



Preparing for Anadromy
in the White Salmon River Basin

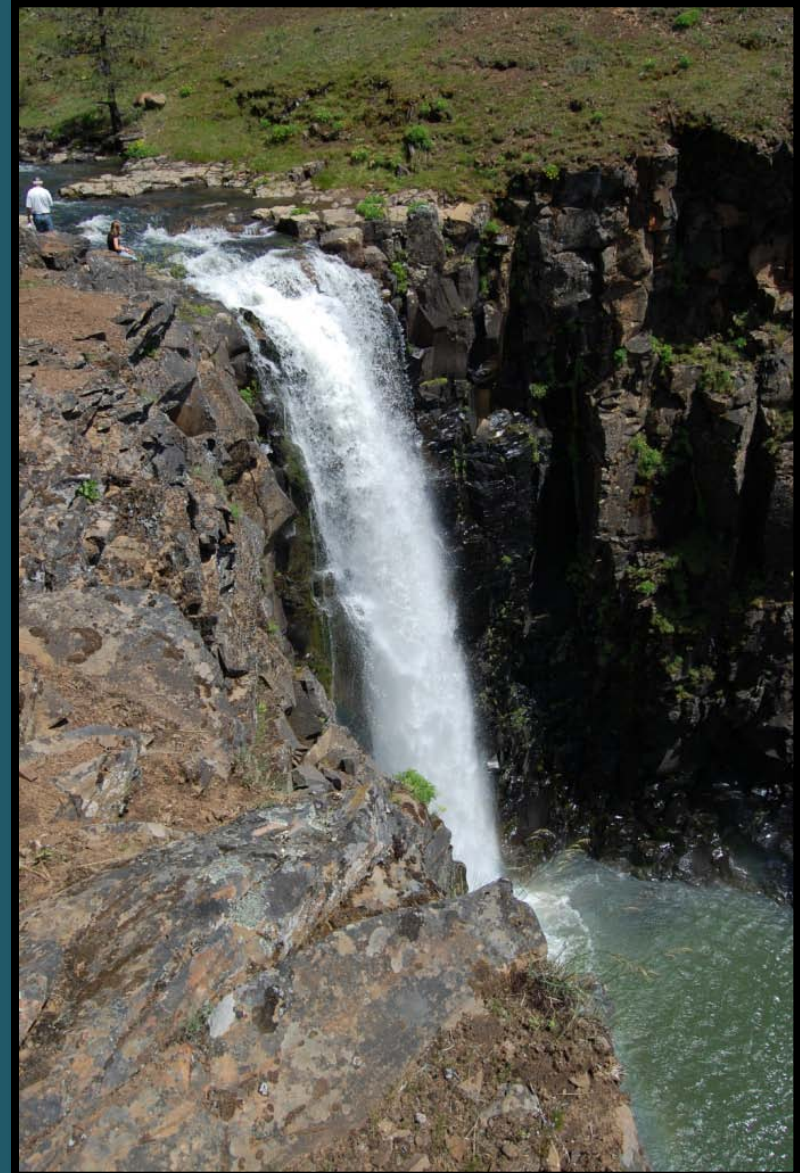
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Underwood Conservation District

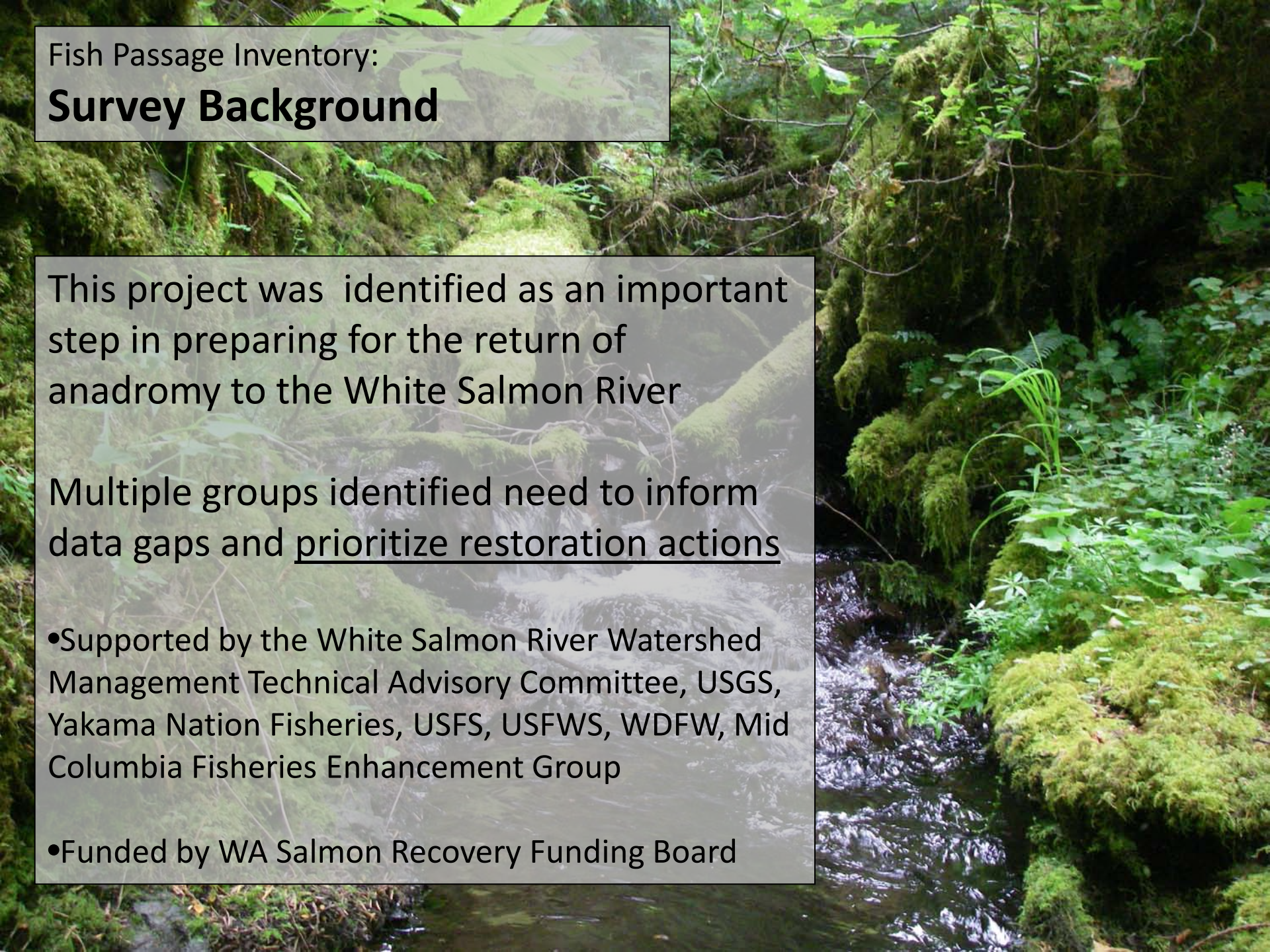
UCD MISSION: to enhance the level of natural resource stewardship in Skamania County and western Klickitat Counties.



District Programs

- Educational Workshops, Seminars and Field Trips
- Classroom and Field Education
- On-Site Technical Assistance and Project Development
- Facilitation of Stakeholder Groups
- Tree Sale and Arbor Day
- Fish Passage Inventory
- Aquatic Invasives Prevention
- Monitoring
- Firewise
- Cost Share for Conservation Practices
- Large-Scale Projects



A photograph of a small, clear stream flowing through a dense forest. The banks are heavily covered in bright green moss and ferns. The water is dark and reflects the surrounding greenery. The overall scene is a vibrant, natural setting.

Fish Passage Inventory:

Survey Background

This project was identified as an important step in preparing for the return of anadromy to the White Salmon River

Multiple groups identified need to inform data gaps and prioritize restoration actions

- Supported by the White Salmon River Watershed Management Technical Advisory Committee, USGS, Yakama Nation Fisheries, USFS, USFWS, WDFW, Mid Columbia Fisheries Enhancement Group

- Funded by WA Salmon Recovery Funding Board

Fish Passage Inventory: **Survey Goals**



1. Identify extent of anadromous fish habitat
2. Determine and prioritize fish passage barriers
3. Identify restoration projects
4. Develop relationships with willing landowners to implement priority projects

Fish Passage Inventory:

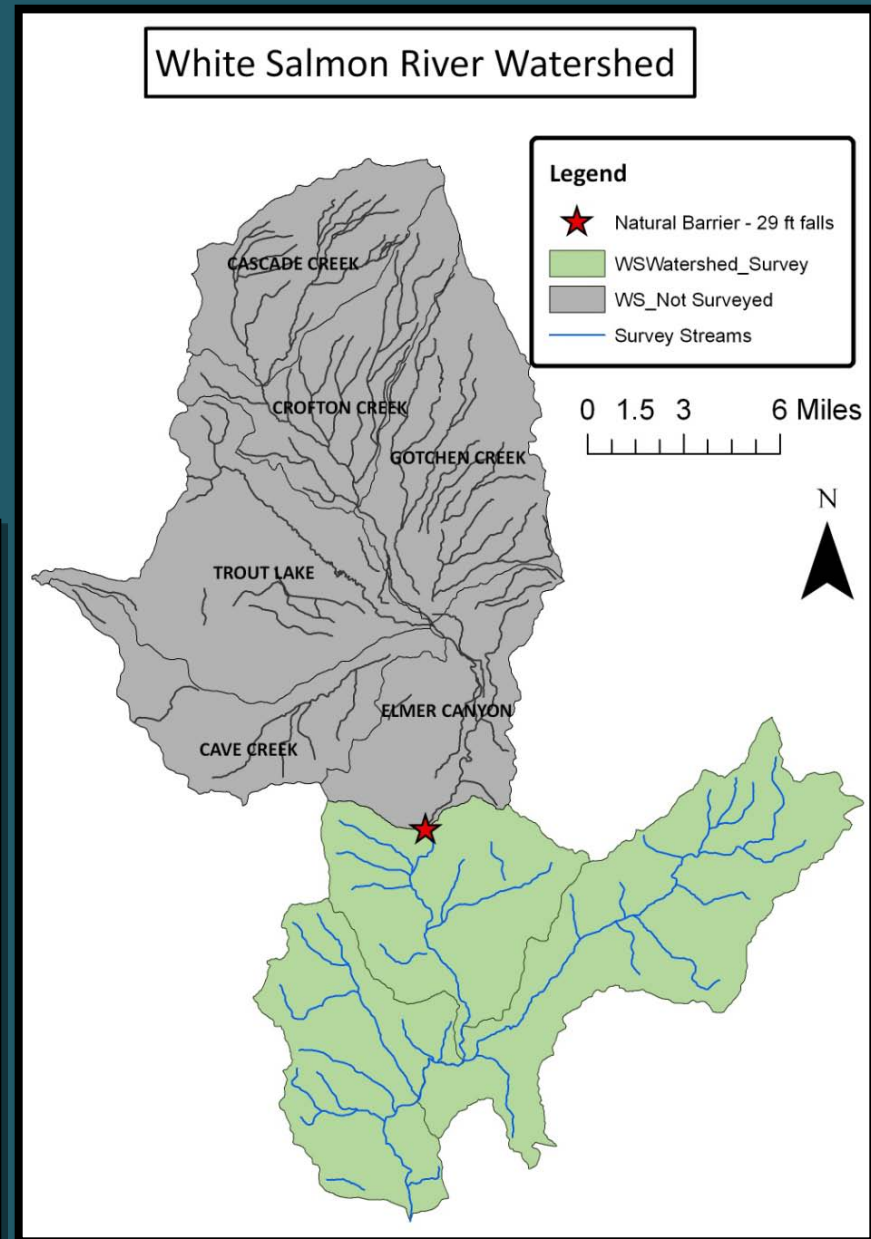
Survey Area

White Salmon Watershed Potentially Anadromous Streams

Not above 22 ft falls on White
Salmon River (RM 16.9)

Little Spring Creek
Little Buck Creek
Mill Creek
Buck Creek
Spring Creek
Rattlesnake Creek
Tributaries at RM:
5.64, 6.45, 7.41, 9.90,
9.91

Not Anadromous:
McIlroy, Gilmer, Phelps,
& Dry Creeks

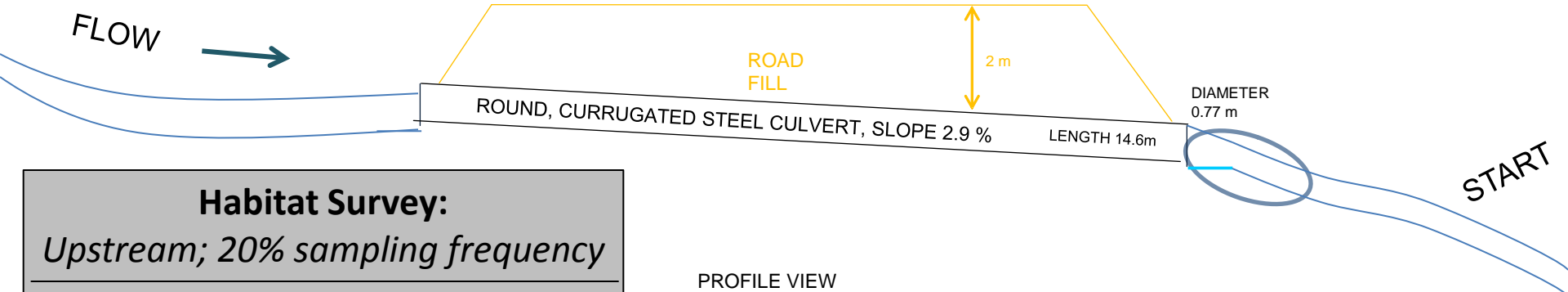


Fish Passage Inventory: Survey Protocol

Features (Culverts, Dams, Bridges): *Assess using WDFW Passage Protocol*

- Feature Type
- Material
- Diameter, Span/Rise
- Length

- Slope
- Hydraulic Drop
- Road Fill
- Plunge Pool (L,D, OHW)



Habitat Survey:

Upstream; 20% sampling frequency

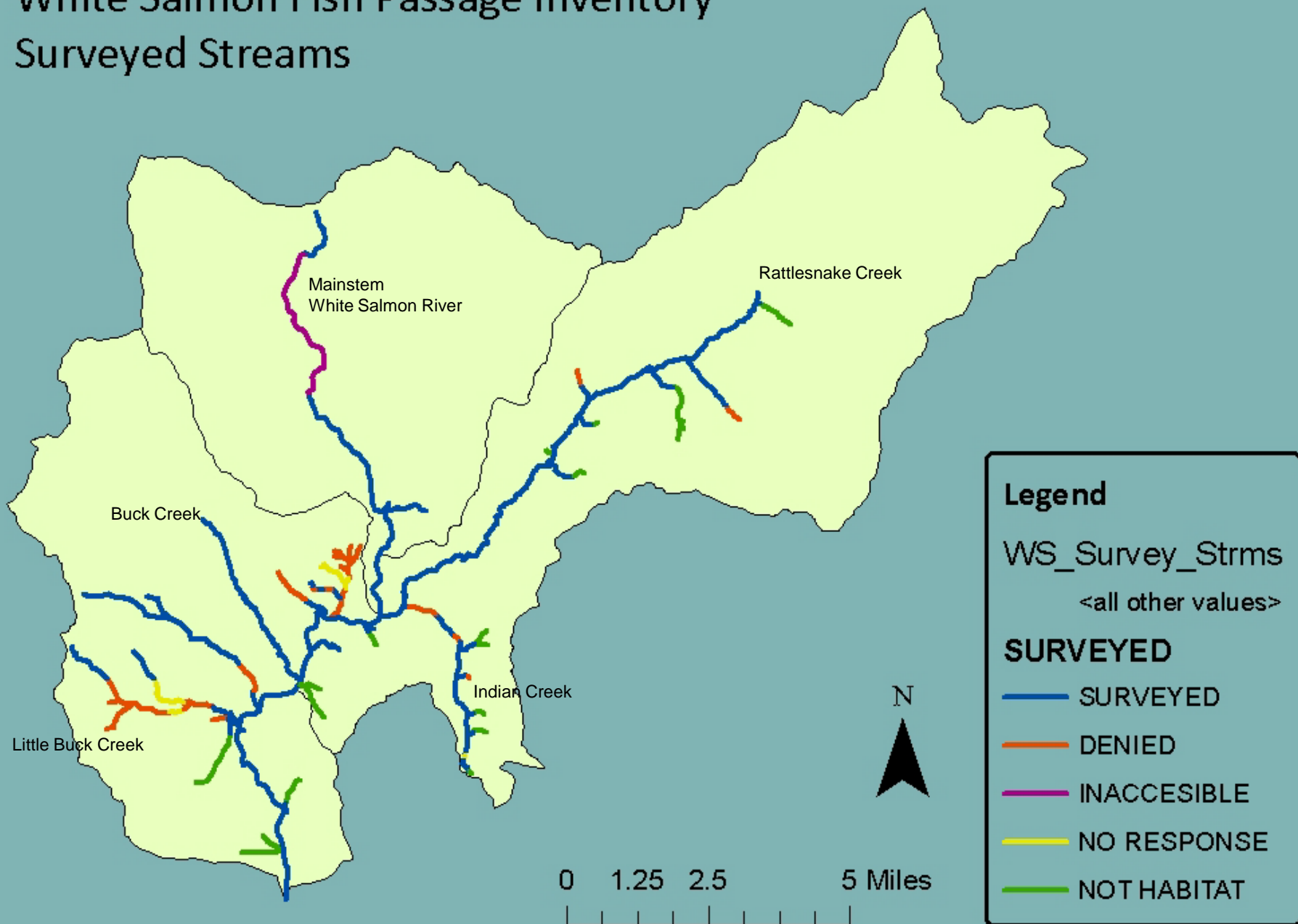
- Habitat Type (L, WW, OHW)
- Substrate Composition (S,G,C,B)
- Stream Gradient
- Instream Cover
- Juvenile Abundance
- Spawning/Rearing Habitat Quality
- Canopy Cover
- Temperature
- Spring Influence

Observation Survey: *Downstream of barrier*

- Temperature
- Canopy Cover
- Dominant Plants
- Instream Cover
- Limiting Factors
- Restoration Needs

White Salmon Fish Passage Inventory

Surveyed Streams



Potential Anadromous Habitat

Stream	Estimated Habitat*	Surveyed Habitat
Rattlesnake Creek	18.5	13.9
White Salmon River	16.9	12.9
Little Buck Creek**	6.5	2.2
Mill Creek	4.9	4.3
Spring Creek	4.8	0.4
Indian Creek	4.7	3.9
Buck Creek	3.4	3.4
RM 9.90 Tributary	1.5	0.8
RM 6.45 Tributary	1.2	0.6
RM 5.64 Tributary	0.8	0.7
Little Spring Creek	0.8	0.5
RM 7.41 Tributary	0.4	0.2
RM 7.49 Tributary	0.2	0.1
RM 9.91 Tributary	0.2	0.2

* Estimations derived from stream surveys, WDFW SalmonScape & DNR "F" type layers
** Little Buck Creek is expected to have barrier falls at confluence with the WSR

White Salmon Fish Passage Inventory End of Fish Habitat

White Salmon:
22' waterfall

Rattlesnake Creek:
55' waterfall

Buck Creek:
14' waterfall

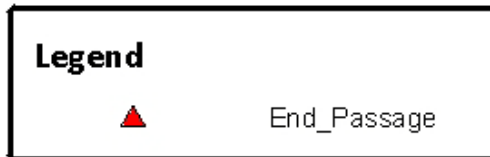
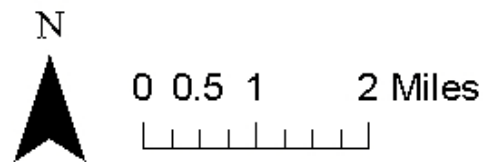
Tributary 9.91:
Spring Source

Mill Creek:
Gradient

L. Buck NWF:
Drainage boundary

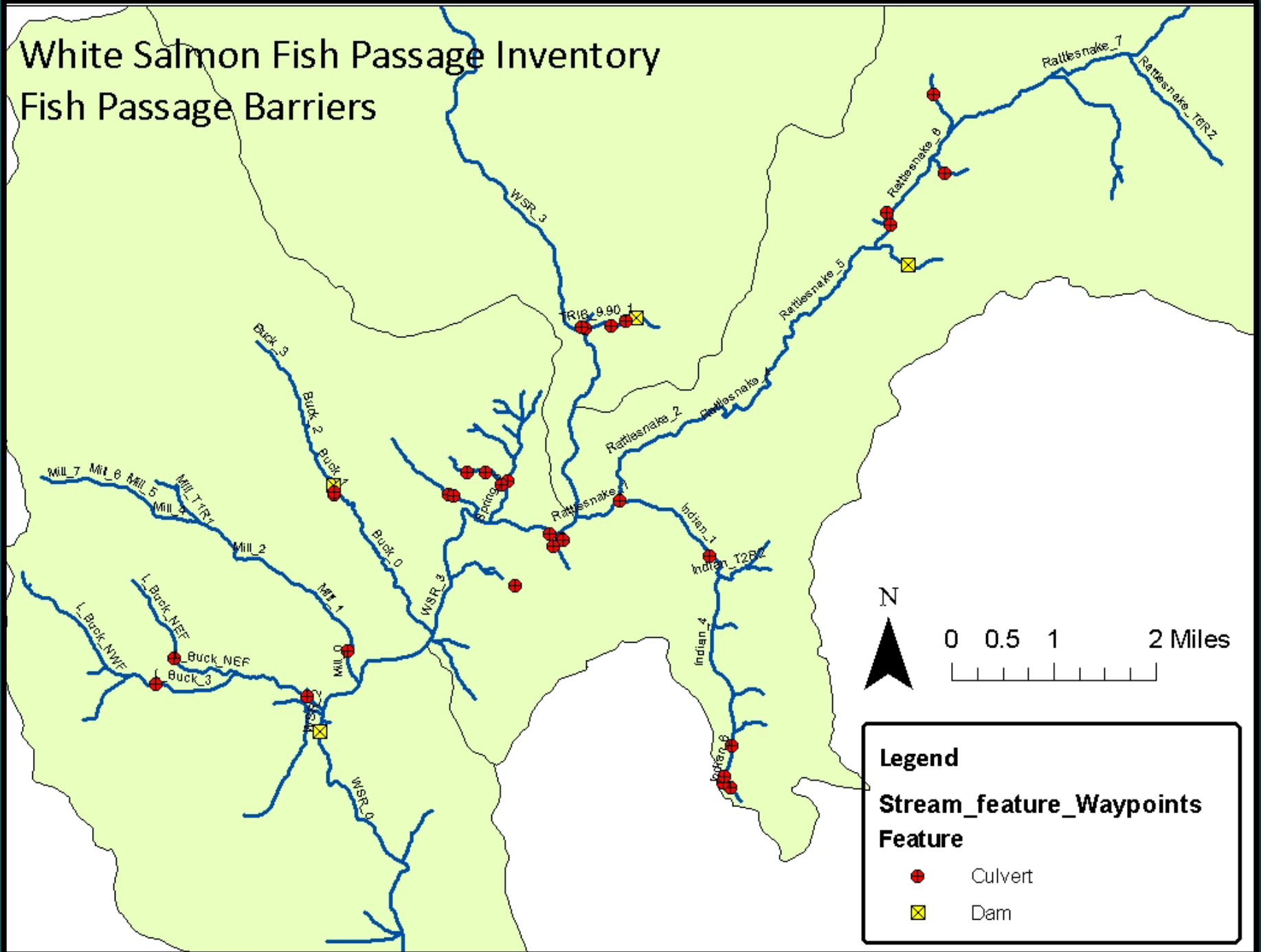
L. Spring Creek:
Spring source &
gradient

Indian Creek:
Subsurface flow



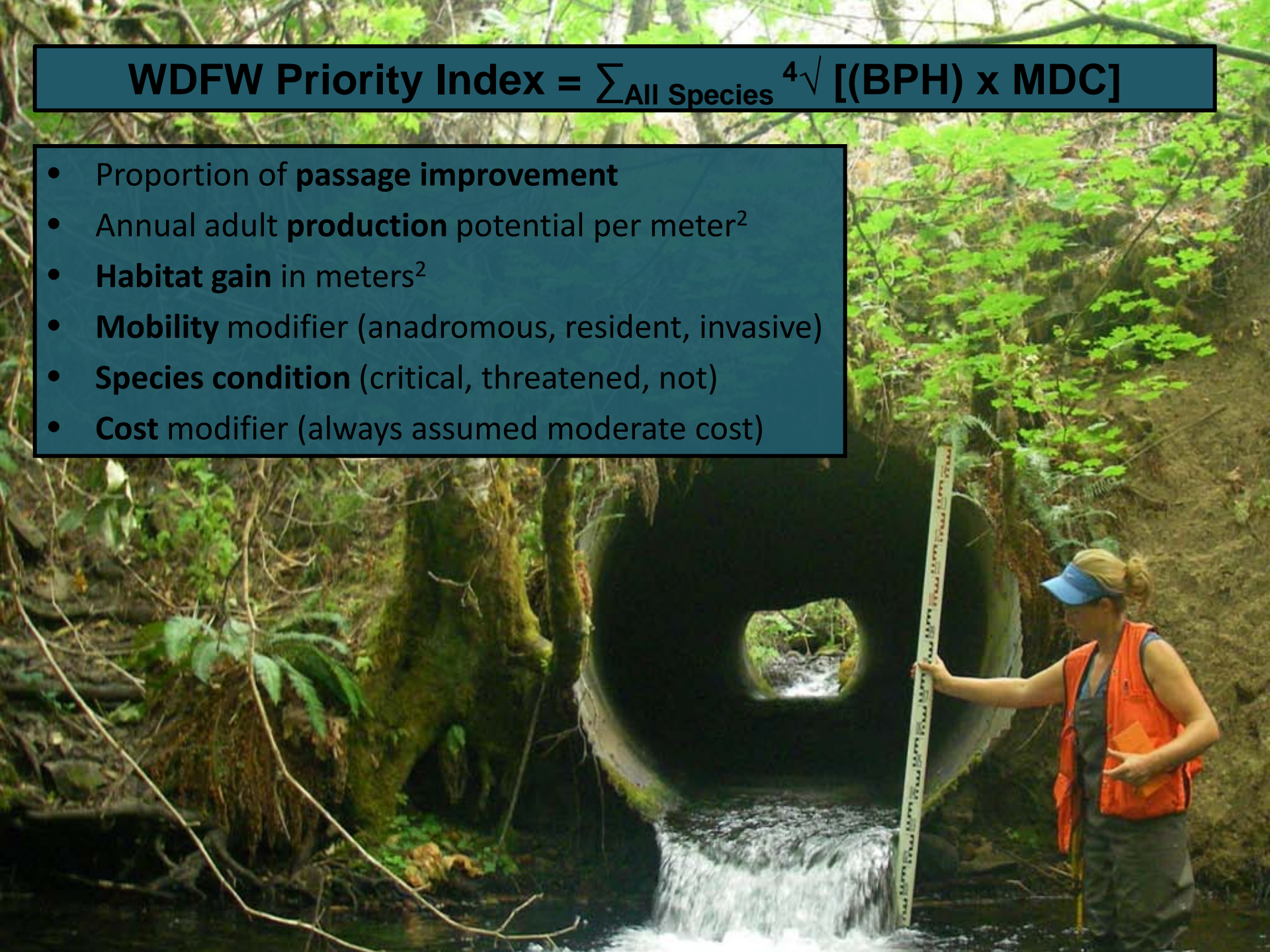
White Salmon Fish Passage Inventory

Fish Passage Barriers



$$\text{WDFW Priority Index} = \sum_{\text{All Species}} \sqrt[4]{[(\text{BPH}) \times \text{MDC}]}$$

- Proportion of **passage improvement**
- Annual adult **production** potential per meter²
- **Habitat gain** in meters²
- **Mobility** modifier (anadromous, resident, invasive)
- **Species condition** (critical, threatened, not)
- **Cost** modifier (always assumed moderate cost)



Fish Passage Inventory:

Barrier Removal Prioritization

Fish Passage Barriers Prioritized by Potential Lineal Habitat Upstream		
#	Stream & River Mile	Upstream Habitat
1	Indian Crk RM 0.05	4.68
2	Mill Crk RM 0.32	4.55
3	Indian Crk RM 1.15	3.50
4	Little Buck Crk RM 1.83**	2.90
5	RM 9.90 Trib RM 0.04	1.48
6	WSR TRIB 9.90 RM 0.31	1.21
7	Buck Crk RM 2.04	1.20
8	WSR TRIB 9.90 RM 0.48	1.04
9	Little Buck NE RM 0.73**	0.94
10	WSR TRIB 9.90 RM 0.59	0.93

Fish Passage Barriers Prioritized with WDFW PI Index		
#	Stream & River Mile	Priority Index*
1	Mill Creek RM 0.32	35.1
2	Indian Crk RM 0.05	25.7
3	Buck Crk RM 2.04	24.9
4	Little Buck Crk RM 1.83**	21.3
5	Little Buck NE RM 0.73**	20.3
6	Indian Crk RM 3.33	14.5
7	WSR TRIB 9.90 RM 0.31	13.8
8	Spring Crk Trib RM 0.04	13.1
9	WSR TRIB 9.90 RM 0.48	12.6
10	WSR TRIB 9.90 RM 0.59	12.3

* WDFW PI #'s only account for sections of stream where habitat data was gathered and are not reflective of all potential anadromous habitat estimated for the stream

** The mouth of Little Buck Creek may be a passage barrier when Condit Dam is removed

Fish Passage Inventory: Restoration Projects

Numerous habitat restoration needs were identified during surveys

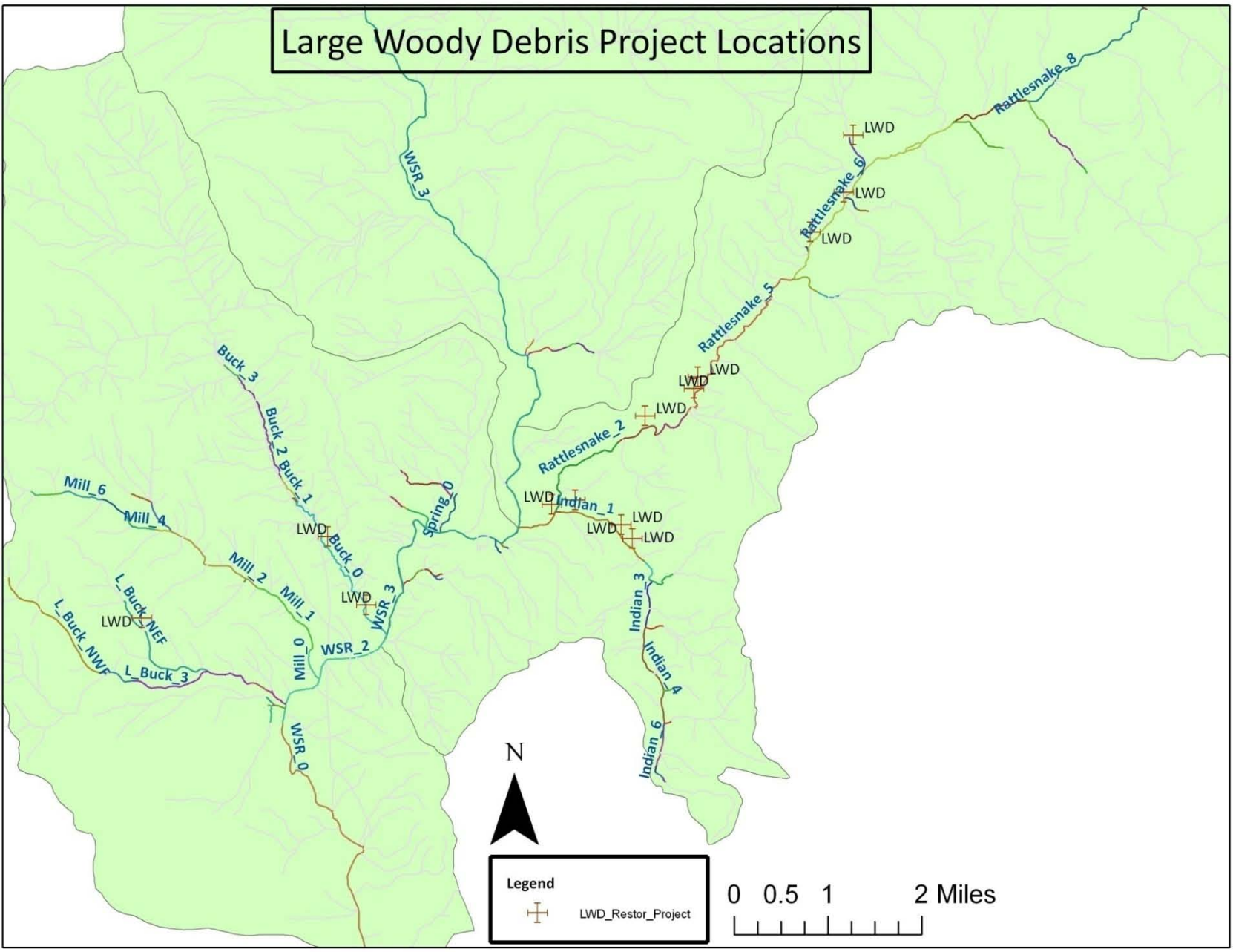
Collected details during surveys to inform future project planning:

Lat/Long, type of access (road/foot), project size (m²), likelihood of landowner willingness

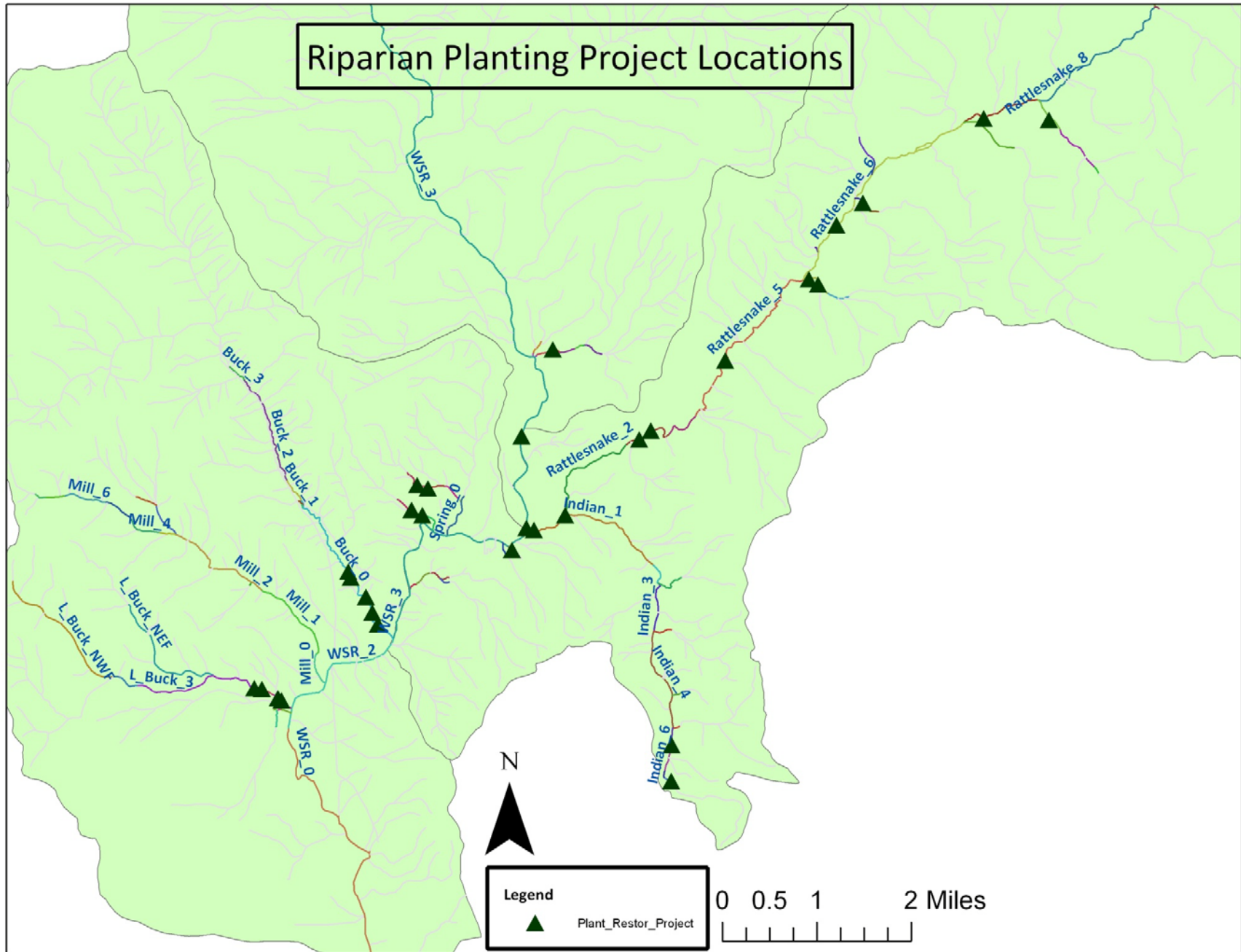
Restoration Project Types	#
Riparian Planting	36
Invasive Weed Removal	44
Large Woody Debris Placement	13
Cattle	18
Erosion/Channel Incision	45
Trash	14
Conifer Release, Thinning	8
Upper Rattlesnake Restoration	46
Total Restoration Projects	235



Large Woody Debris Project Locations



Riparian Planting Project Locations

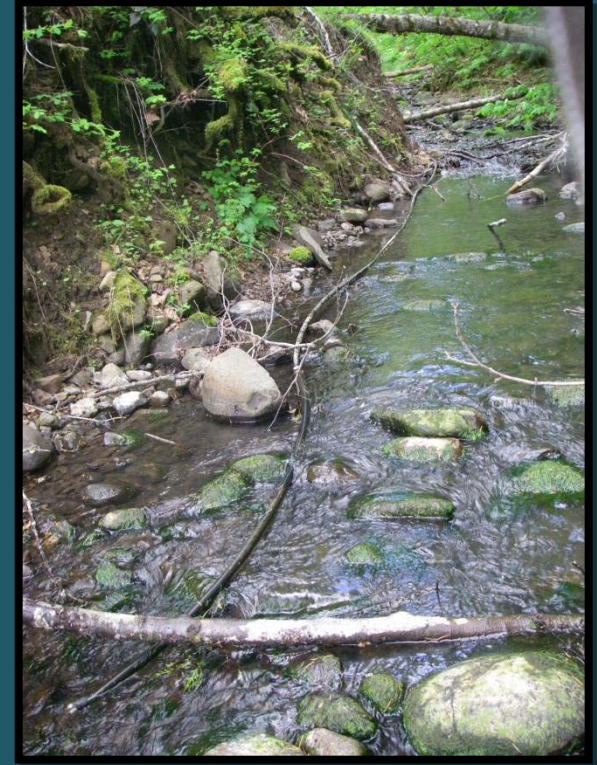


Restoration Project Highlights

Project Scale: From low hanging fruit to multi-phase efforts

UCD and others poised to assist interested landowners implement restoration projects

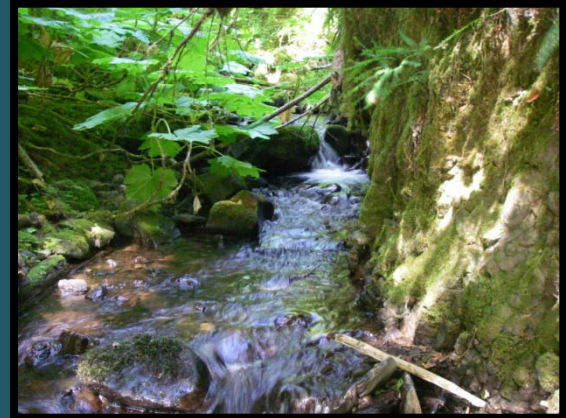
Working to prioritize projects by reach



Fish Passage Inventory:

Outcomes

- Worked with **51** landowners to gain access to riparian properties
 - 68 contacted, 10 denied, 7 unresponsive
- **44** miles of potential anadromous habitat surveyed (65 miles of potential habitat estimated)
- **33** instream features recorded
 - 30 barriers and 1 passable culvert
- Over **200** potential restoration projects identified
- 15+ projects already being explored with landowners!



An aerial photograph of a landscape. The top half is dominated by a dense, dark green forest. A stream or river flows through the forest from the top left towards the bottom center. Below the forest, there are several large, rectangular, light brown or tan patches, which appear to be agricultural fields or cleared land. The overall scene is a mix of natural and human-modified environments.

Fish Passage Inventory:

Database

Geographically orients data including:

- Survey type (data collected, reach breaks, miles of stream surveyed, instream features)
- Reach habitat details (canopy cover, dominant vegetation, slope)
- Barriers (rearing/spawning habitat upstream, passability, Priority Index rating, # of upstream/downstream barriers)
- Projects (including project type, size, access points)

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