

Little Arnot Run Restoration of a Headwater Stream

Ephraim Zimmerman

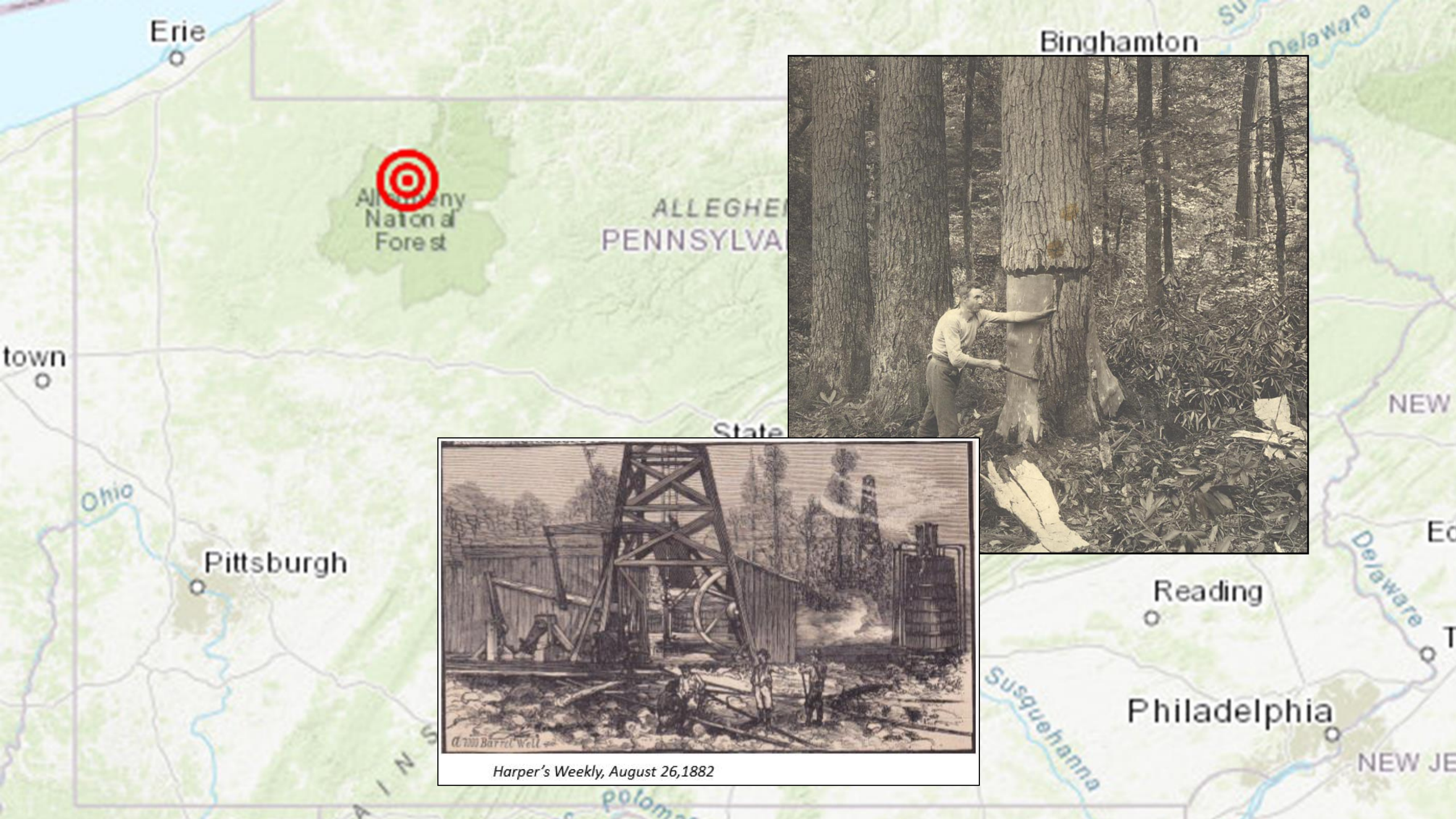
Pennsylvania Natural Heritage Program

Western Pennsylvania Conservancy

2024 Joint MAWWG NEBAWWG Meeting

Nov 14, 2024





Allegheny
National
Forest

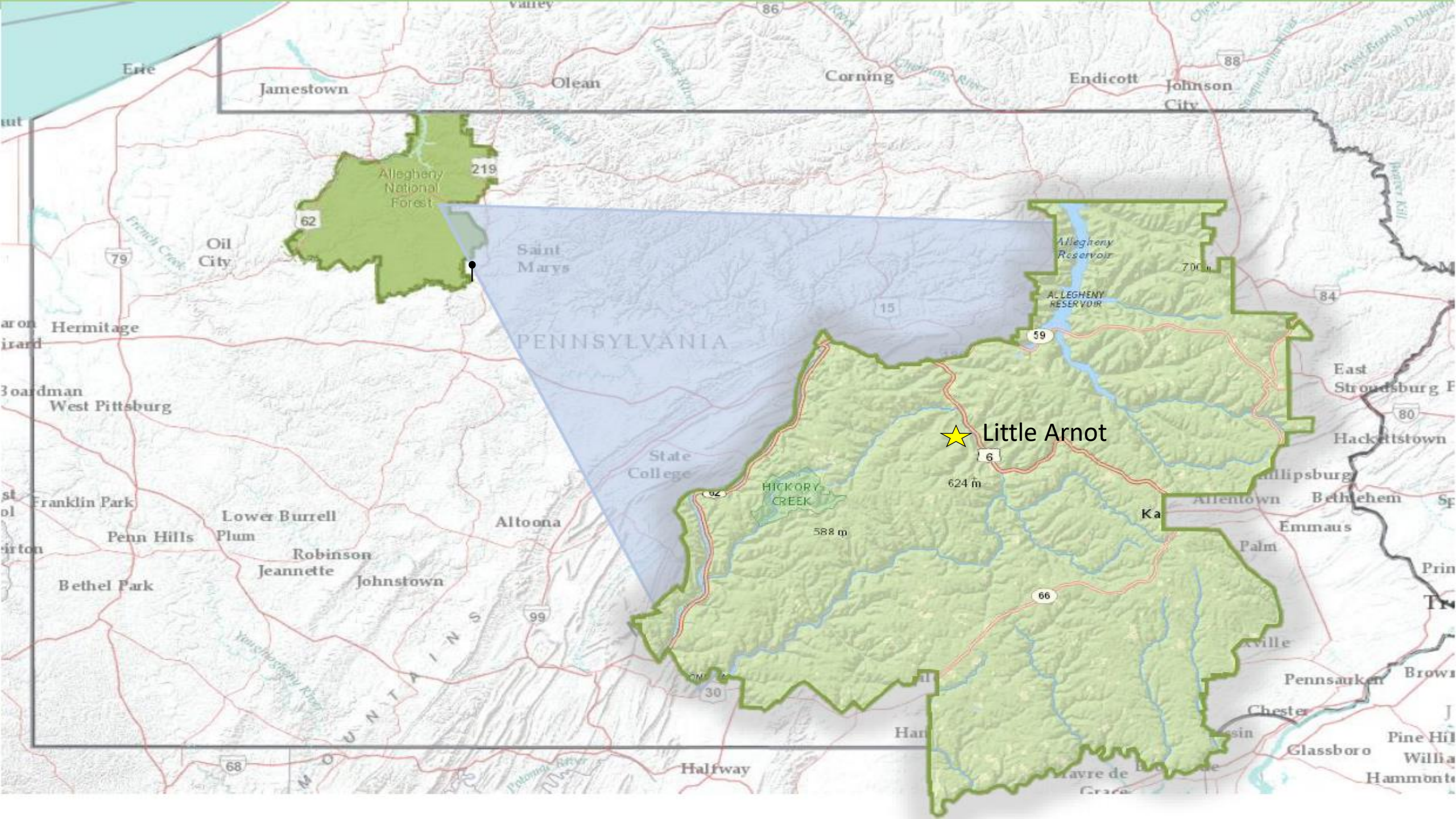
ALLEGHENY
PENNSYLVANIA



Harper's Weekly, August 26, 1882







Jamestown

Olean

Corning

Endicott

Johnson City

Allegheny National Forest

Saint Marys

PENNSYLVANIA

State College

Altoona

★ Little Arnot

HICKORY CREEK

Allegheny Reservoir

ALLEGHENY RESERVOIR

Oil City

Lower Burrell

Plum

Robinson

Jeannette

Johnstown

Allentown

Bethlehem

Emmaus

Palm

Pennsarkon

Chester

Glassboro

Halfway

Lawrenceville

Pine Hill

Williamstown

Hammon

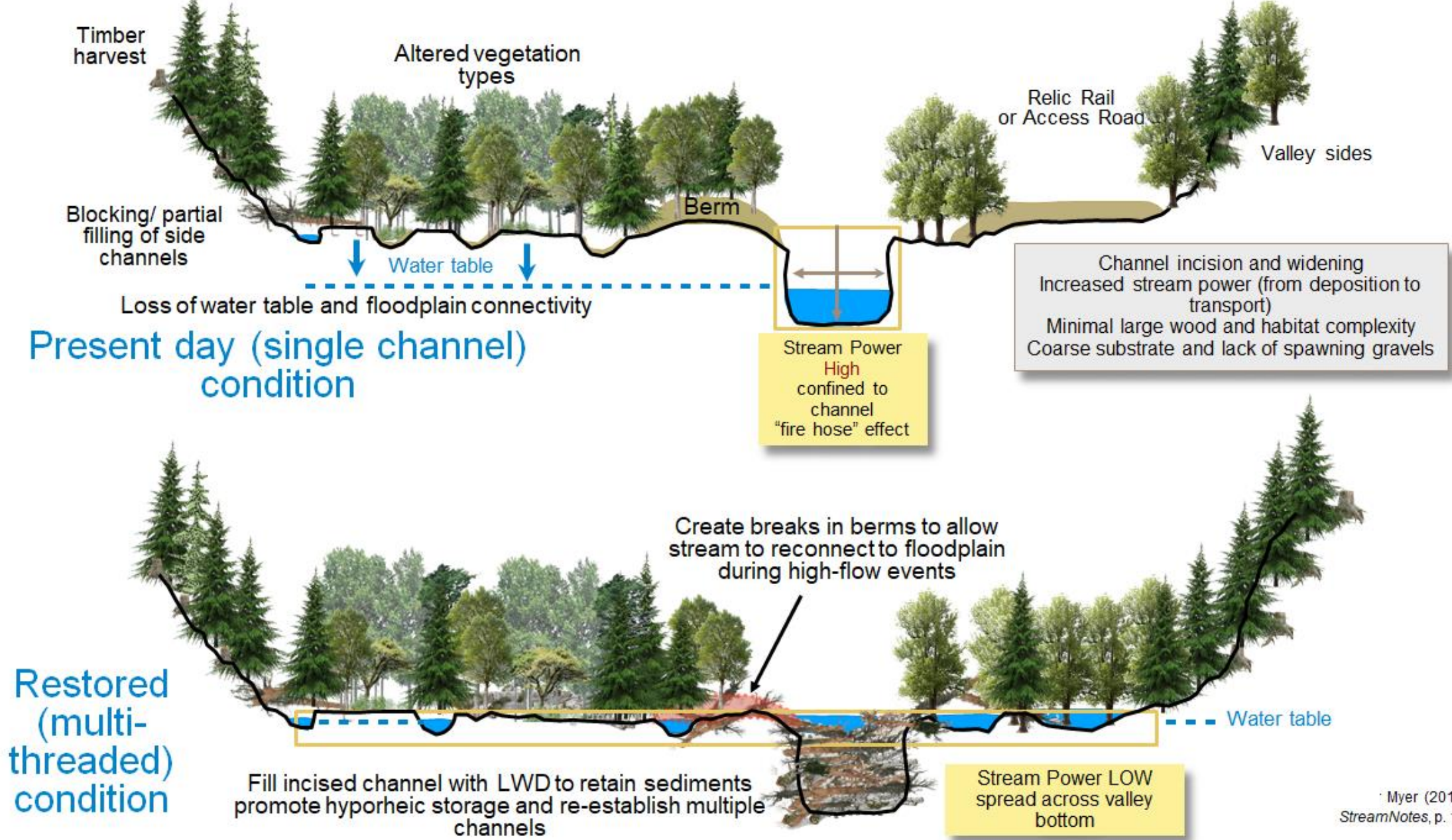


Relic oil well in
Little Arnot
watershed









Modified after Figure 2 from an article by Kate Myer entitled "Deer Creek: Stage 0 Alluvial Valley Restoration in the Western Cascades of Oregon" in the May 2018 edition of StreamNotes, a newsletter published by the National Stream and Ecology Center, U.S. Forest Service, USDA, p. 1- 5.

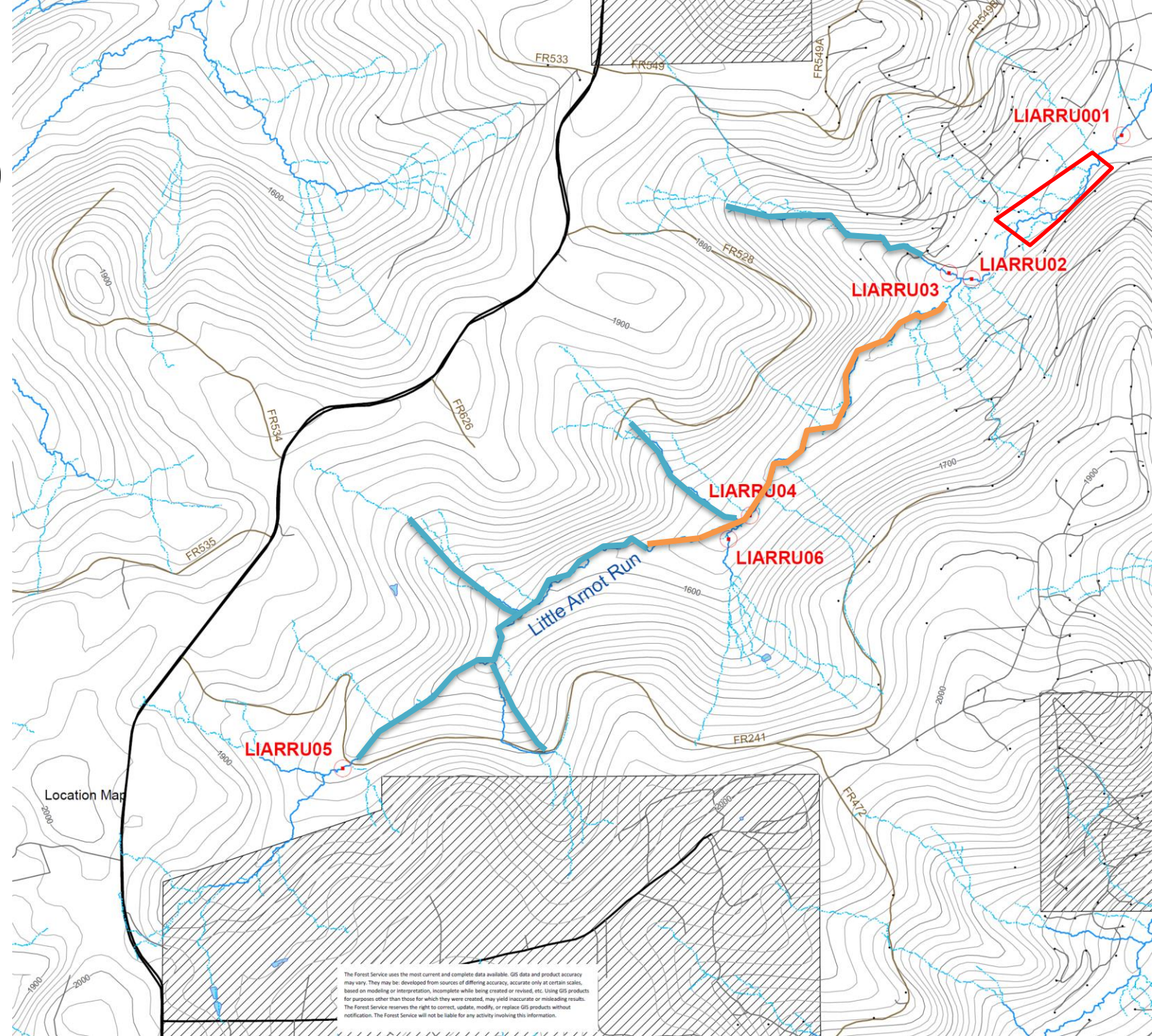
Removal of artificial
barriers (excavator reach)



Directional Felling +
Winching



Directional Felling

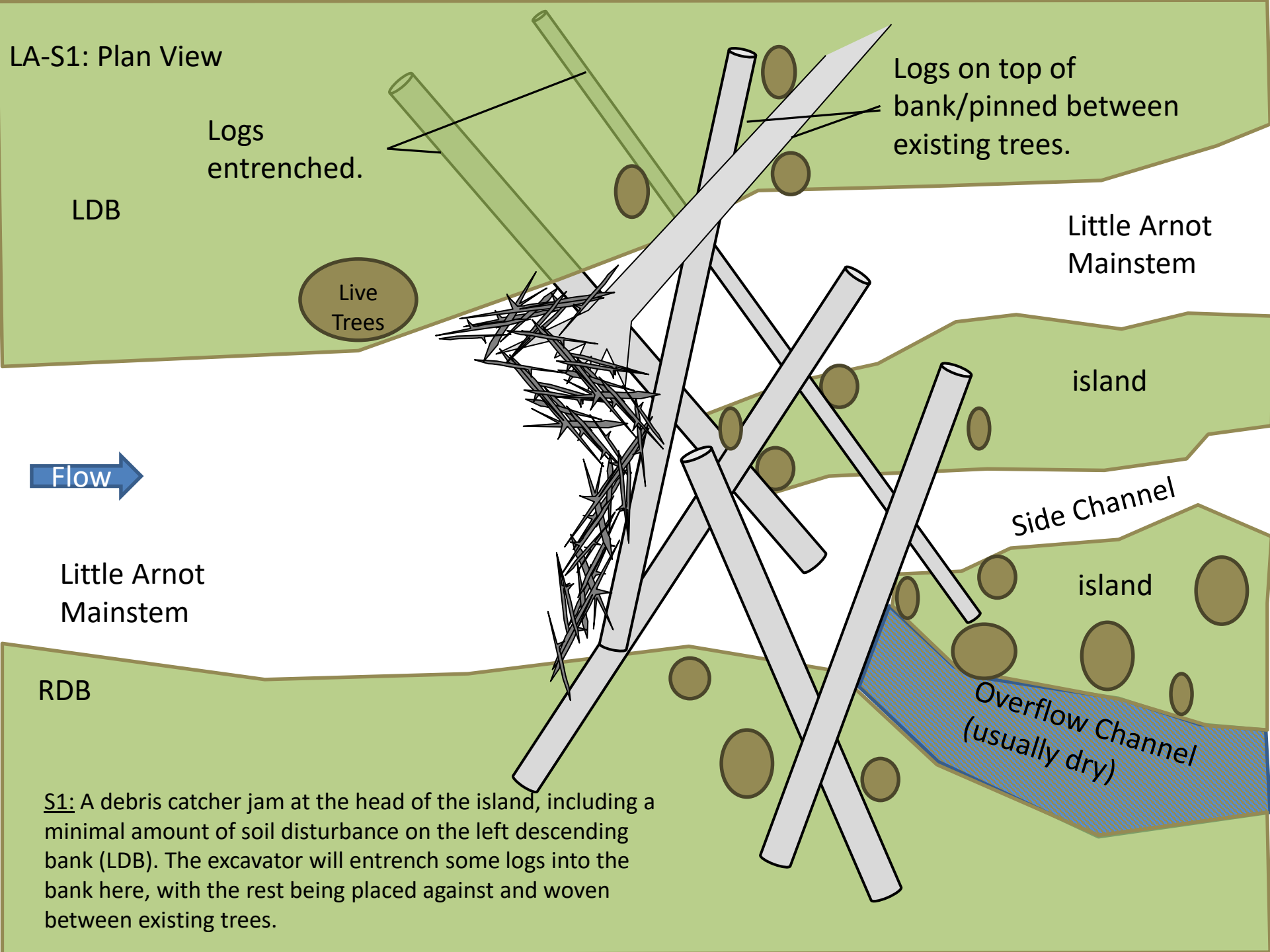




KOMATSU

CAT

LA-S1: Plan View



S1: A debris catcher jam at the head of the island, including a minimal amount of soil disturbance on the left descending bank (LDB). The excavator will entrench some logs into the bank here, with the rest being placed against and woven between existing trees.





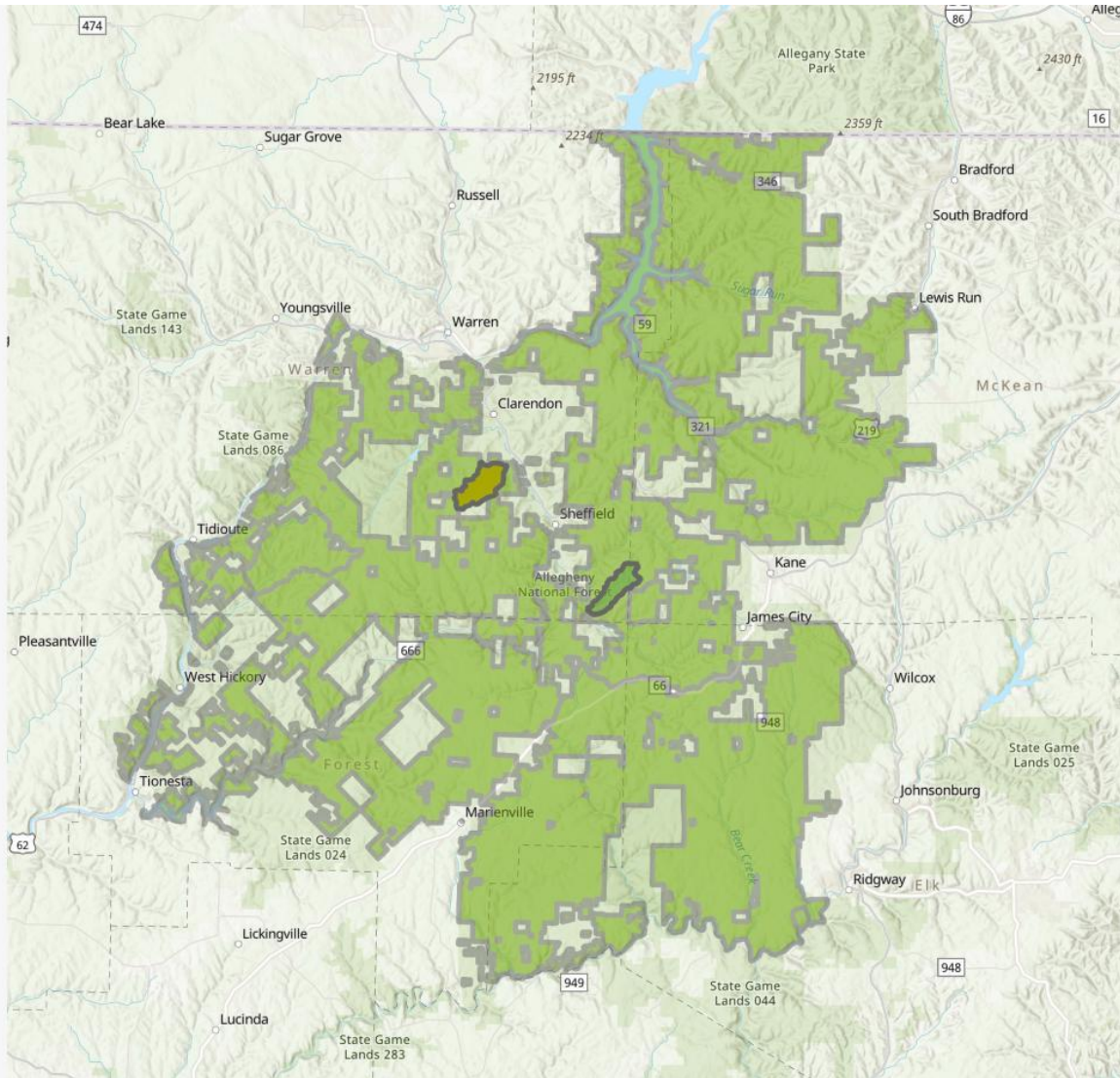




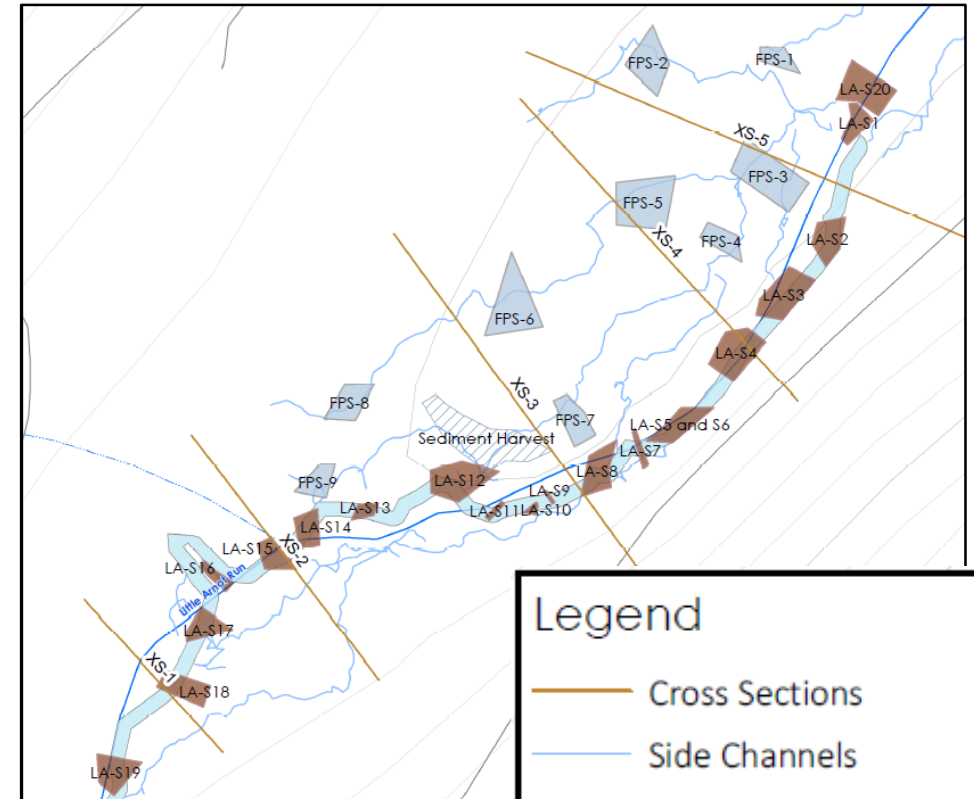




Assessment/Monitoring



- Cherry Run Watershed
- LAR Watershed
- Allegheny National Forest



Legend

- Cross Sections
- Side Channels
- Disturbance_area
- Proposal**
 - Floodplain Structures
 - Mainstem Structures
 - Sediment Harvest

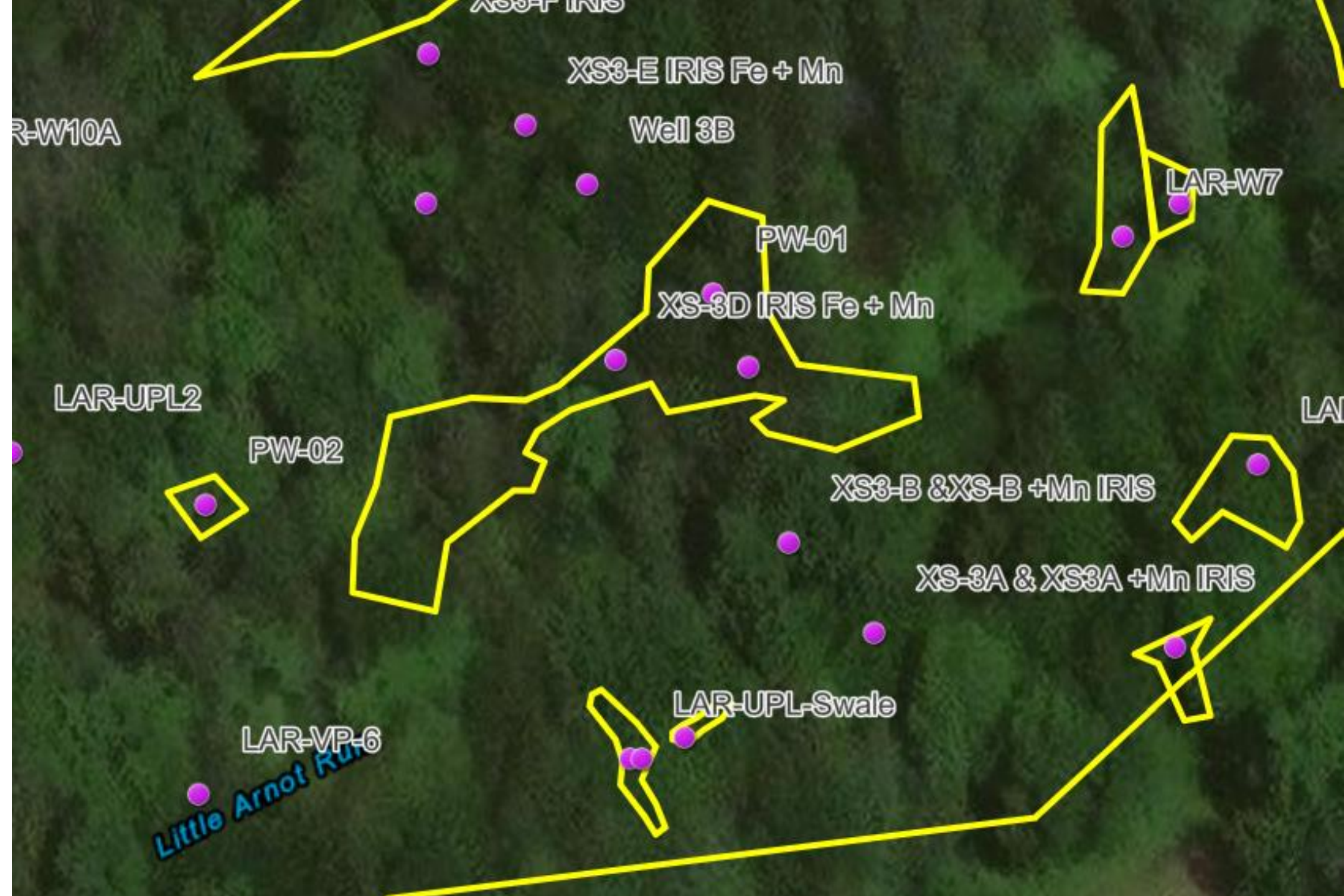


Monitoring

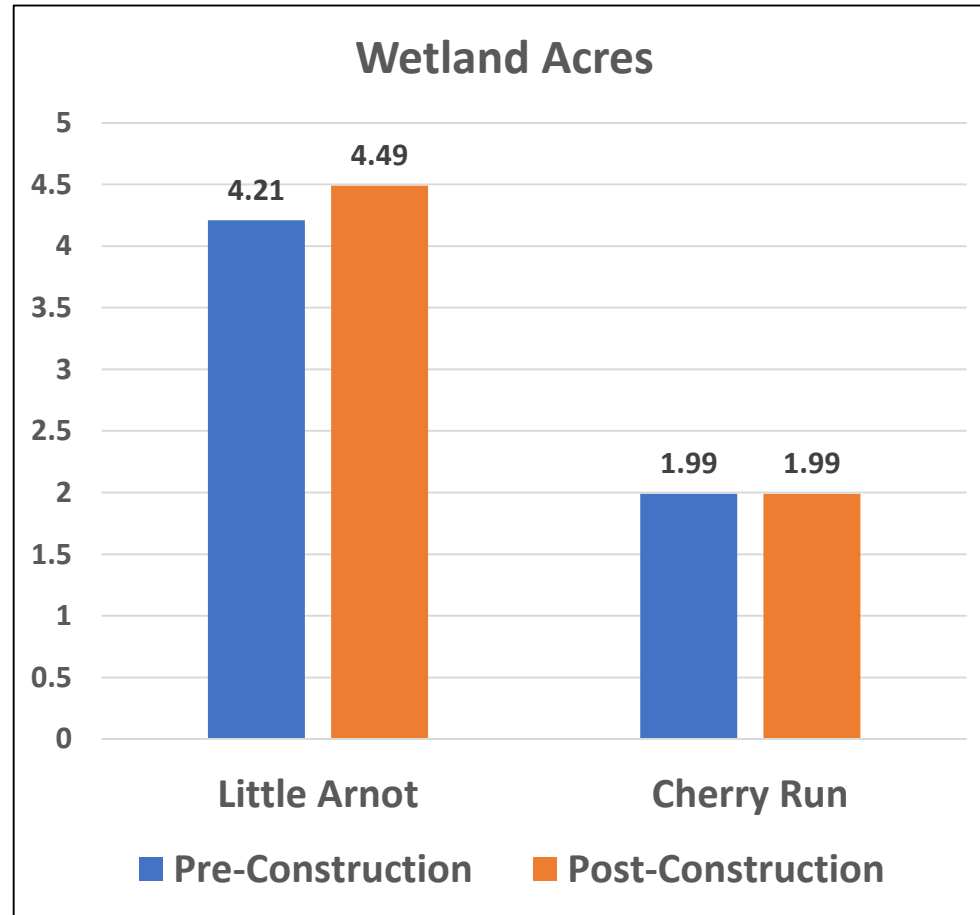
- LWM structures
- Wetland Area
- Trout Spawning/Canopy Measurements
- Organic Carbon and Water Quality
- Vegetation Community Composition/structure
- Macroinvertebrates
- Fish
- Algae, Biofilms and Productivity
- Reptiles and Amphibians

Documenting wood structures





Pre vs. Post-Construction Wetland Delineations



- 9 new wetlands
- 1 wetland no longer wet (574 sf)
- 2 wetlands now stream channels (921 sf)
- 5 wetlands absorbed by expansion

Trout spawning survey/Canopy assessment

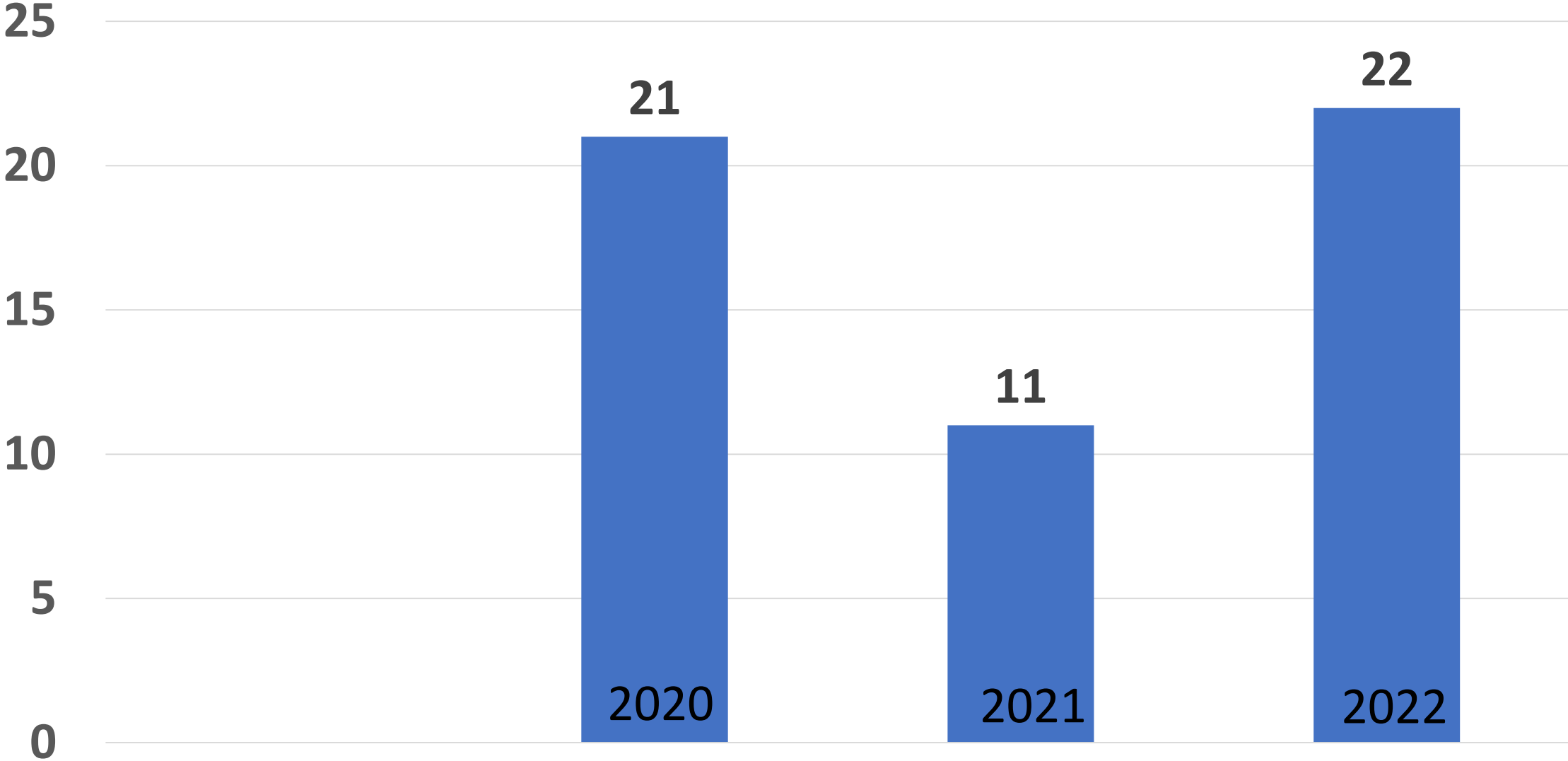


SPHERICAL DENSIOMETER Model-A E3 Model-C
(An instrument for measuring forest canopy density)

INSTRUCTIONS
Hold instrument level, 12" - 16" in front of body and at elbow height, so that operator's head is just outside of grid area.
Assume four equal-sized disks in each square of the grid and systematically count disks equivalent to quarter-square canopy openings.
Multiply the total count by 1.04 to obtain percent of overhead area **not** occupied by canopy. The difference between this and 100 is an estimation of canopy density in percent. (Assuming each dot to represent one percent is often accurate enough.)
Make four readings per location - facing North, East, South and West - record and average.

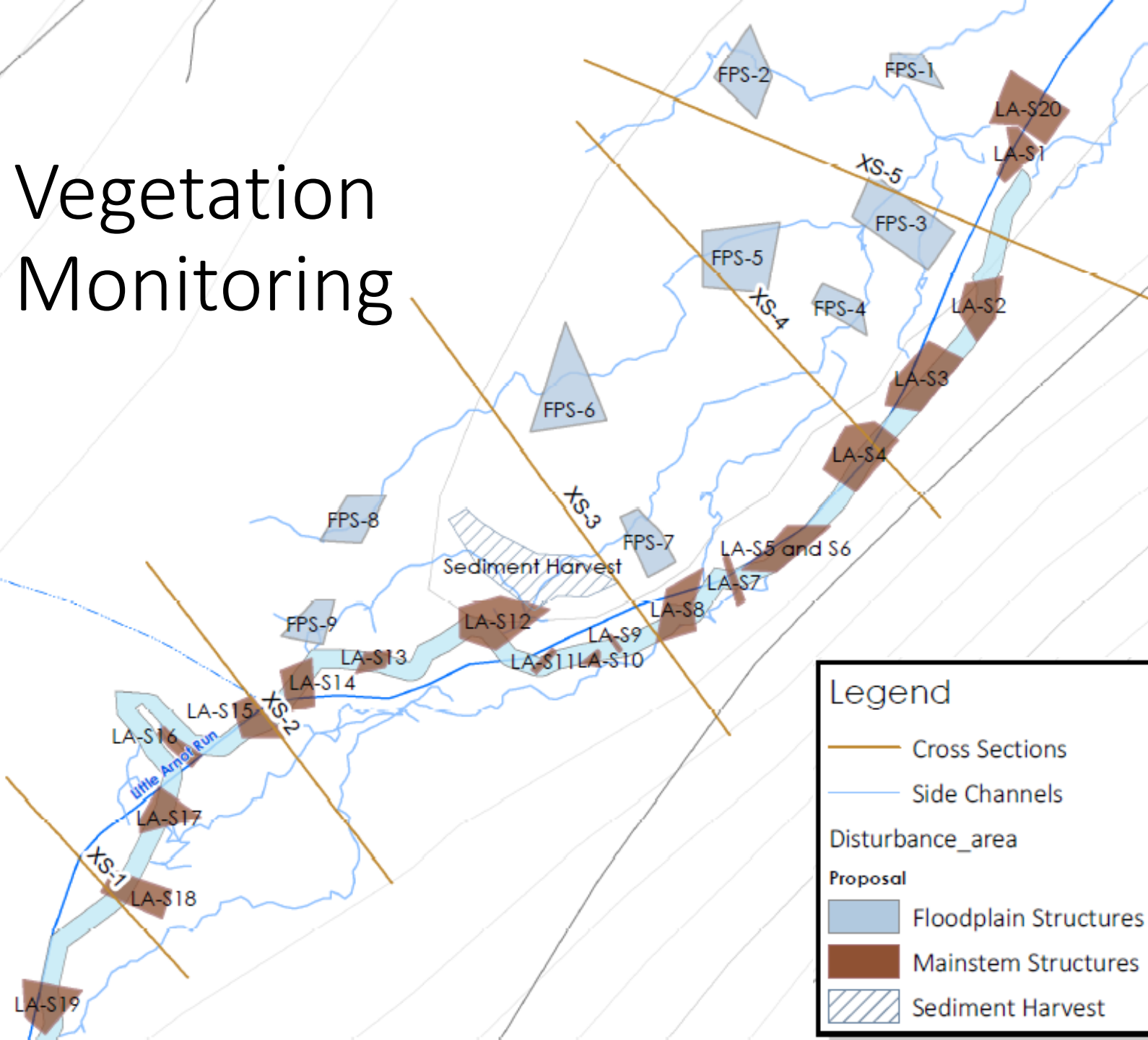
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Redds



LAR Redds 2020 LAR Redds 2021 LAR Redds 2022

Vegetation Monitoring





LAR 2021
7/28/2021
Plot 2.1
Plot center
from pin 225
@ 45°

- Each transect contained at least one permanently marked larger plot
- Overstory/understory characteristics in quadrats
- Ground cover
- DBH of all trees over 10cm
- Coarse woody debris
- Tree regeneration.









Invertebrates

Conclusions and Lessons Learned

A photograph of a stream flowing through a forest. The water is clear and brownish, reflecting the surrounding greenery. The stream is heavily cluttered with fallen branches, logs, and debris, particularly in the foreground and middle ground. The banks are covered in moss and ferns, and the background shows dense trees and a steep, rocky slope. The overall scene suggests a natural, undisturbed environment with significant woody debris.

Acknowledgements

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- Lock Haven University- Heather Bechtold, Steve Seiler, Fish and Stream Productivity
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