# Functional lift of a headwater stream-wetland complex restoration revealed by a decade of environmental and ecological monitoring

National Stream Restoration Conference 2023

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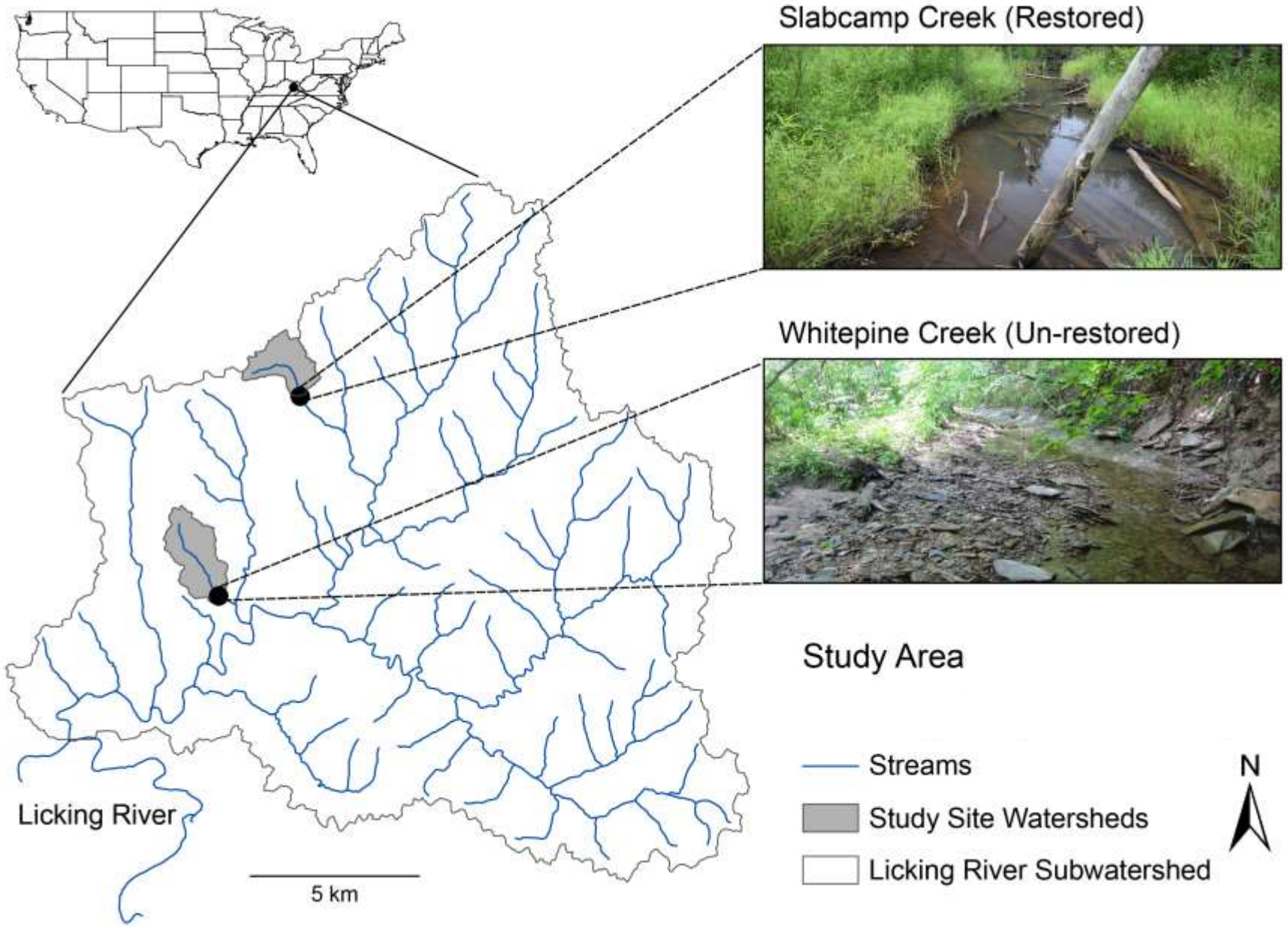
# Outline

- Pre-Restoration Condition
- Restoration of the Valley
- Ecological Response
- Conclusions

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# Pre-Restoration Condition

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*Pre-restoration condition in 1950s. Homestead areas in purple*

*Ten years post restoration*

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# Restoration of the Valley: Goals

- Reconnection of the historic valley aquifer
- Creating interconnected and diverse habitat
- Re-establish a frequent flooding regime
- Reduce flood velocities to retain habitat and organic matter

*RESULT: stream wetland complex*

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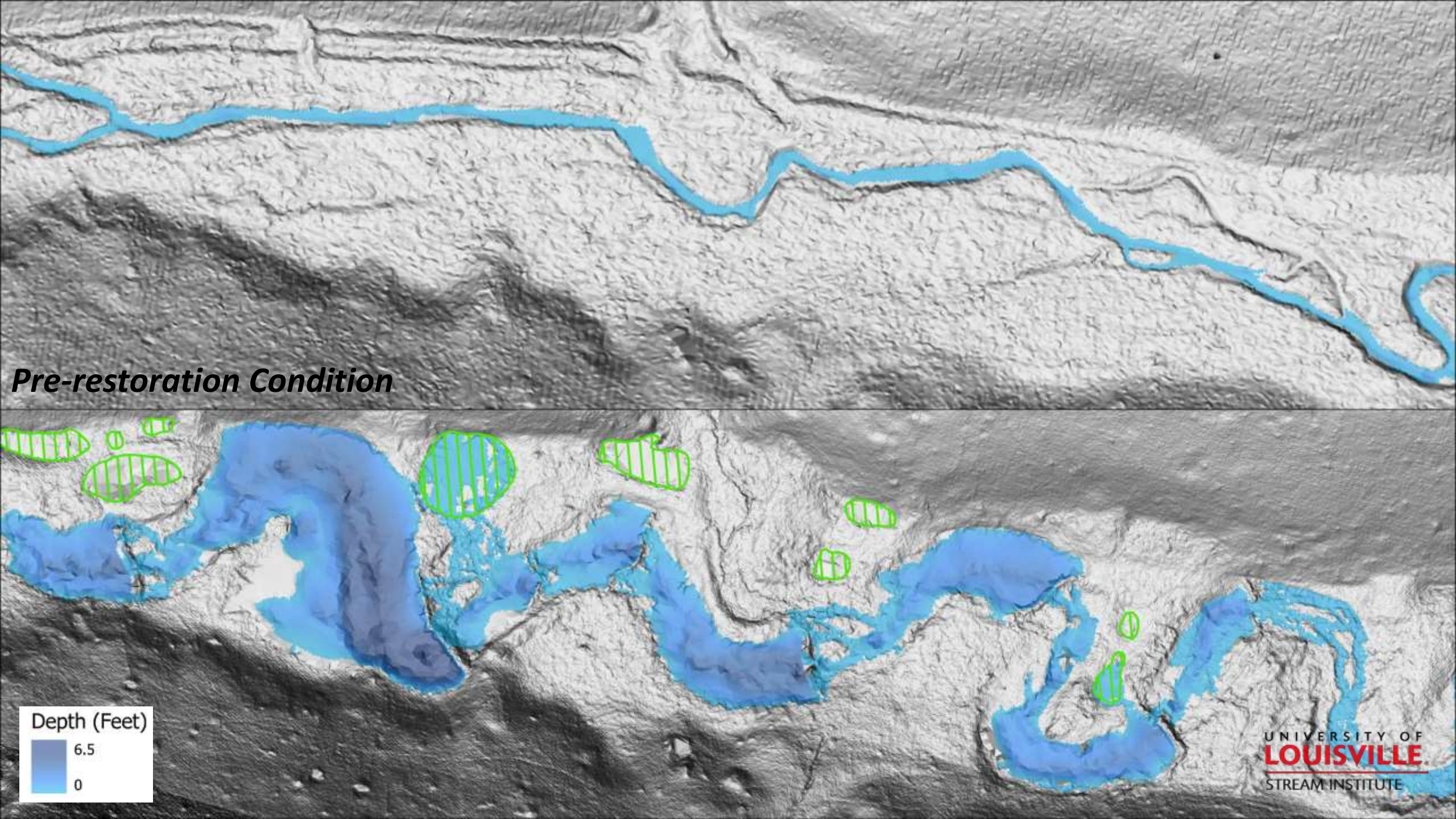
Pre-restoration Condition
Depth (Feet)
6.5
0
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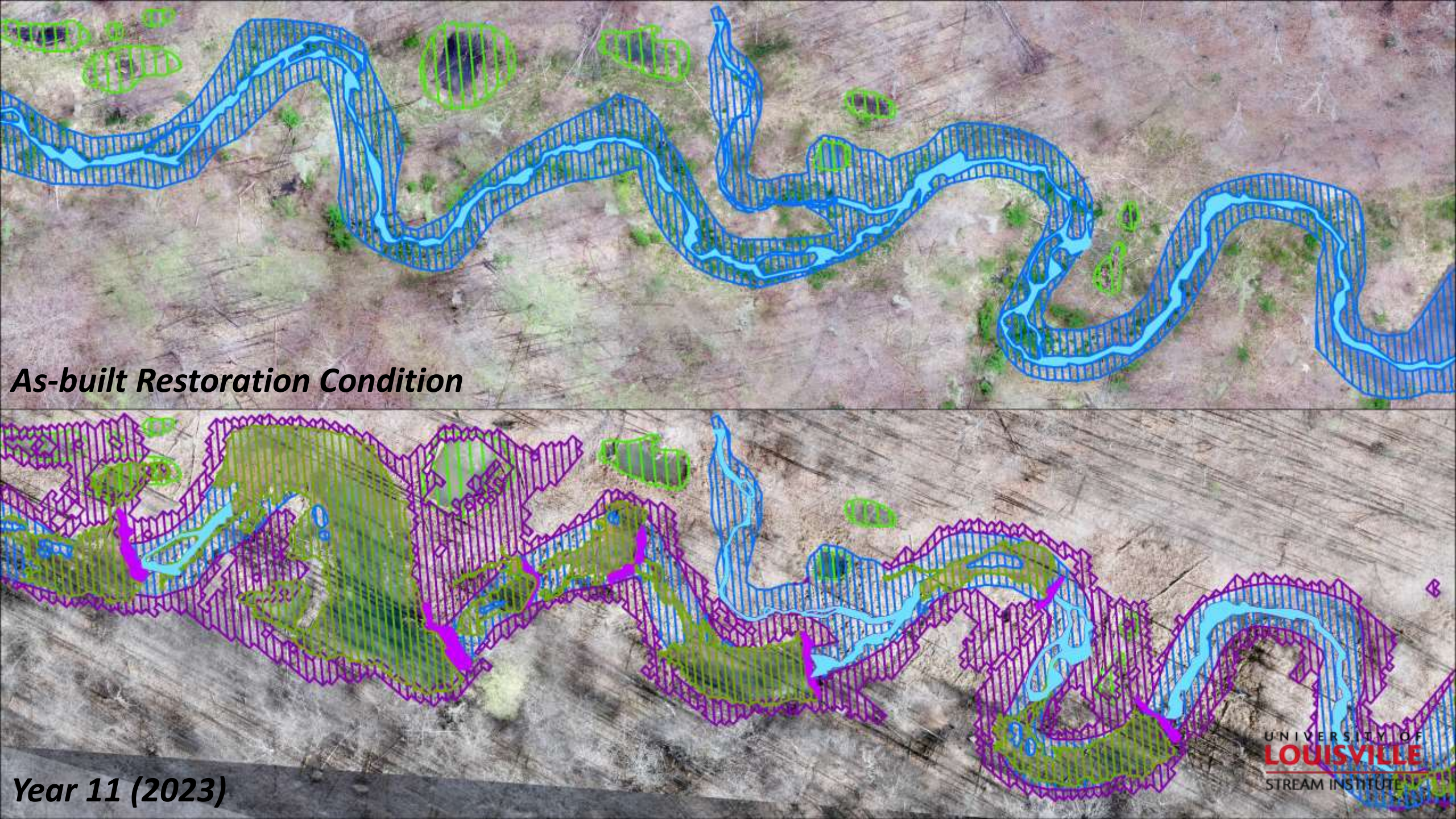
As-built Restoration Condition
Year 11 (2023)
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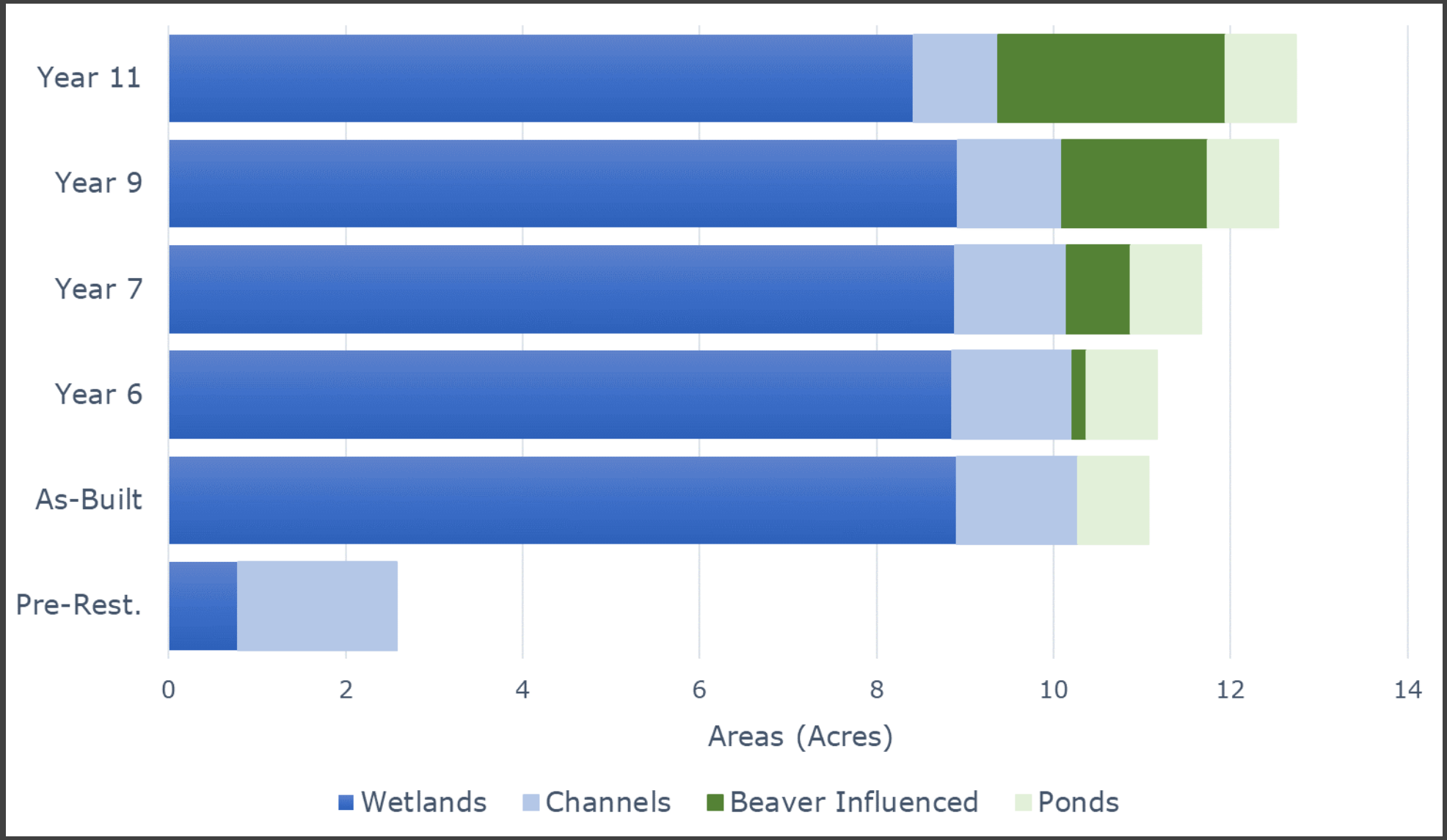


*Preliminary habitat analysis.*

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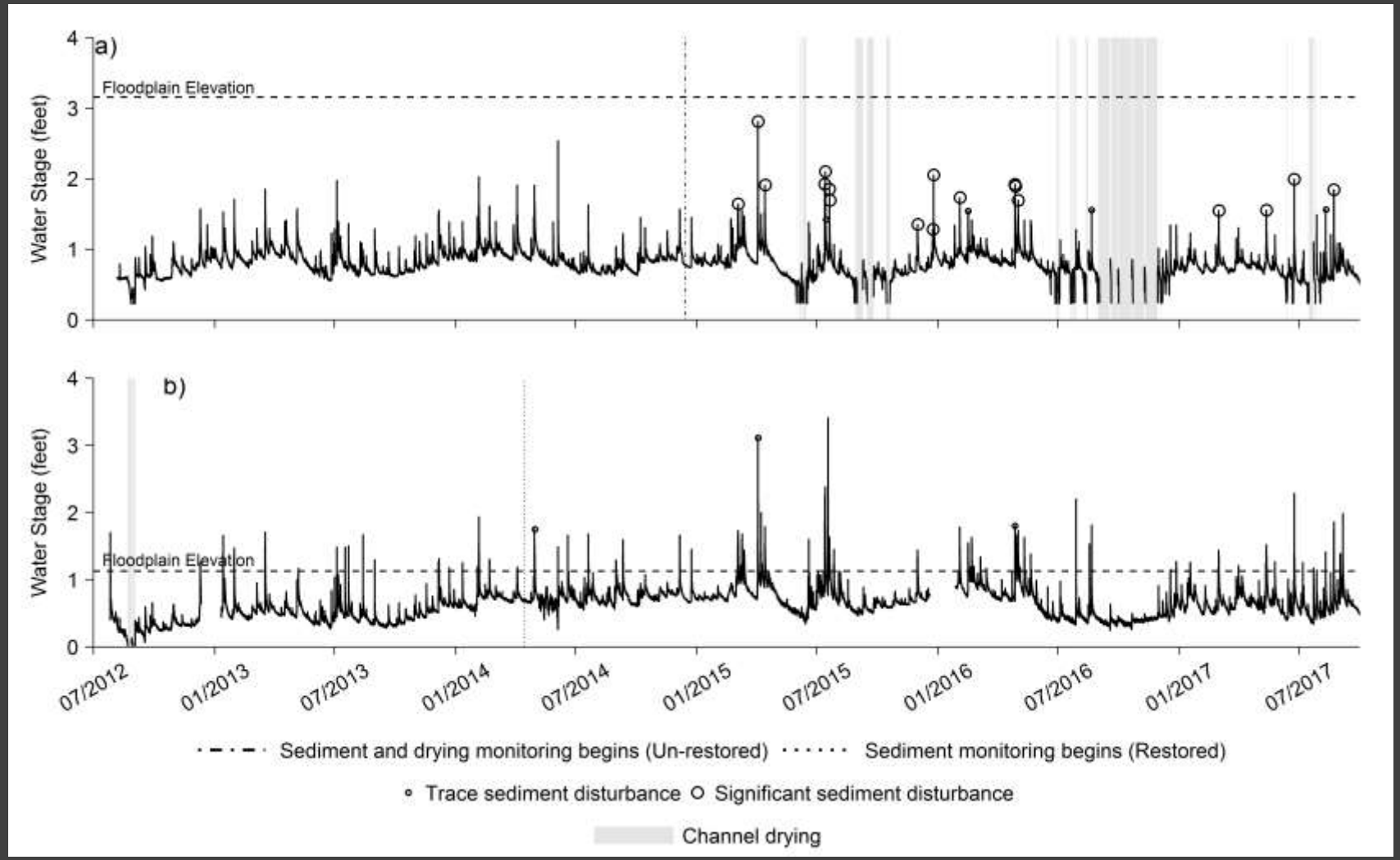
# Restoration of the Valley: Results

- Simple measurements are effective at showing function
- Metrics targeted: floodplain inundation frequency, frequency of drying, habitat suitability, presence of wetland vegetation, and retention of sediment/organic matter




*Braccia et al., 2023 (Environ. Monit. Assess. 195:394)*

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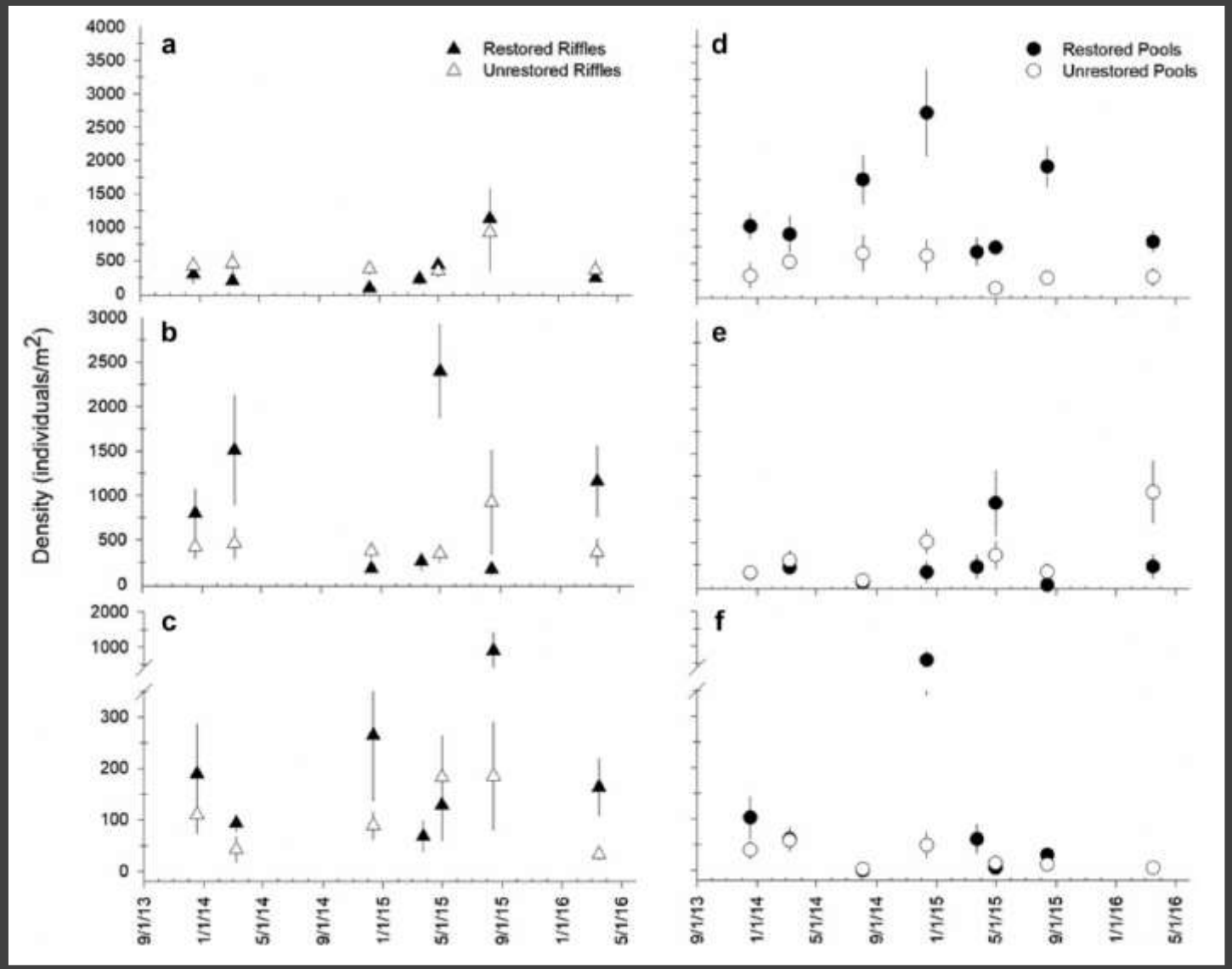
# Ecological Response: Invertebrates

- EPT Biomass 3-4X greater on in the restored channel pools
- Life histories of species in restoration in line with observed change to perennial flow
- Effective utilization of organic matter hotspots by species (burrowing mayflies)

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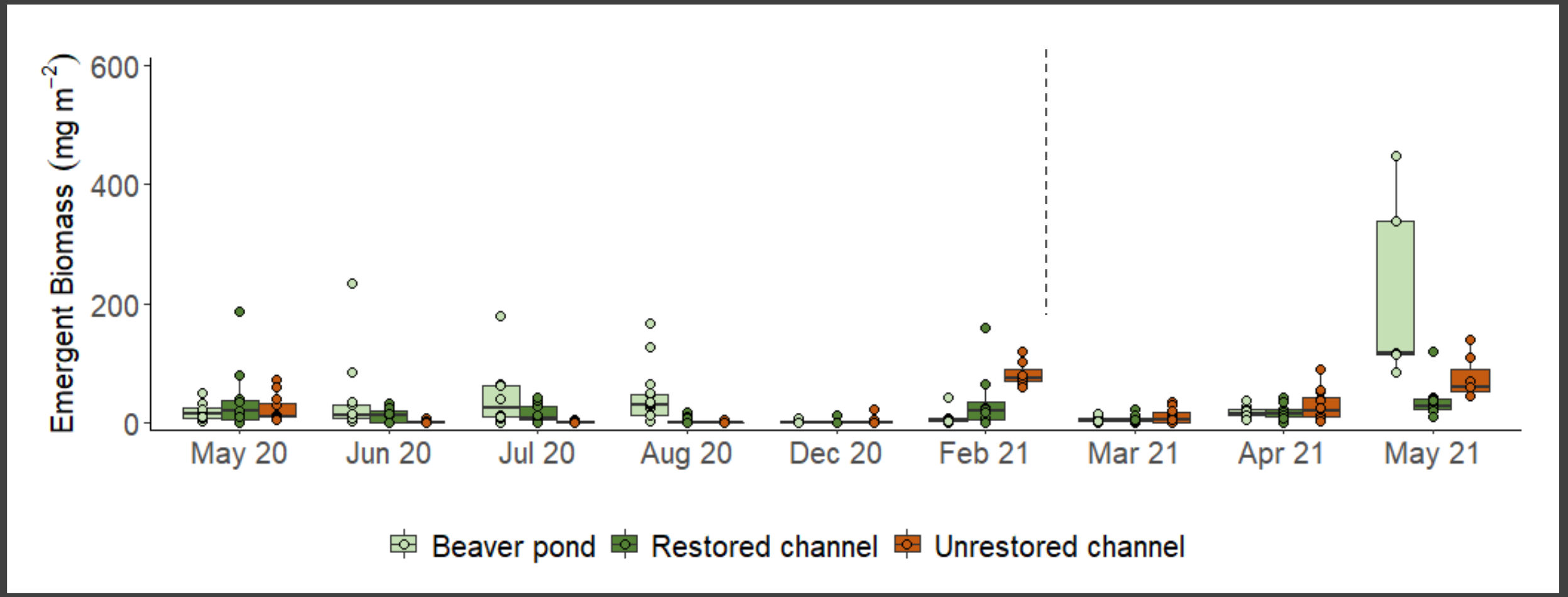
# Ecological Response: Invertebrates




Restored environments (especially beaver pools) provide food to terrestrial organisms throughout the growing season

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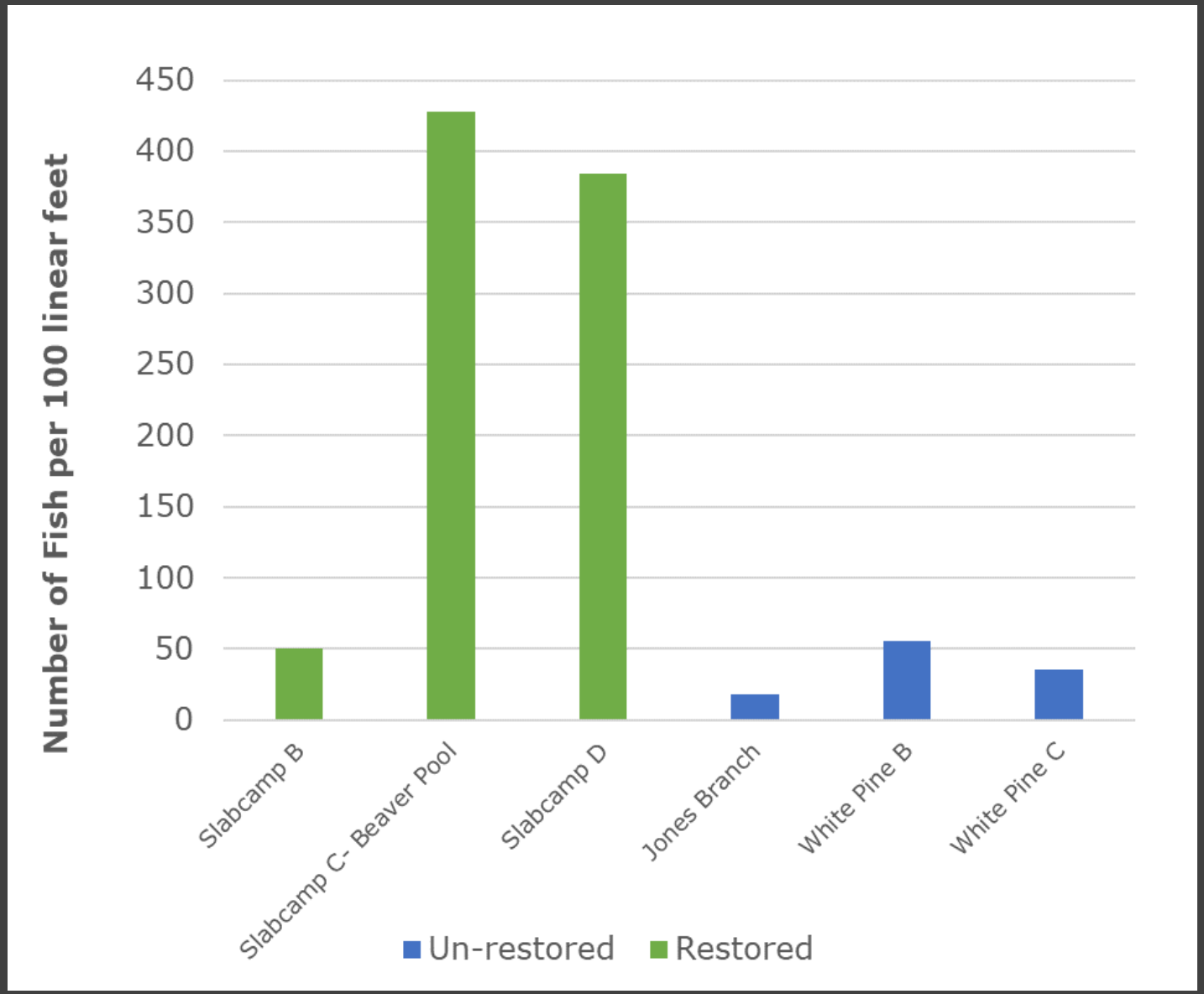
# Ecological Response: Fish

- 9 species found in the restoration vs. 4 in the un-restored sites
- Fish in the restoration were 50-100% larger by mass

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*White Pine (Un-restored)*

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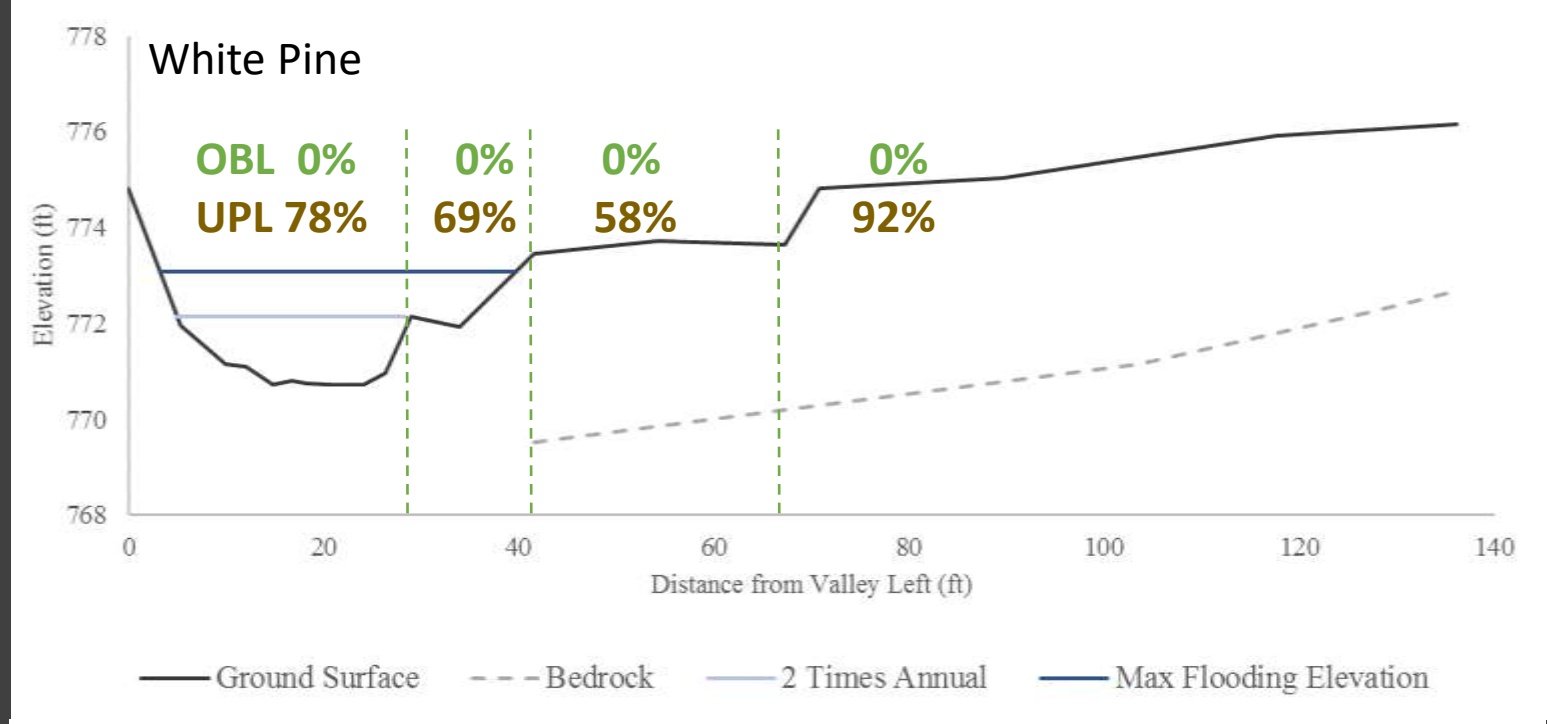
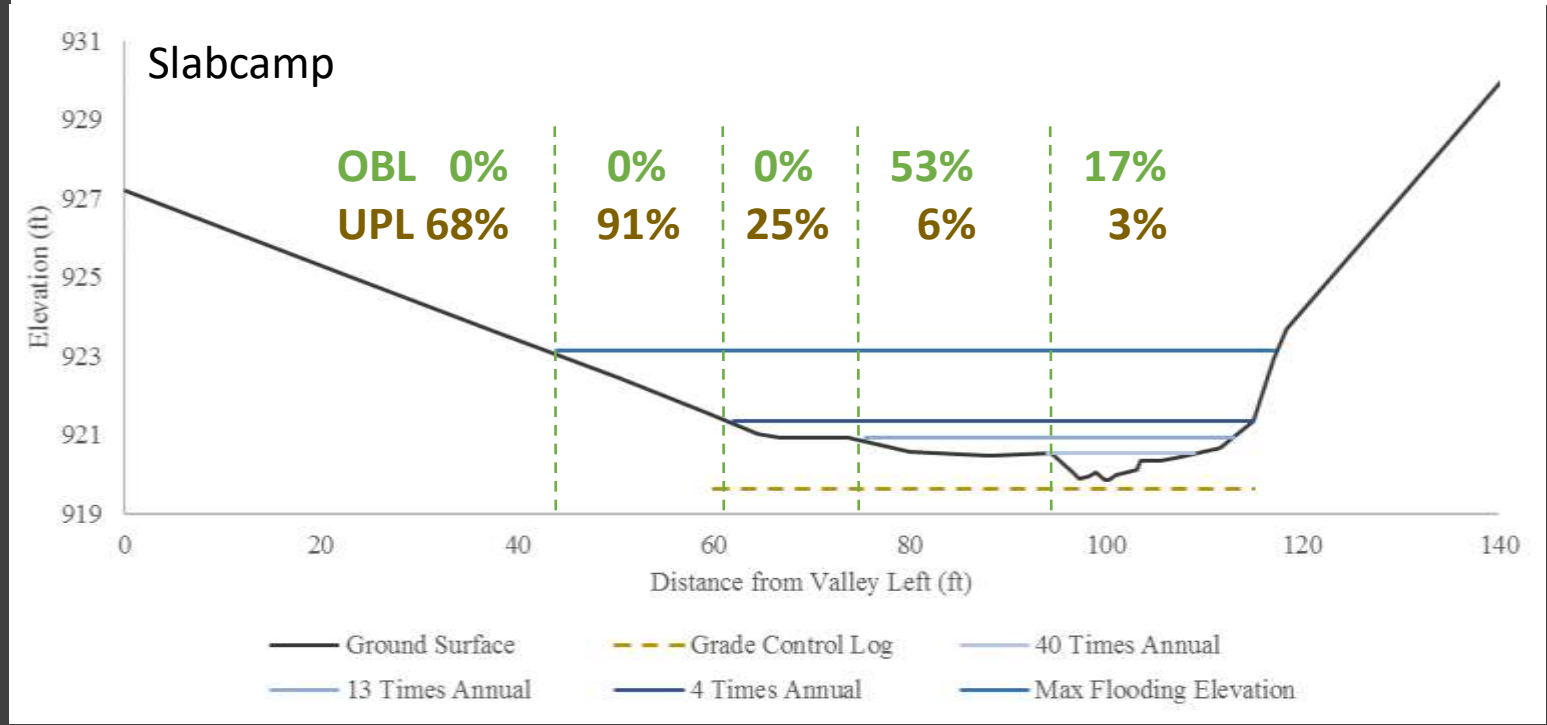
# Ecological Response: Vegetation

All plants (% cover)



# Conclusions

- Simple and robust measures should be sufficient if the restoration has achieved its goals
- Different outcomes / end points should be acceptable provided that the environment is functioning effectively
- Conduct pre and post restoration mapping of resources and their utilization throughout valleys

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