediments exposed in wide vs narrow canyon segments on the San Juan Arm of Reservoir Powell. More habitat for initial tamarisk establishment was exposed with early reservoir draw-down in wide reaches, which is now drying (see large areas of gray vegetation in left-hand image) with further draw-down and water table drop (see Figure 2).

### 3) Plant Succession in Two Directions

- First, older plant communities establish up-river, with younger ones down river as the reservoir drops (see today's talk by Seth Arens!)

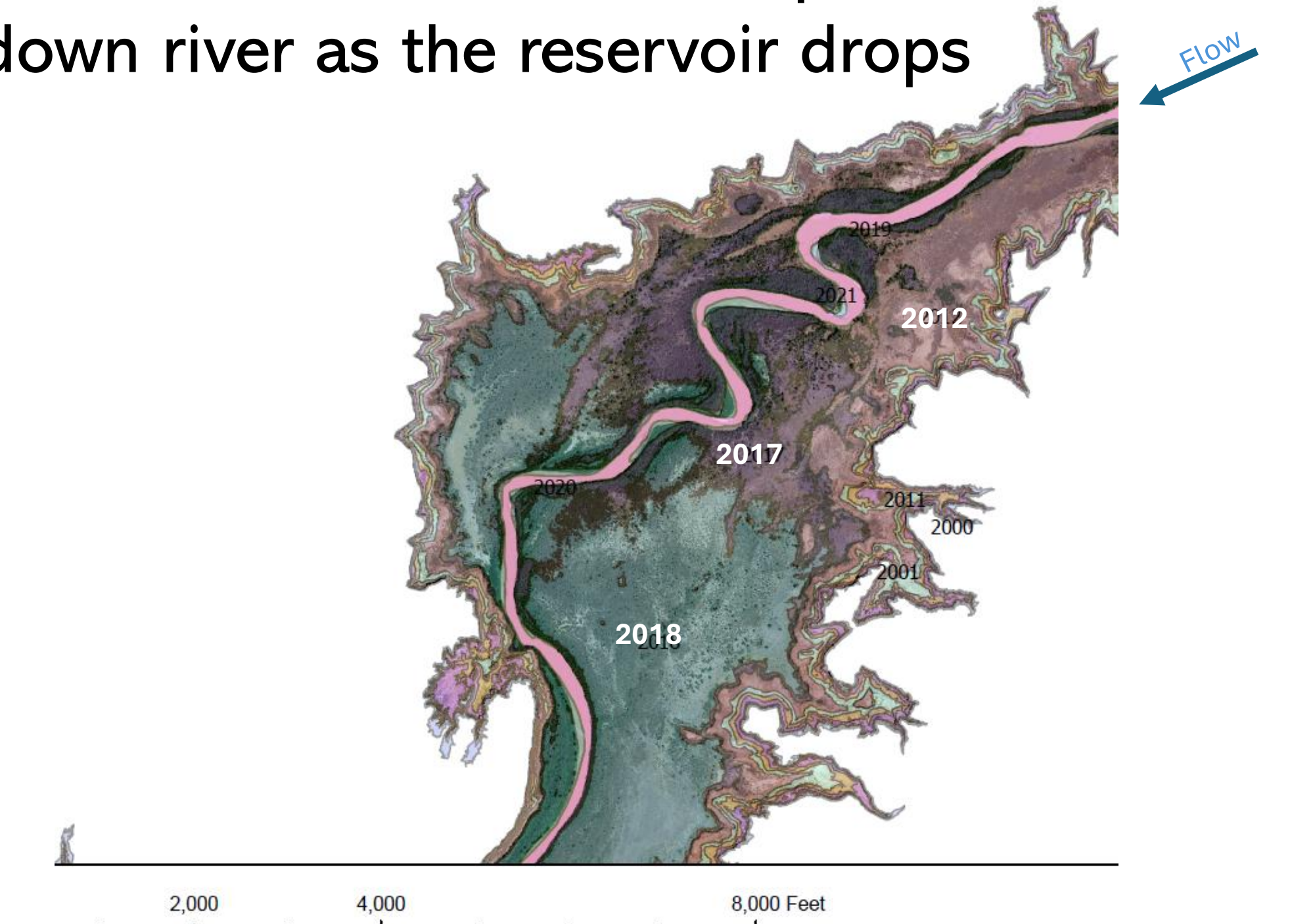


Figure 6. Exposure ages of sediments at different reservoir elevations from 2021 NAIP imagery. Oldest sediments upstream (2012), to youngest farther downstream (2018).

- Second, laterally, oldest plants are on high Dominy Fm. terraces and youngest on inset channel margins. (See Fig. 2)

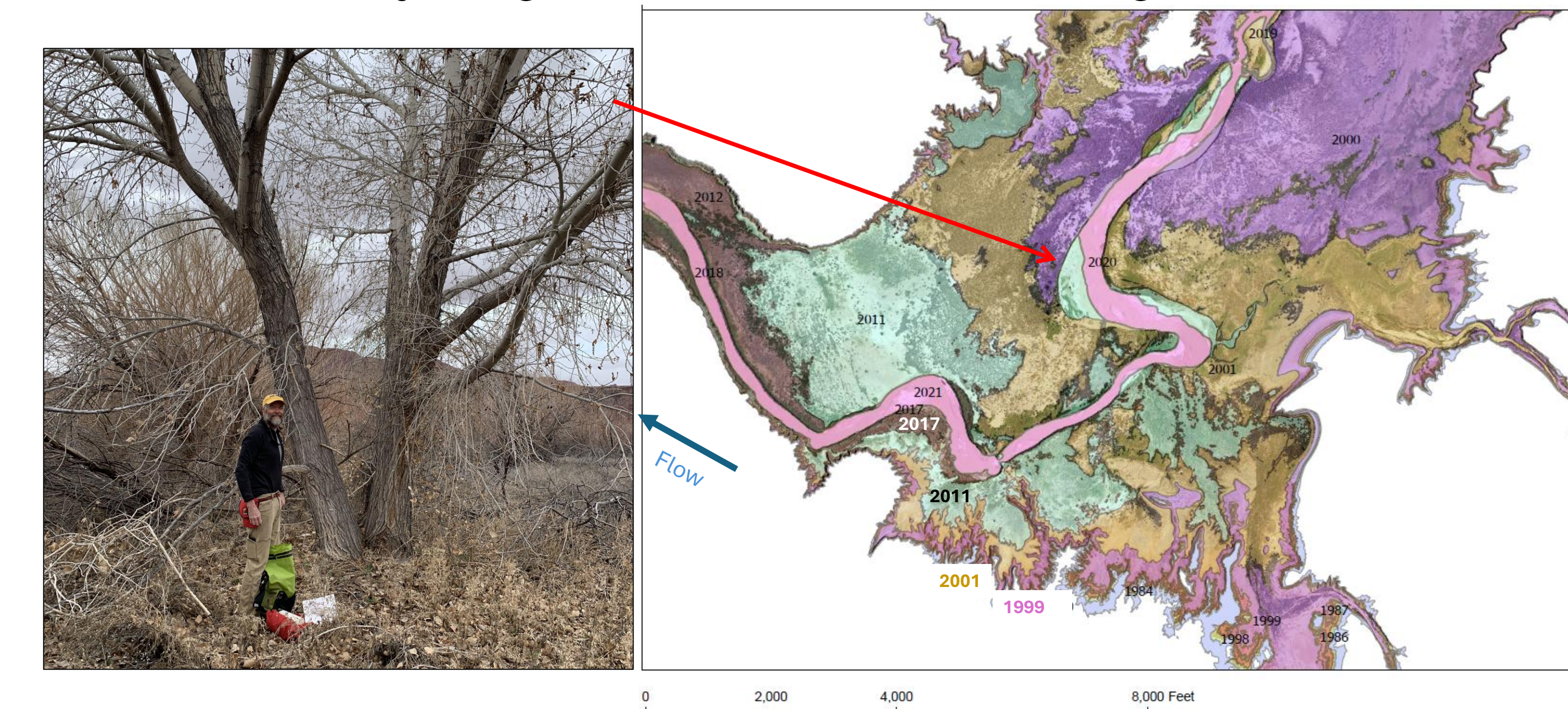


Figure 7. Left: Gary G. by mature cottonwoods established on sediments exposed in 2000, meaning these trees are likely 24 years old. Right: Exposure ages of sediments at different reservoir elevations, showing a complex mosaic of different-aged surfaces from the channel margin outward to the bounding canyon walls. Base image is 2021 NAIP air photo, clipped to 1983 Reservoir Powell high stand elevation.

- Invasive **non-native species** much less common
- “Surprising,” because upstream of Clay Hills these non-natives are dominant:
  - Tamarisk
  - Russian olive



Figure 3. Channel incision along the San Juan arm forms inset terraces as the river progressively cuts down through thick reservoir sediments. (Nokai Canyon)