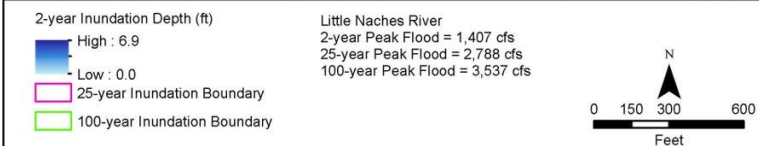
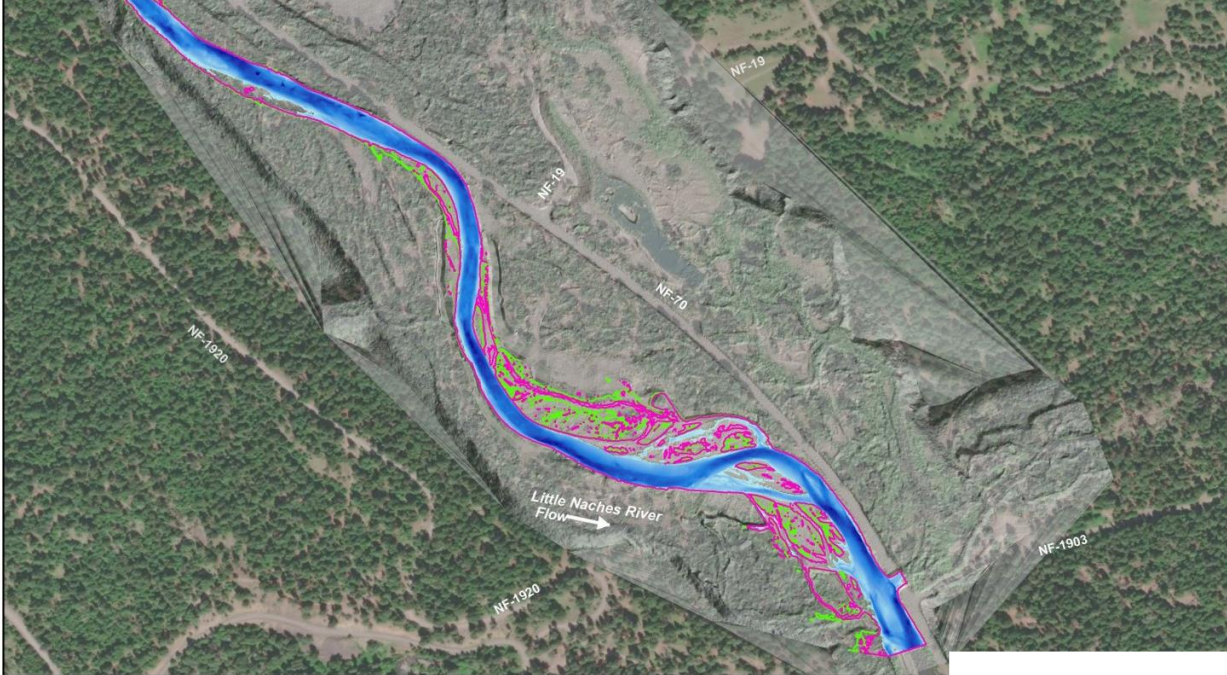




Rebuilding the Little Naches River: locally-sourced wood, balanced cut/fill and drone-assisted monitoring

Rebecca Wassell
Mike Bosko
Zac Zacavish





Little Naches River

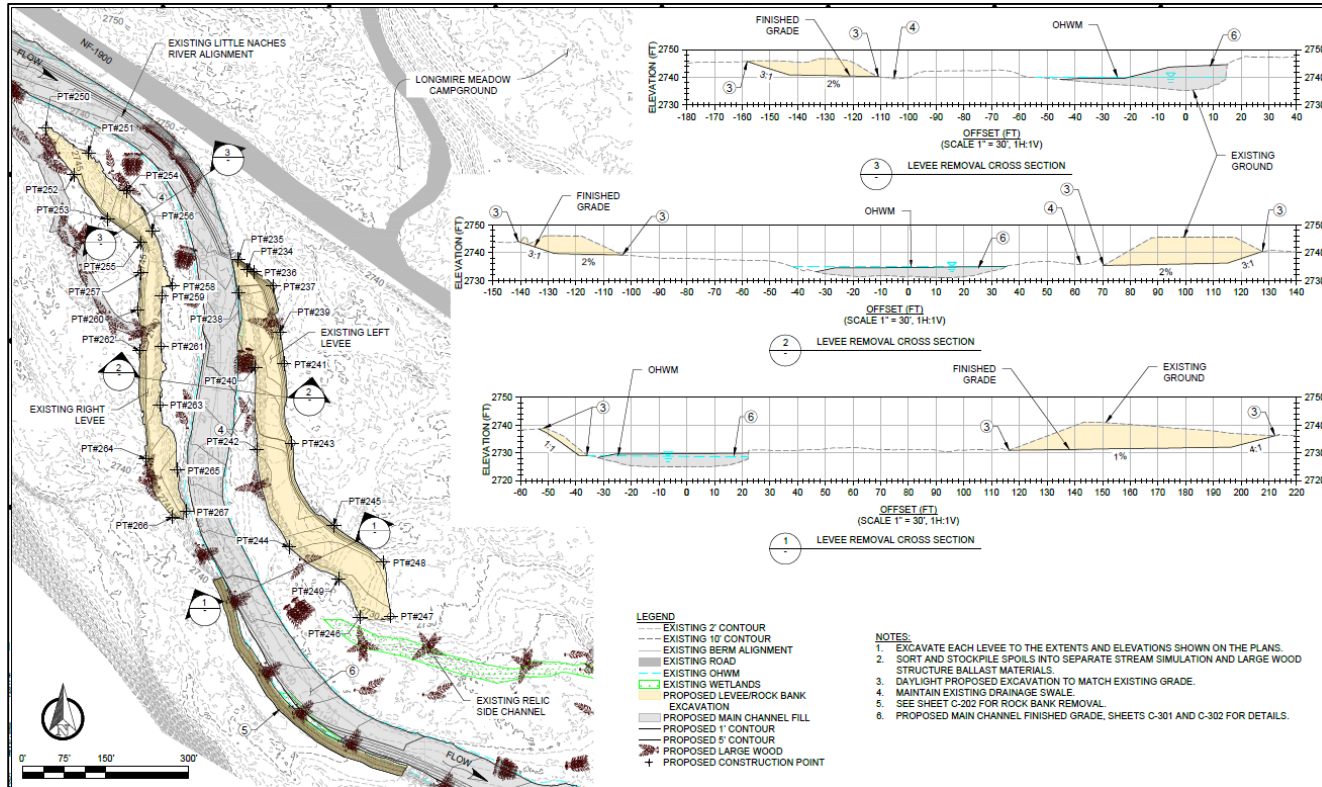
- Hosts Chinook, steelhead and bull trout
- Popular recreation destination
- Legacy of levees, wood removal and channel bed lowering via bull dozer
- Critically low flow in later summer
- River 3.3 to 4.3 prioritized in geomorphic assessment

- Working group of tribe, federal & state agencies and NGOs worked to develop project and secure funding
- Tetra Tech, Inc. selected to design project in 2019
- Project constructed in summer 2022



Intuitive innovation:
 Programmatic
 Environmental Compliance
 allows for balanced cut/fill

- Region 6 Aquatic Restoration Biological Opinion (ARBO)
- Programmatic NEPA
- USACE NW 27



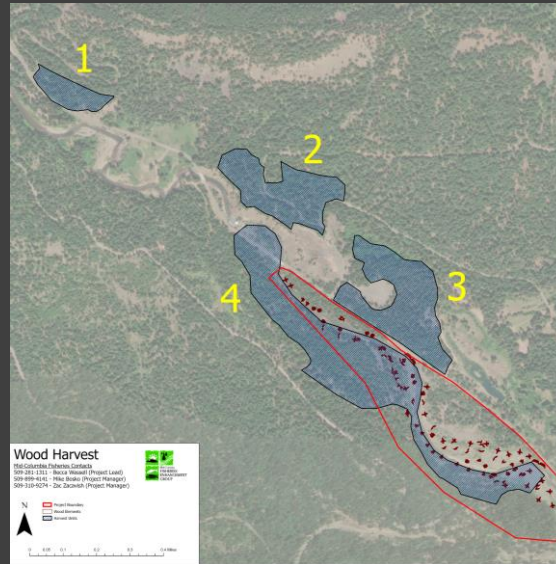


United States Department of Agriculture
Forest Service

Little Crow Restoration Project Environmental Assessment

Naches Ranger District, Okanogan-Wenatchee National Forest, Yakima and Kittitas Counties, Washington Updated
April 2020

(Original October 2018)

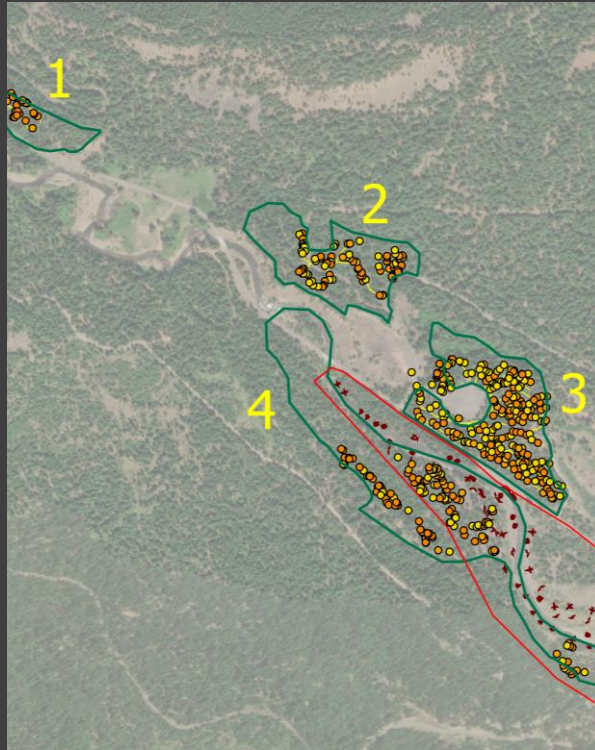
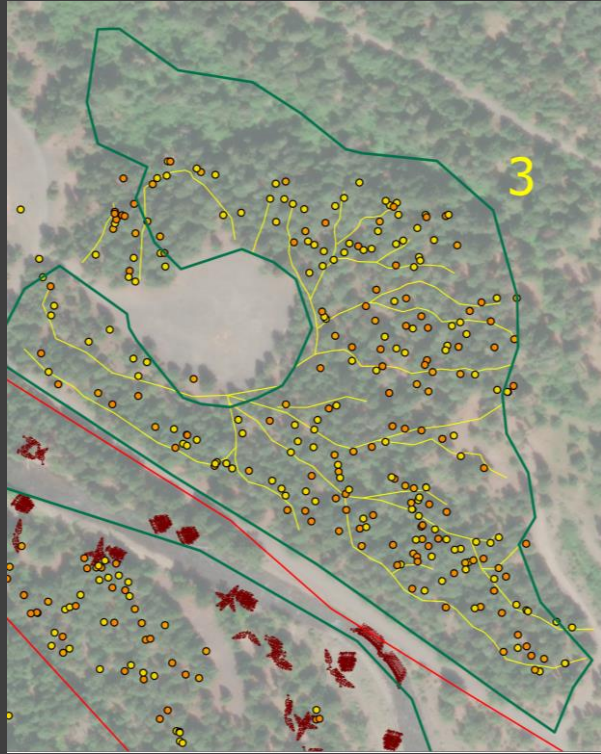


On Site Tree Harvest:

Location of wood to the project site is key

Identify opportunities for forest thinning near projects

Foresight to include harvest units in an EA (2020)



- Collaboration with partners: silviculturist, forester and biologist
- Tree acquisition, a project of its own
- Ongoing access to available wood throughout construction
- Close access, improved efficiencies
- Mapping aided both contractor and project managers
- Tree marking for quick identification: tipping and staging

Landscape Restoration needs Landscape Monitoring

Pre-Project
~260 cfs



March 22, 2022

Post Project
~162 cfs



February 2, 2023

Capturing Events

**5-year flow event
~1987 cfs**



May 5, 2023

**Current Status
~ 158 cfs**



June 7, 2023

Comparison

Winter 2023
~162 cfs



Feb 2, 2023

Current Status
~ 158 cfs



June 7, 2023



Log Jam Monitoring



February 2, 2023

2-year Event Model Comparison



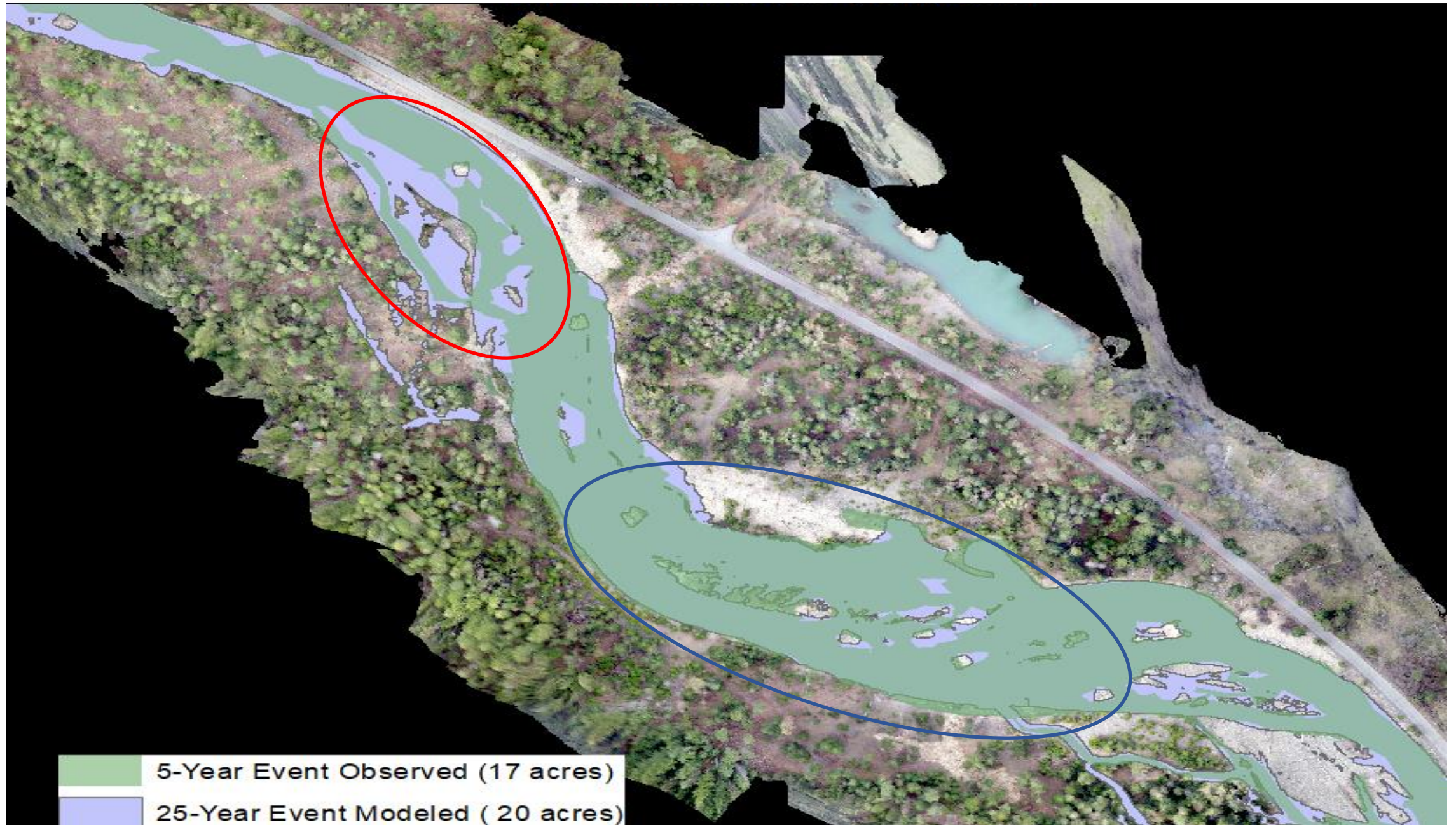
Inundation-1407 cfs (modeled)



Inundation- Post- 1800 CFS event



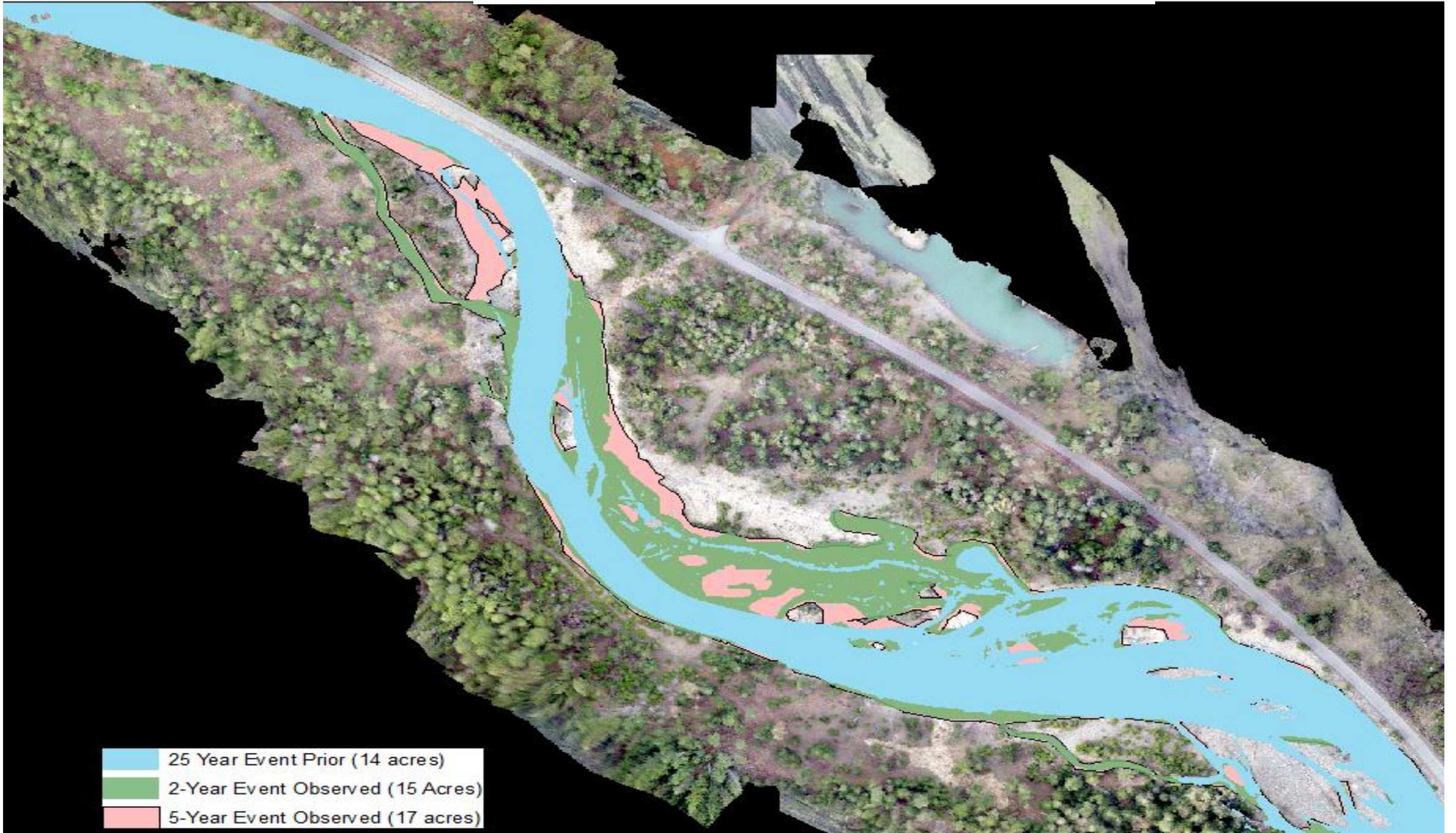
5-Year Observed versus 25-year Modeled (pre-project)



2- year/5-year Minimal Wood Movement



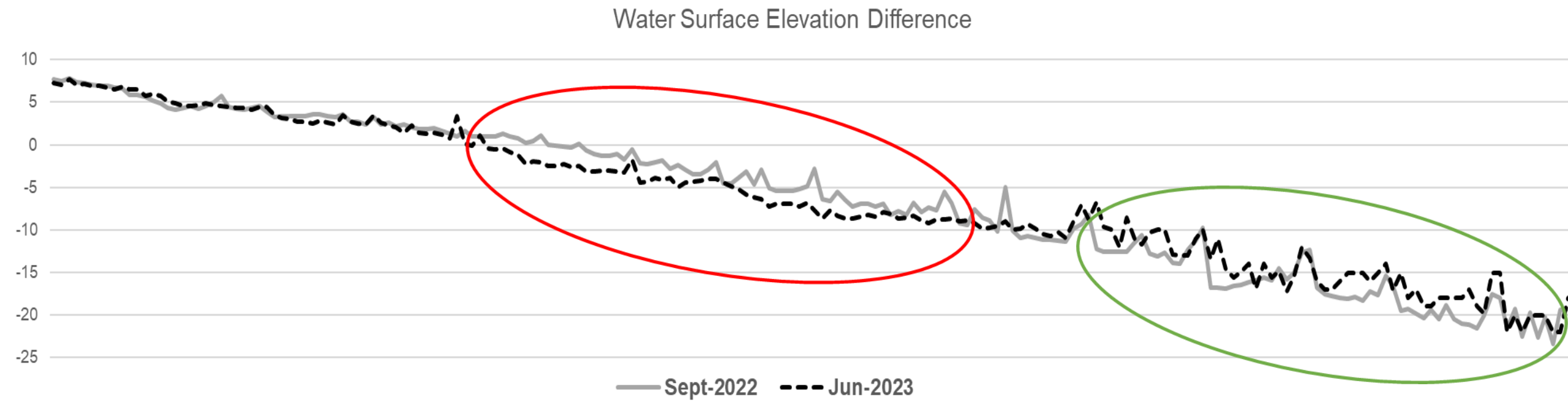
Flood Events Pre-Post Project



25 Year Event Prior (14 acres)
2-Year Event Observed (15 Acres)
5-Year Event Observed (17 acres)

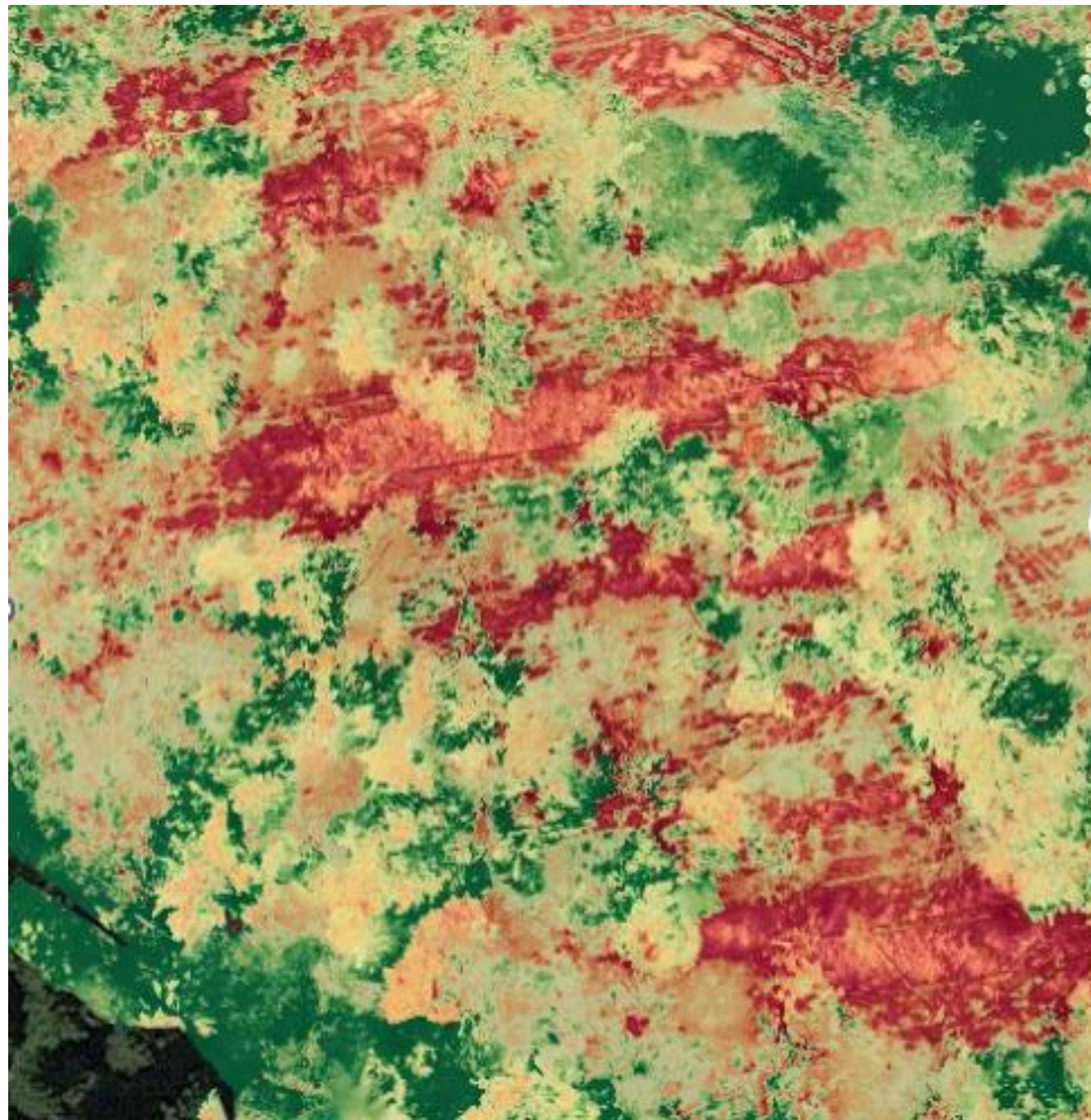
September 2022 (Low Flow Channel)



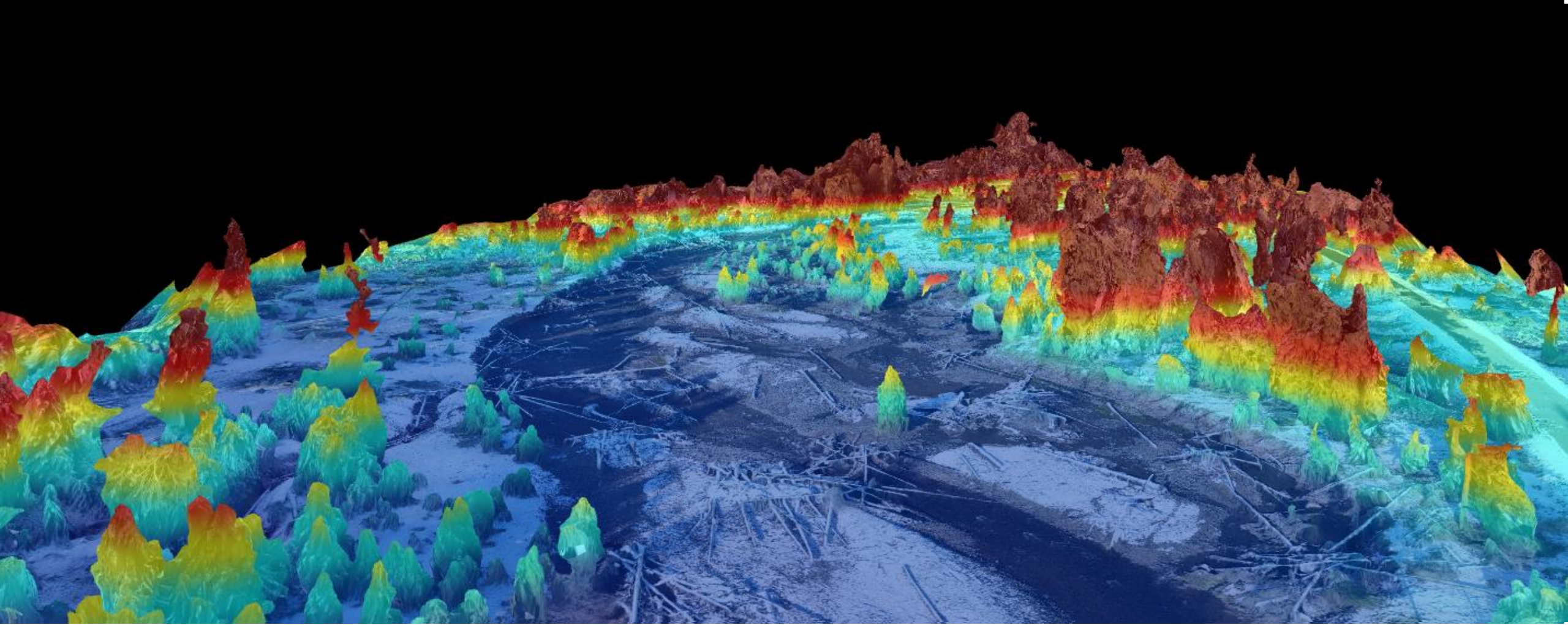


Meeting Harvest Prescription

- Quickly assess canopy density
- Programs can digitize canopy
- Can add clarity and consistency in canopy density set by NEPA, EA decisions



Vegetation Monitoring



- Trees over 50 greater than 50 feet over lowest elevation
- Create Proxy stream shade layers

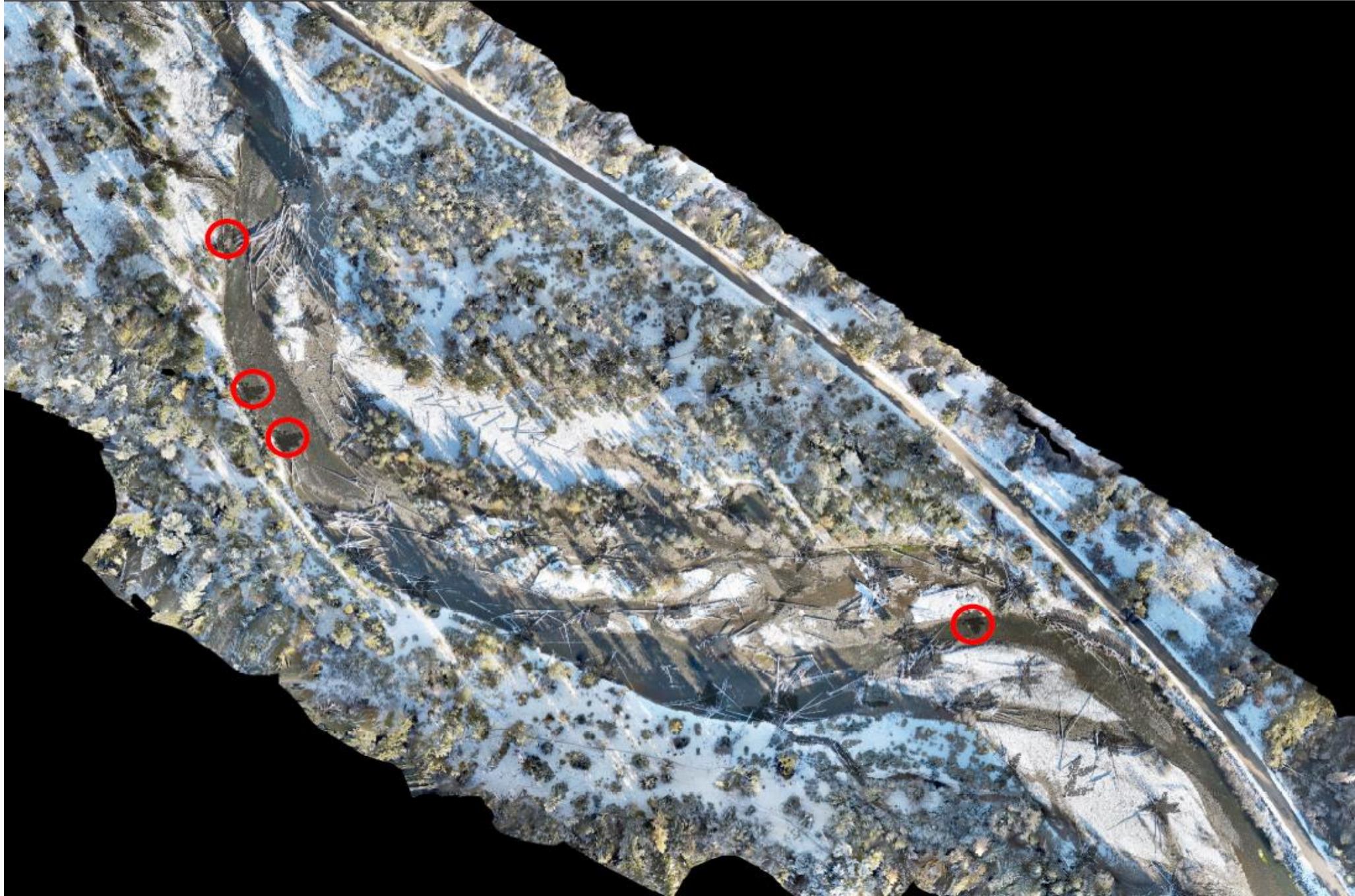


USDA Forest Service Yakama Nation U.S. Fish and Wildlife Service Yakima Basin Fish and Wildlife Recovery Board

WA Department of Fish and Wildlife Yakima Basin Integrated Plan WA Department of Ecology NOAA Fisheries Water Pushing Dirt

Tetra Tech BCI Contracting Wakefield Excavation

EJL Monitoring



2-year flow widths

(gathered from flow path fall flow event)

- 162.28 wetted flow widths
- 79 feet pre-project conditions

Can monitor flow widths at seasonal intervals and rapidly target high flow events

