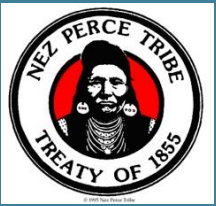


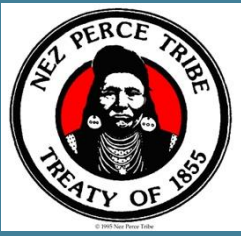
# APPLICATION OF LIDAR IMAGERY IN EMERGENCY MITIGATION PROJECTS FOR THE NEZ PERCE TRIBE

Brent Lloyd



# EMERGENCY MITIGATION

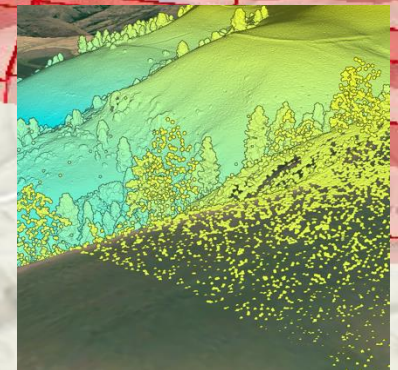
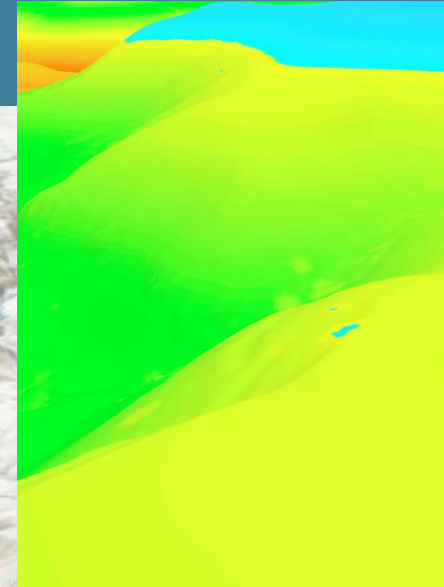
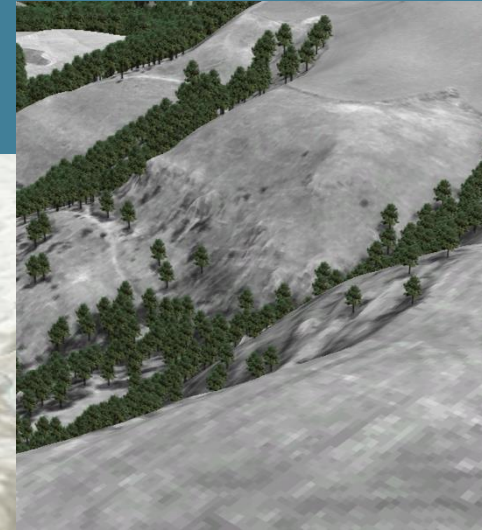
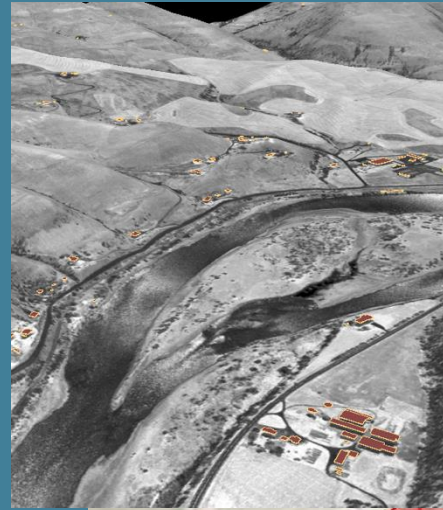


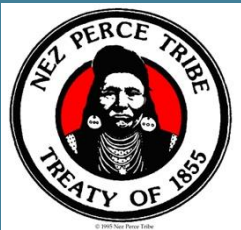


# Nez Perce Tribe

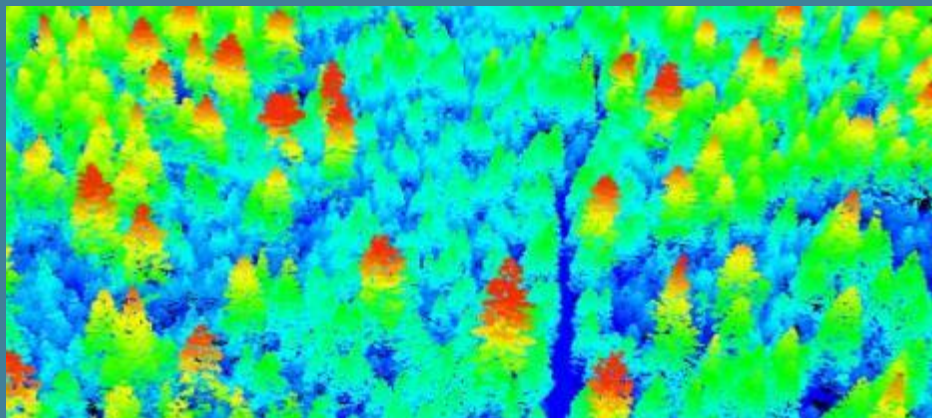
## Lidar – Light Detection and Ranging

- Point Cloud
- Digital Elevation Model
- Digital Surface Model
- Trees
- Orthophoto
- Building Structures





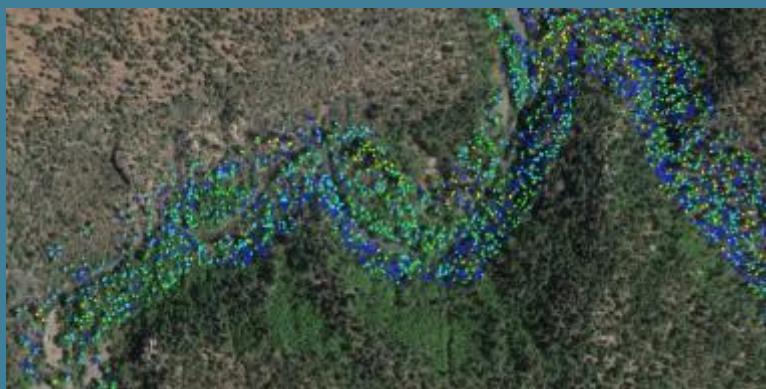
# FOREST HEALTH IN EMERGENCY MANAGEMENT



Height Image



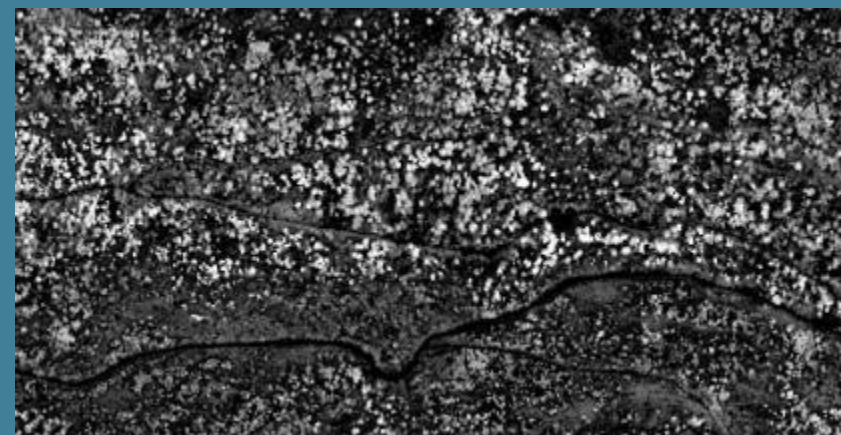
DEM



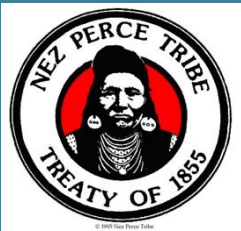
Tree Locations by Species



QA/QC



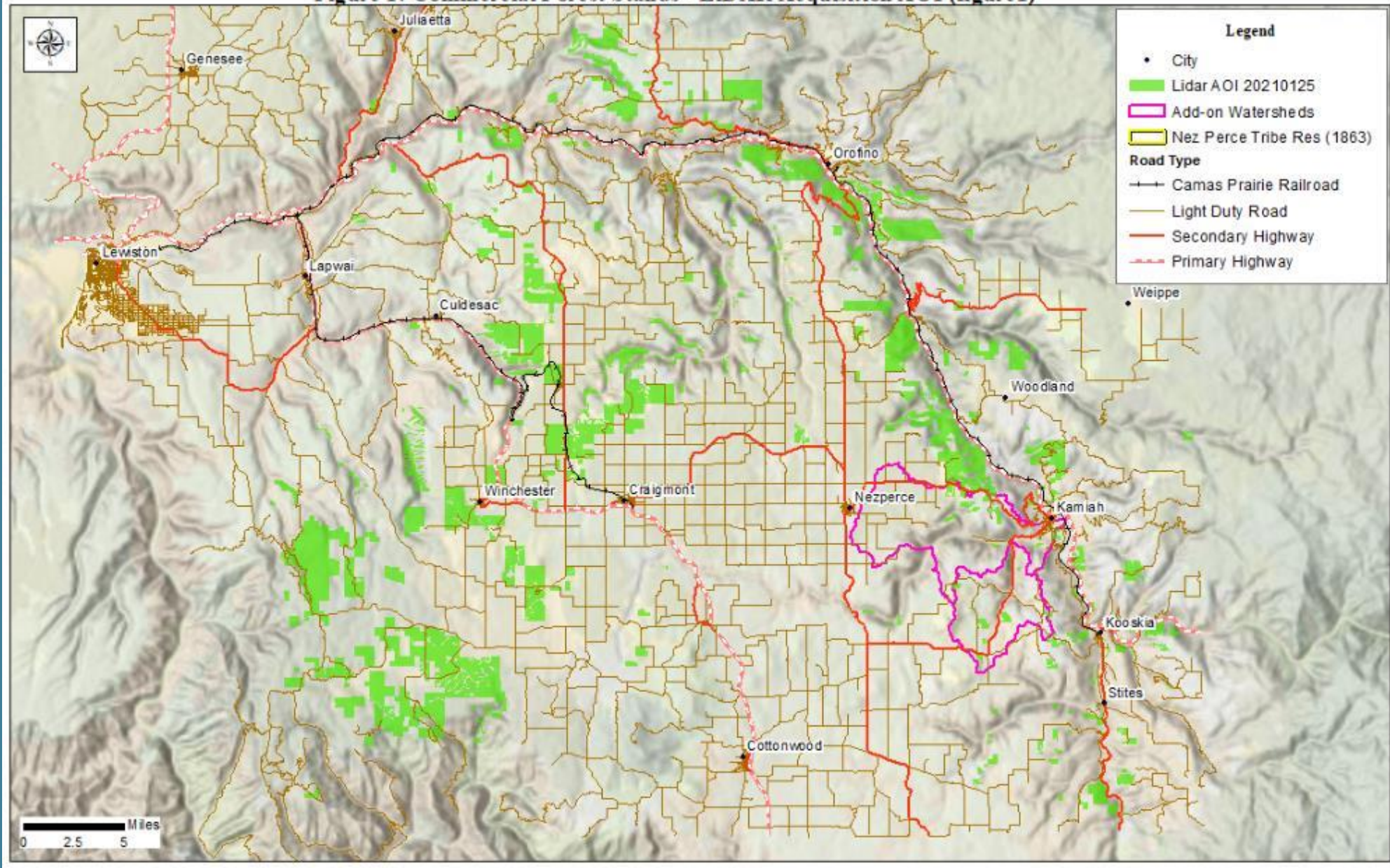
SEM



# Nez Perce Tribe



Figure 1: Commercial Forest Stands - LiDAR Acquisition AOI (figure1)





Nez Perce Tribe  
Forestry & Fire Management

## LIDAR COST / TIMELINE

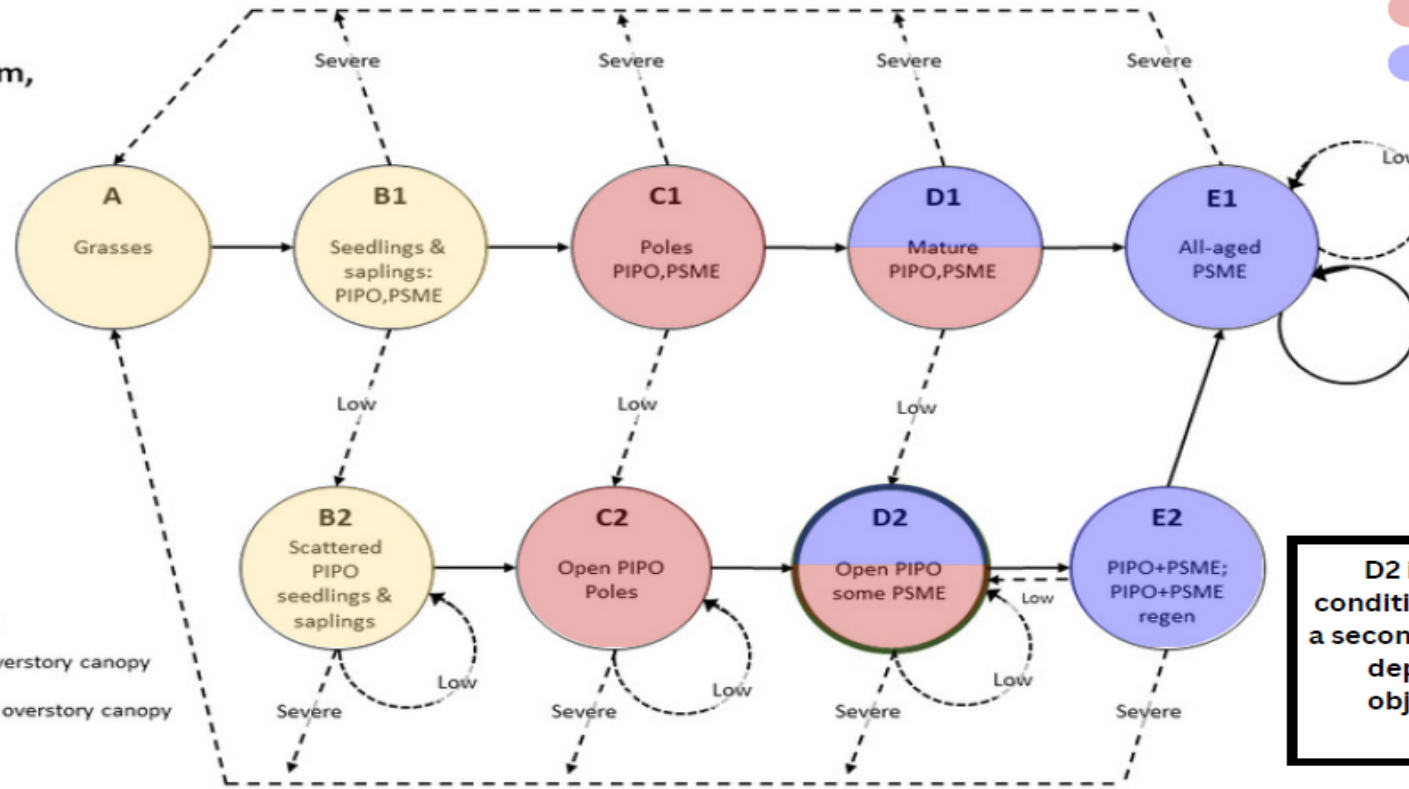
Item	Project Acres	Cost	Delivery Date
Lidar + QA/QC		\$107,056.96	08/31/2021
Pre-processing and Field work		\$32,263.03	12/31/2021
Lidar Analysis & Inventory		\$87,035.15	4/30/2022
FPS Stand / Stock Tables		\$25,010.10	6/30/2022
<b>Total</b>	<b>83,367</b>	<b>\$229,425.99</b>	<b>(\$2.75 / acre)</b>

# **NPT FIRE MANAGEMENT PLAN - SMITH & FISCHER GROUP SUCCESSION PATHWAYS WITH CLIMATE CHANGE ADAPTATION INTERVENTIONS**

- **Fire Group 1: Pathway 1, Warm, Dry Douglas-fir, Ponderosa Pine.**
- **Fire Group 2: Pathway 2.2, Warm, Dry to Moderate Douglas-fir, Ponderosa Pine. In this particular fire group pathway, ponderosa pine, western larch, and Douglas-fir are dominant seral species. Grand fir may be present in stands without frequent fire (e.g., D2) and may eventually dominate F**
- **Fire Group 7: Pathway 7.1, Moderate and Moist Grand Fir Habitat Types. In this particular fire group pathway, succession may be dominated by Douglas-fir and other seral species**

**Fire Group 1 –  
Pathway 1: Warm,  
Dry DF, PP**

- Yellow = regeneration/establishment
- Red = intermediate/improvement
- Green = replacement/final harvest



PIPO – Ponderosa Pine  
PSME – Douglas-fir

- Succession in Absence of fire
- - - → Response to fire
- Low – Little mortality in overstory canopy
- Severe – High mortality in overstory canopy

Smith & Fischer, 1997  
INT-GTR-363

## When to Consider Climate Change Adaptation Interventions Along Forest Succession Pathway

### Early Succession - Establishment

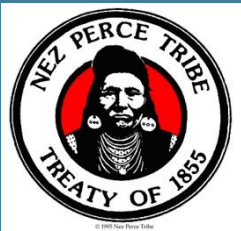
- (A) Plant fire-tolerant and drought-tolerant species
- (A) Acquire seeds from different provenances (future climate-adapted)
- (A) Control planting density
- Allow wildfire
- (A) Conduct salvage logging post-disturbance
- (A, B1, B2) Encourage forage for wild game while encouraging sapling survival
- Proactively coordinate with neighboring jurisdictions on fire response and post-fire decisions based on location and potential severity

### Mid Succession - Intermediate

- (C1, C2, D1, D2) Light thinning and cultural burning as needed with low mortality to manage fuel loads and encourage fire- and drought-tolerant species, age-class and structural variability, but moving towards low-density stand
- (C1, C2, D1, D2) Encourage forage for wild game, while encouraging individual tree growth
- Identify potential future fuel break locations, create where needed
- Monitor for density, fire, insects and disease
- Encourage large PIPO, PSME

### Late Succession - Replacement

- (D1, D2, E2) Thinning and cultural burning with low mortality to retain large, vigorous fire- and drought-tolerant individuals (i.e., PIPO, some PSME), at lower density and manage fuels
- (E1) Consider heavy thin and cultural burn
- (D1, D2, E2) Maintain some age-class and structural variability
- (D1, D2, E2) Maintain wild game habitat and forage
- Manage fuel break locations
- Monitor for density, fire, insects and disease
- Protect large PIPO, PSME



# Nez Perce Tribe

## Nez Perce Digital Inventory

☰

**Stand List by Basal Area/Acre**

Stand ID:	25041004
Gross Acres:	7.0
Dominant Speciea/BA:	DF
Basal Area/Acre:	140

Stand ID:	25060600
Gross Acres:	22.0
Dominant Speciea/BA:	PP
Basal Area/Acre:	135

Stand ID:	25041304
Gross Acres:	5.7
Dominant Speciea/BA:	DF
Basal Area/Acre:	130

Stand ID:	25020520
Gross Acres:	14.3
Dominant Speciea/BA:	GF
Basal Area/Acre:	121

Stand ID:	25060300
Gross Acres:	157.7
Dominant Speciea/BA:	PP

**DBH in Inches**

Dom/Co-Dom  
**9.4**  
Avg DBH in Inches

---

**Height in FT**

Dom/Co-Dom  
**41.5**  
Avg Height FT

Use Map Selector in upper left hand corner of map to select a stand. Once activated, icon will be highlighted, hold shift + click to select multiple stands.

object_id	1774
management_id	
stand_id	25030900
elev_ft	
slope_perc	
aspect	
measured_date	
as_of_date	

**Selected Area Species Distribution**

- XX 299
- ES 796
- WL 363
- LP 7
- PP 5.3k
- DF 422

**Selected Area Dominance Distribution**

- Intermediate 14.1%
- Co-dominant 20.6%
- Suppressed 25.3%

**Total Tree Count**  
**13,337**

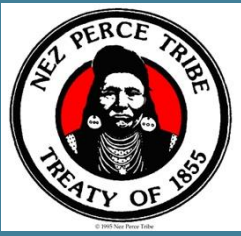
**Selected Acres**  
**146.1**

**Selected Gross BF(>6" SED)**  
**362,585**

**Dead Gross BF(>6" SED)**  
**3,296**

Nez Perce Tribe Digital Inventory - Stands Inventory

Nez Perce LiDAR AOI

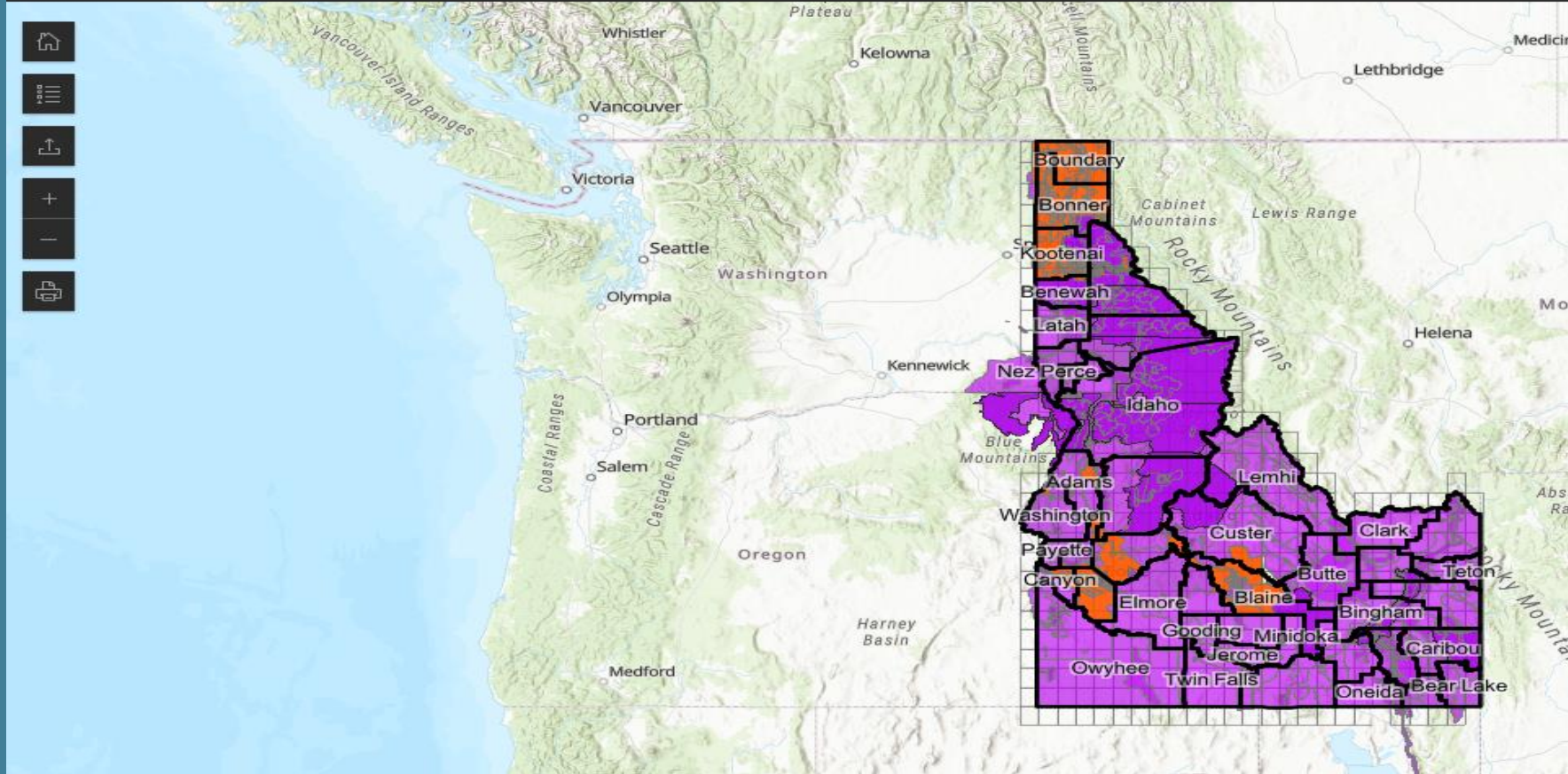


# Nez Perce Tribe

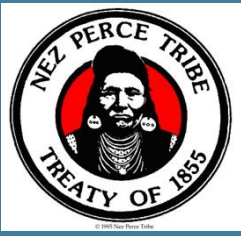


Idaho State UNIVERSITY

## Idaho Lidar Web Viewer

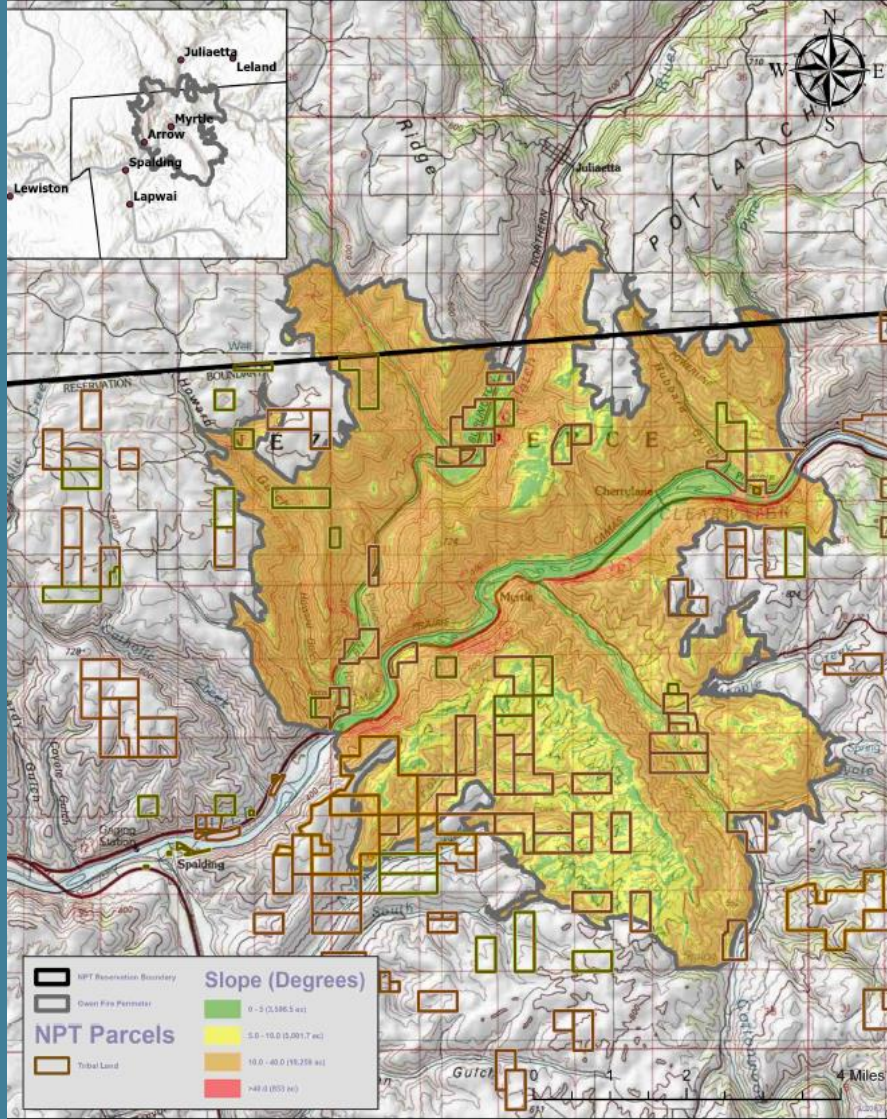


[Idaho Lidar Consortium](#)

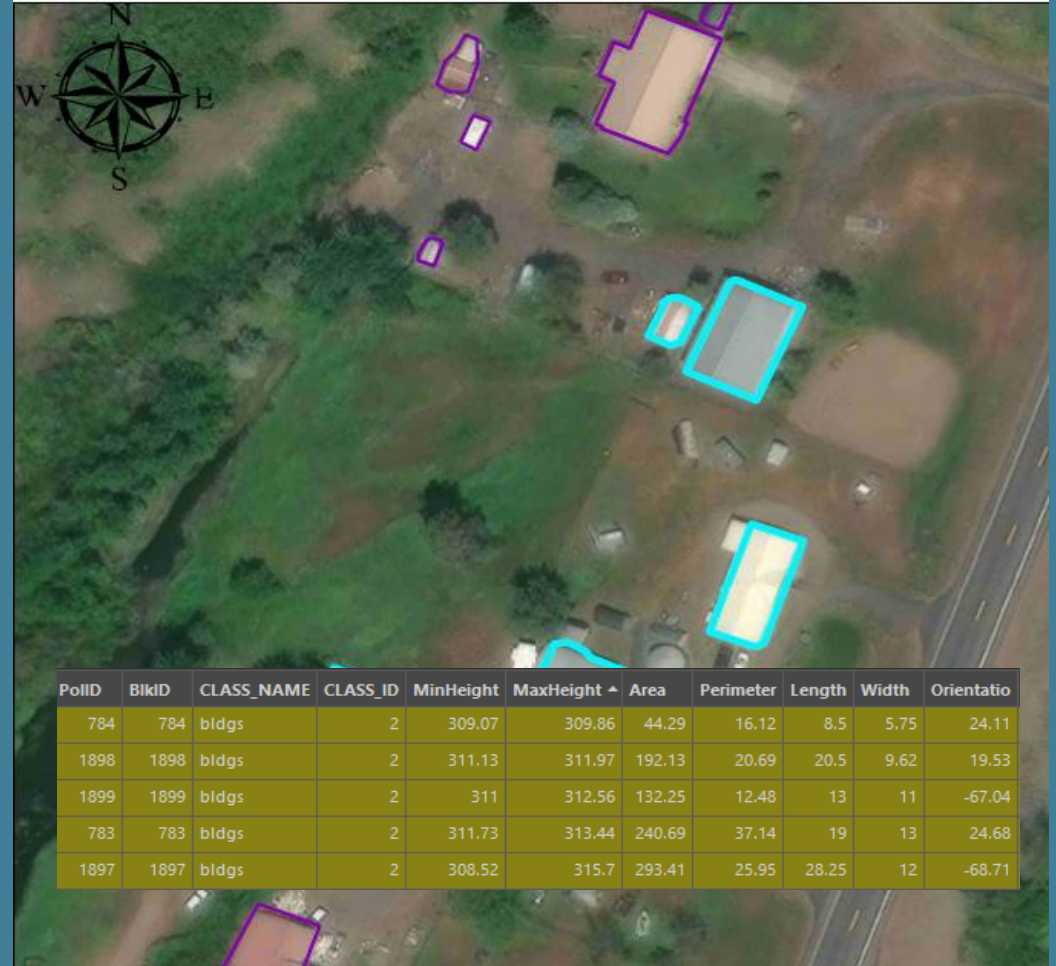


# Nez Perce Tribe

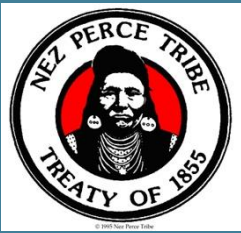
## Gwen Fire Slope



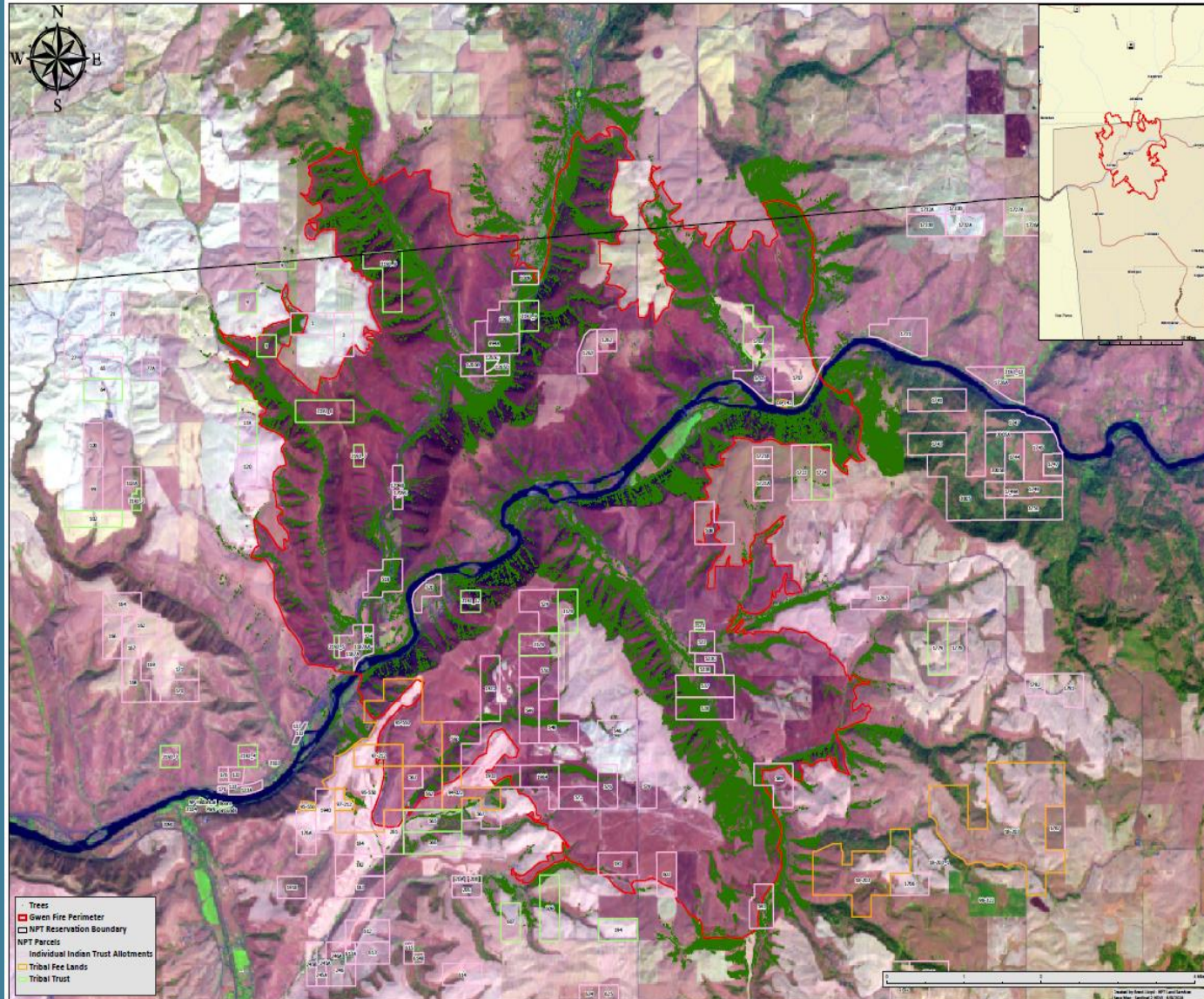
## Structure Perimeters



Structures Destroyed: 156  
Homes Destroyed: 38

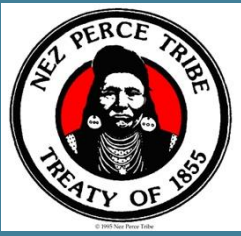


# Gwen Fire Burned Areas



	OBJECTID *	Shape *	Height	Radius
1	1553	Point ZM	4.96	3.6
2	1559	Point ZM	5.56	2.8
3	1560	Point ZM	6.07	2
4	1562	Point ZM	6.39	3.2
5	1565	Point ZM	6.44	3.2
6	1571	Point ZM	7.55	3.2
7	1576	Point ZM	7.14	4.4
8	1580	Point ZM	7.45	3.6
9	1581	Point ZM	7.72	5.6
10	1582	Point ZM	8.15	2.8
11	1584	Point ZM	8.36	2.8
12	4116	Point ZM	2.41	2
13	4117	Point ZM	3.55	2.4
14	4118	Point ZM	3.49	2

Total Trees: 294,263 within fire perimeter



# Nez Perce Tribe

Digital Elevation Model (DEM)

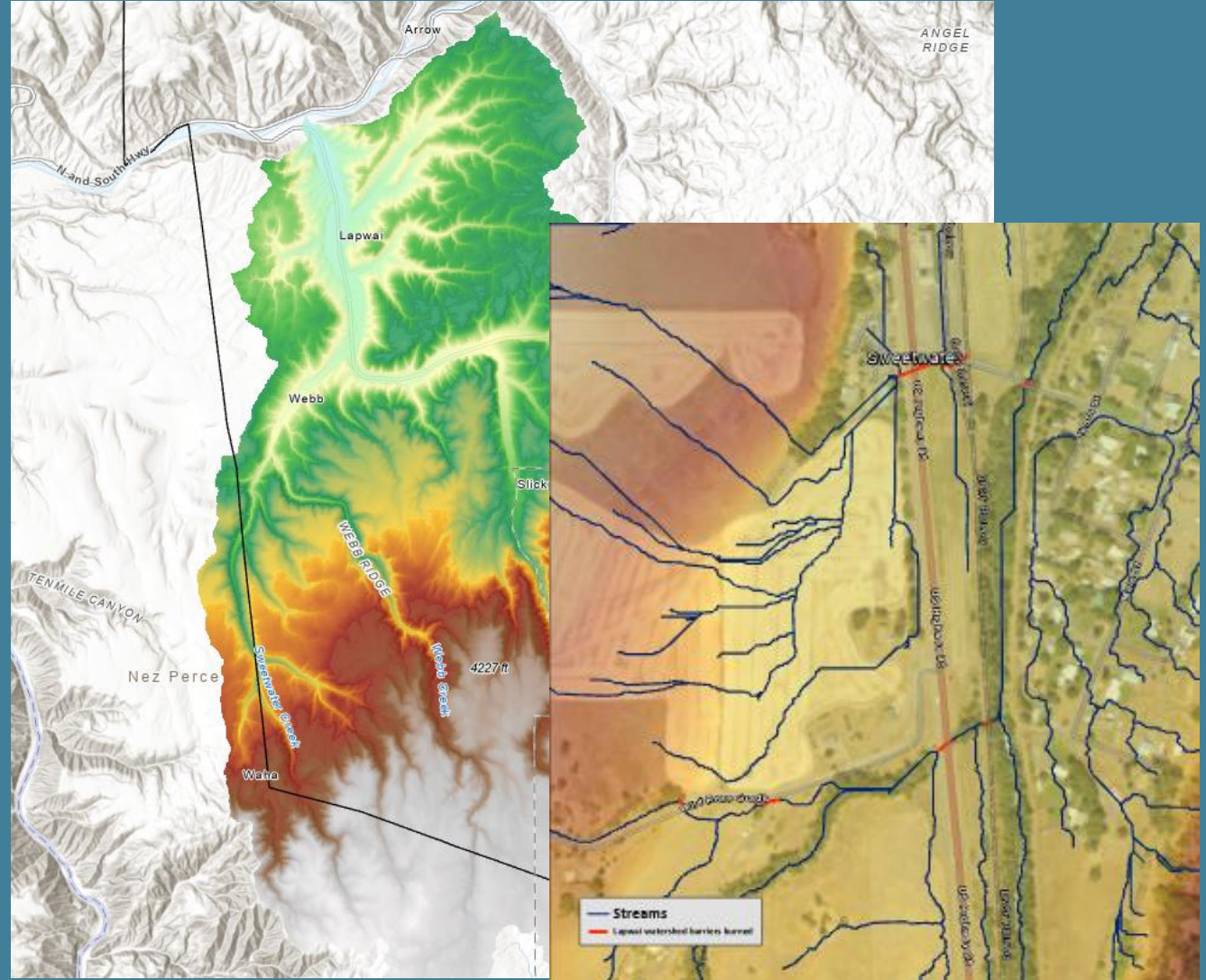
Barrier Inventory  
- Bridges  
- Culverts

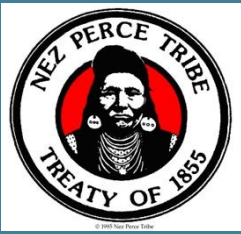
Burned Culverts in DEM

Flow Direction

Flow Accumulation

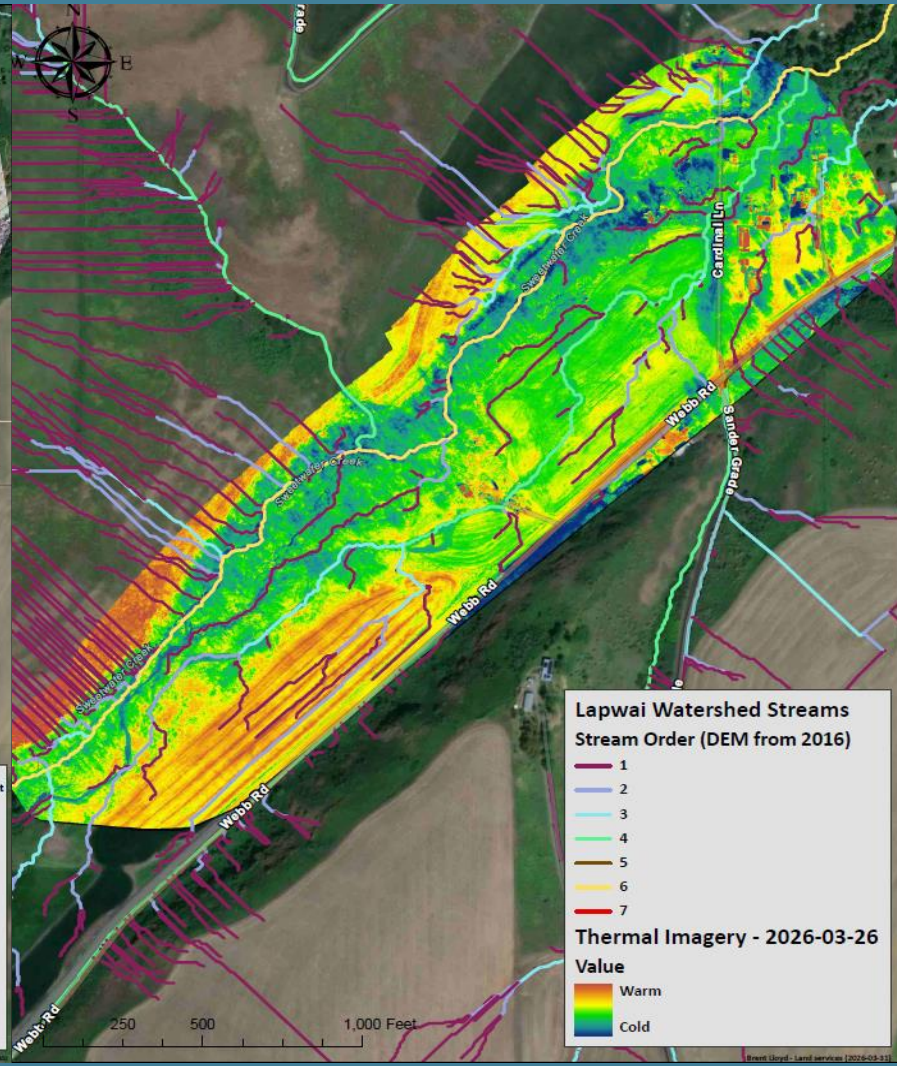
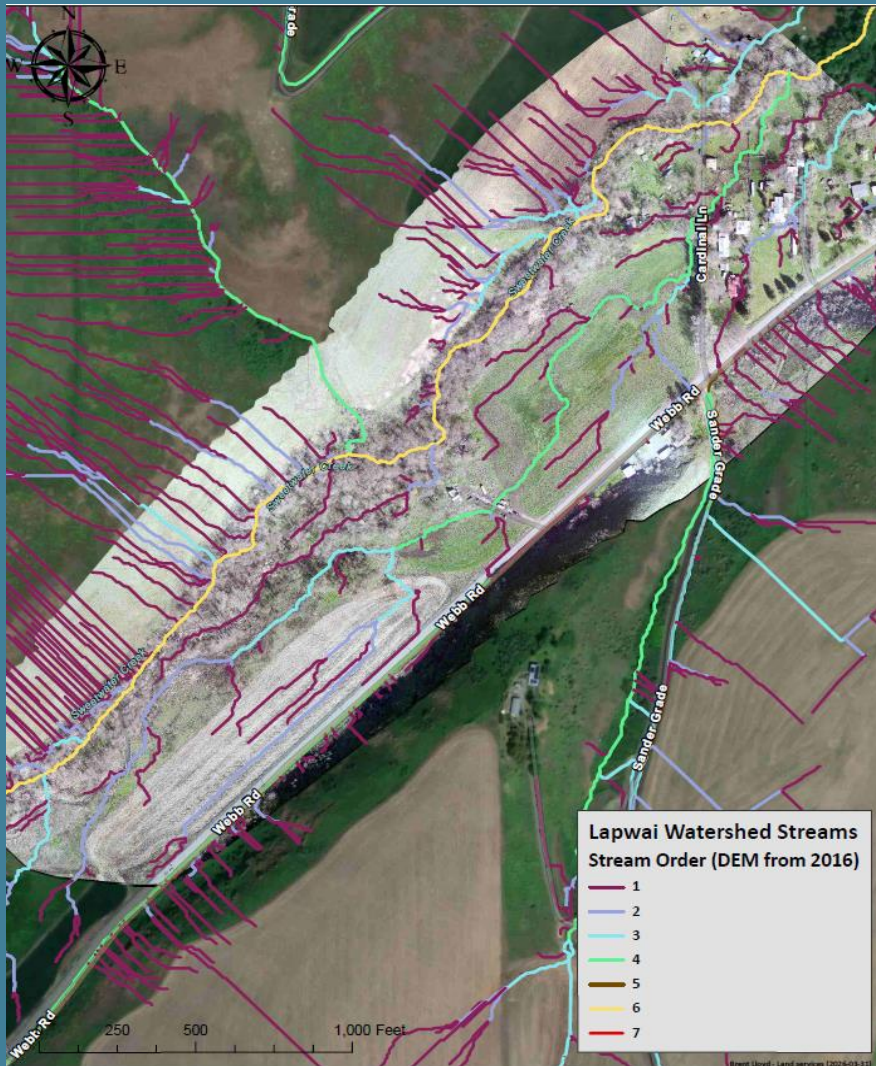
Stream Order

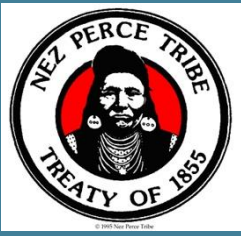




# Nez Perce Tribe

## Houses Flooded in March 2026

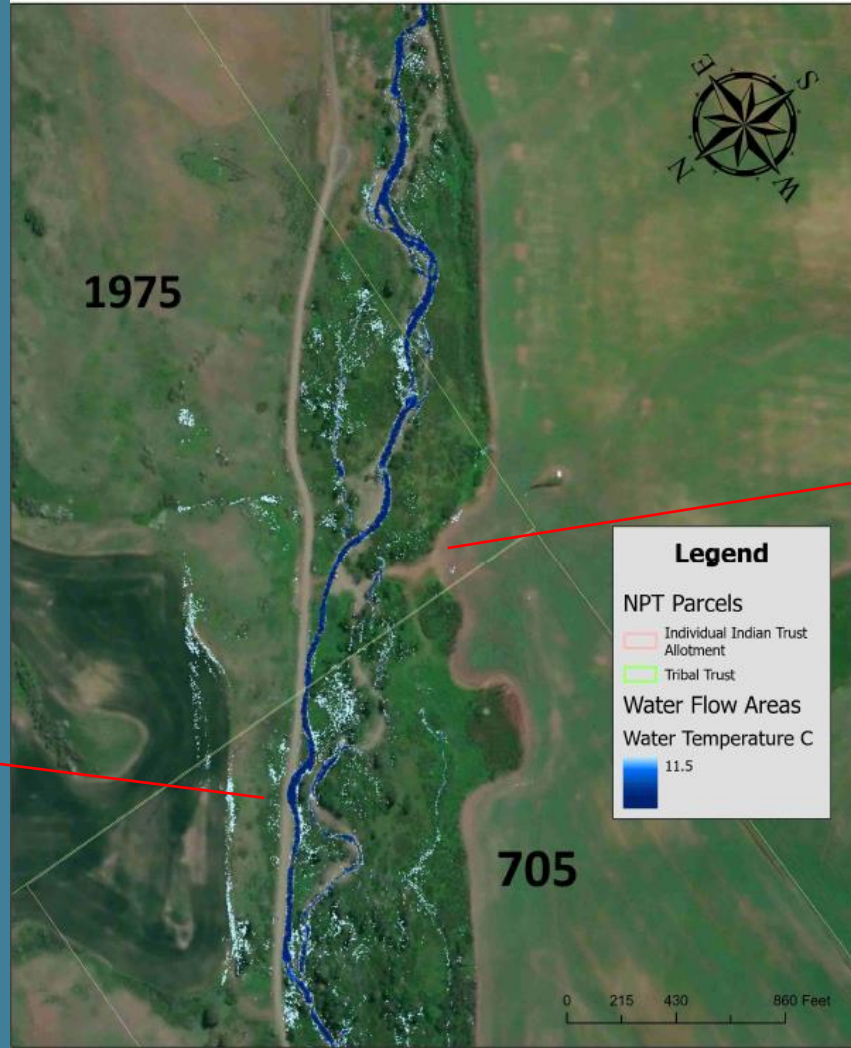




Nez Perce Tribe

## Rock Creek Flooding

### Rock Creek Water Flow Areas

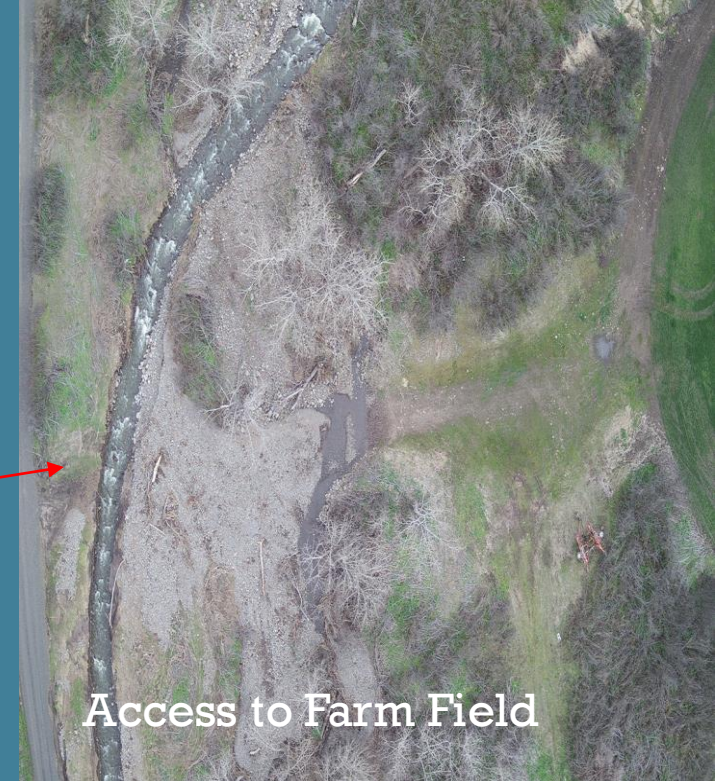


**Legend**

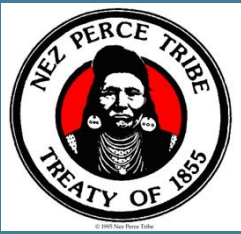
- NPT Parcels
  - Individual Indian Trust Allotment
  - Tribal Trust
- Water Flow Areas
  - Water Temperature C
    - 11.5



Road Damage

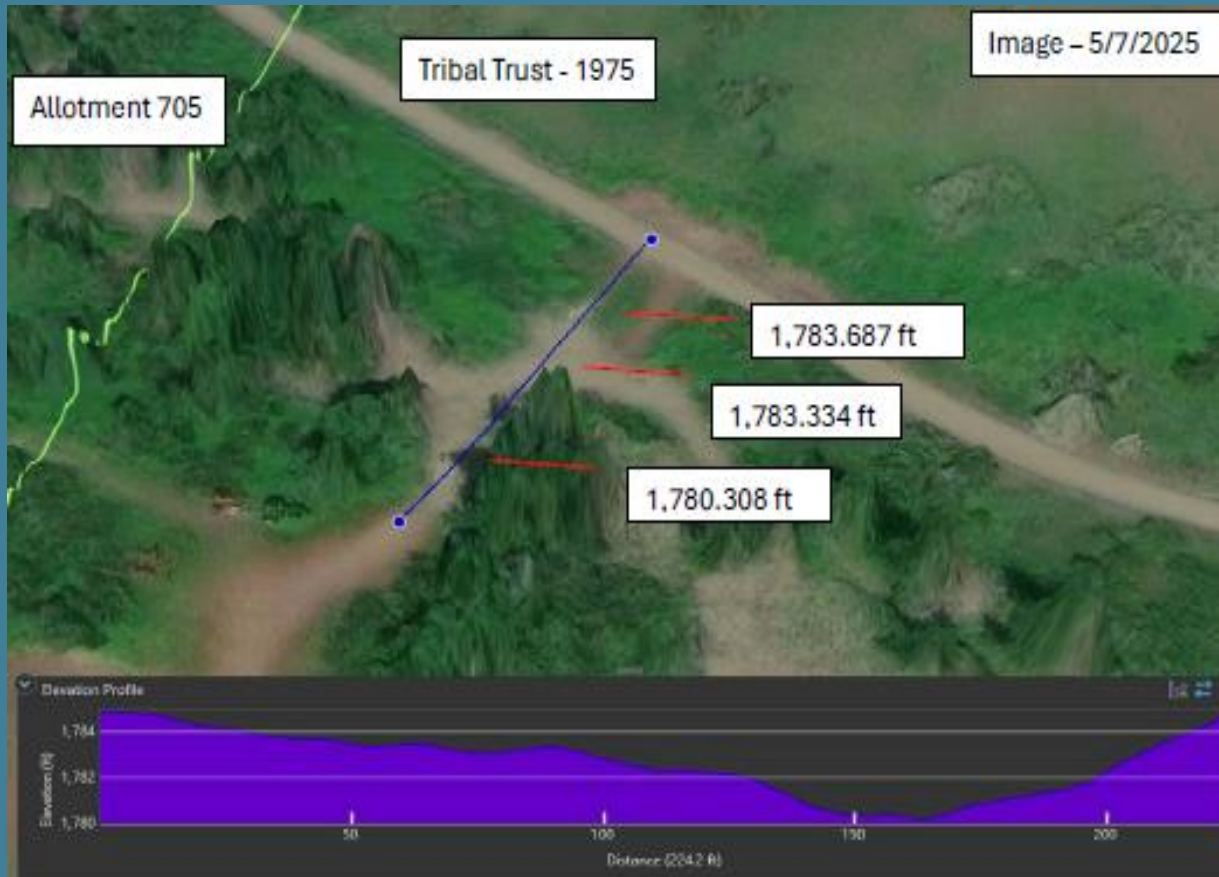


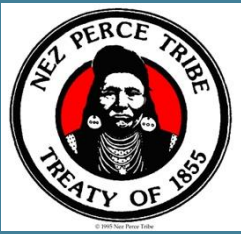
Access to Farm Field



# Nez Perce Tribe

## Rock Creek Flooding – Road Access





# Nez Perce Tribe

## Rock Creek Flooding Road Damage

