

# Fox Creek Habitat Restoration: Restoring Function on Century- Old Working Lands

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Gorge Sciences Conference  
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# Outline

- 
- History of Fox Creek
  - Monitoring to Inform Restoration
    - Project Updates
    - Ongoing Monitoring

# History of Fox Creek

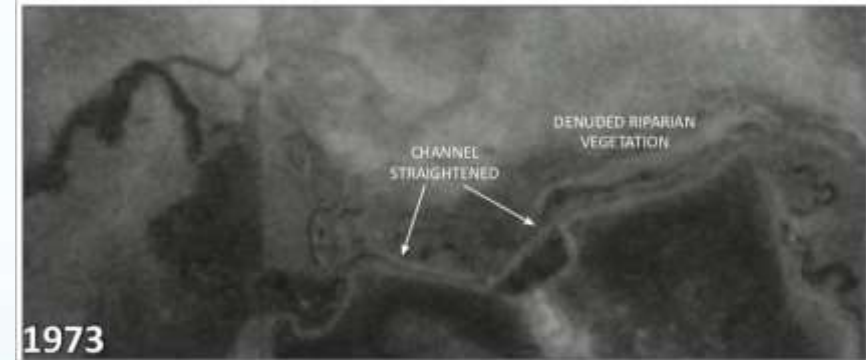
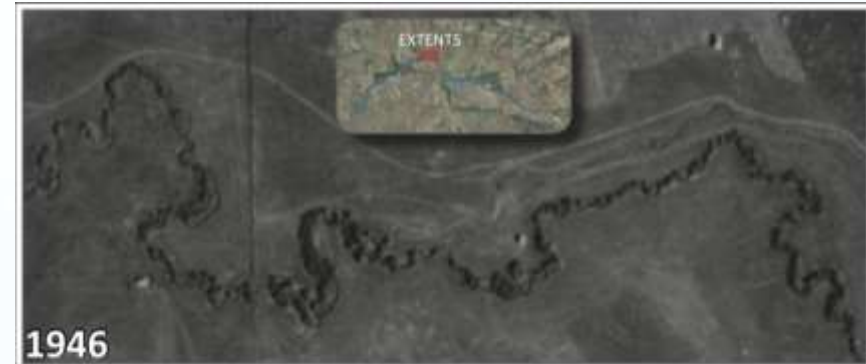
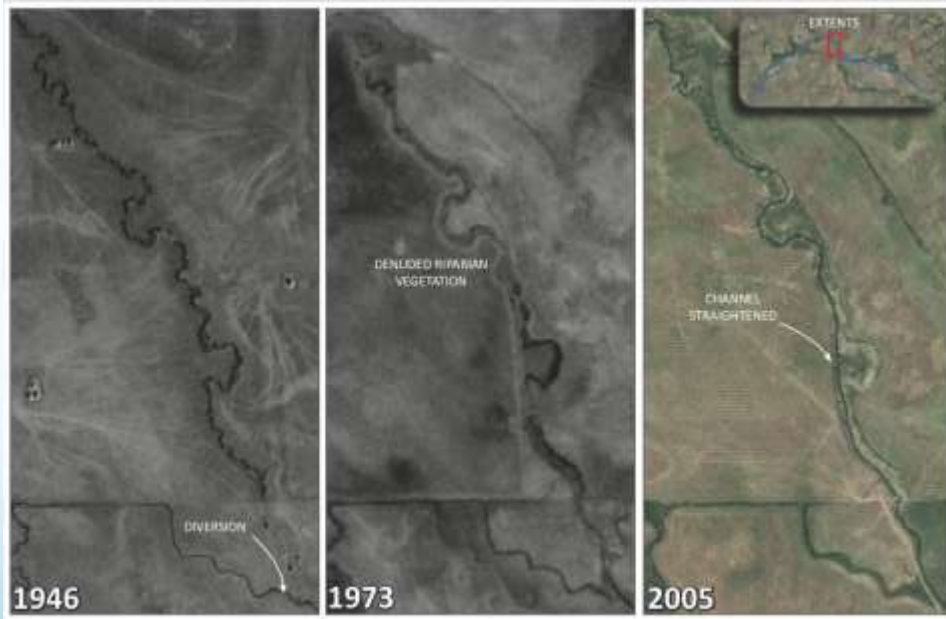
- Homesteaded in 1880's



- Usual and Accustomed



# History of Fox Creek





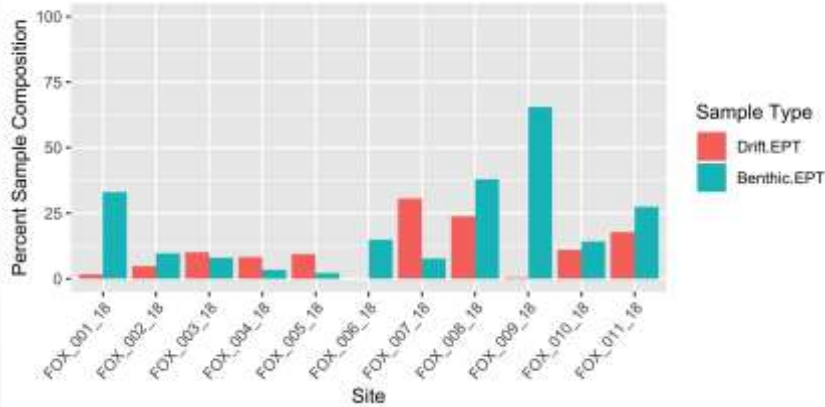
# Fox Creek – Monitoring to Inform Restoration



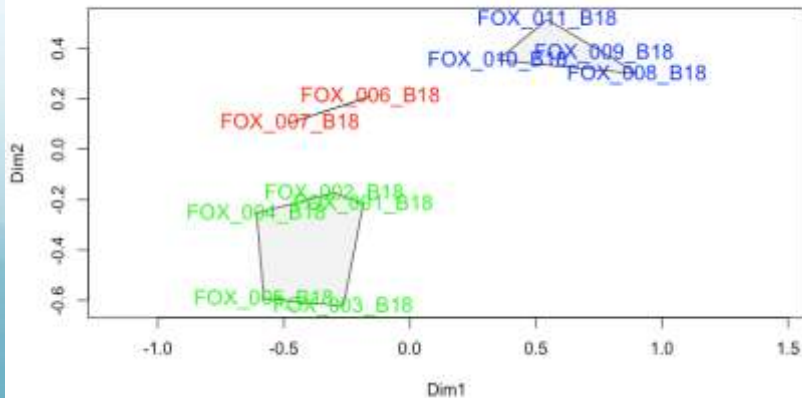
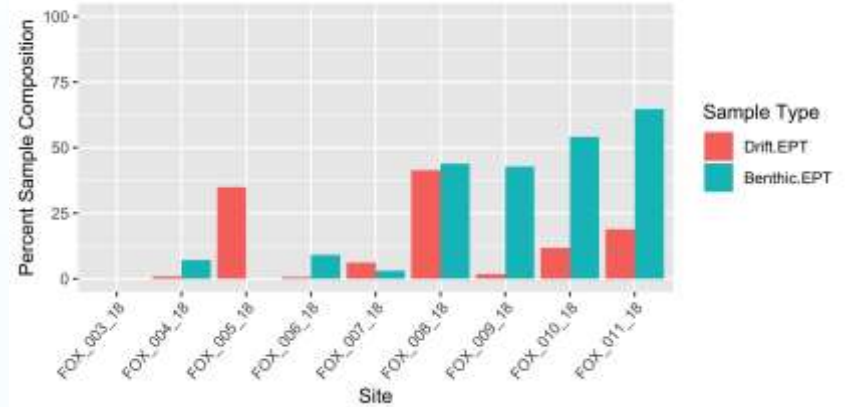
# Fox Creek - Macroinvertebrates

- 11 Sites, 2 visits (June & Sept.), 44 Total Samples

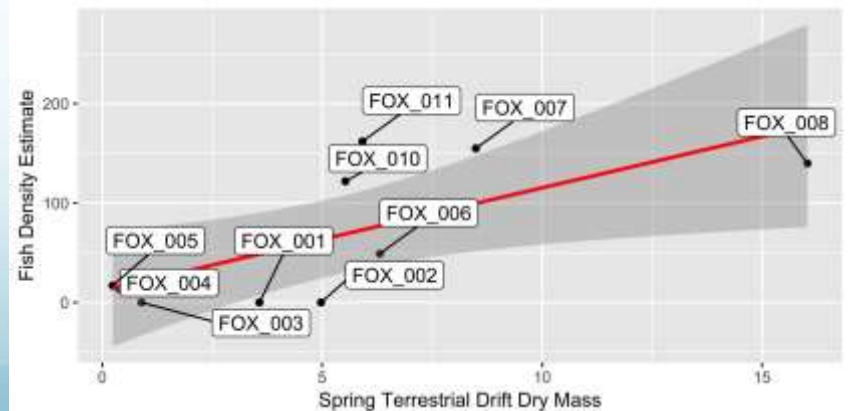
Summer EPT Composition for Drift and Benthic Samples



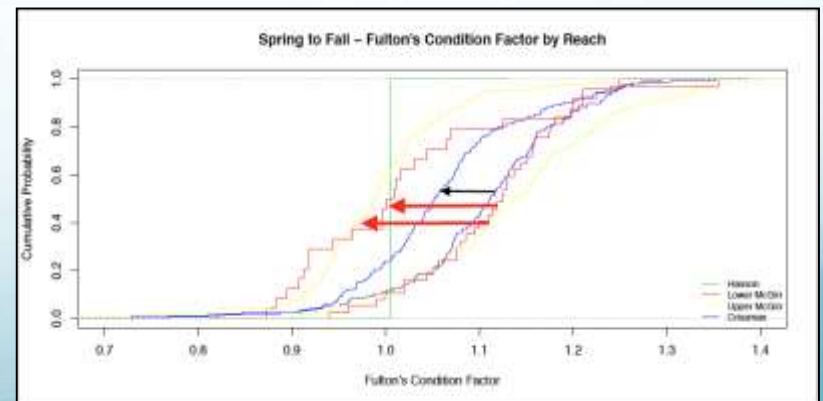
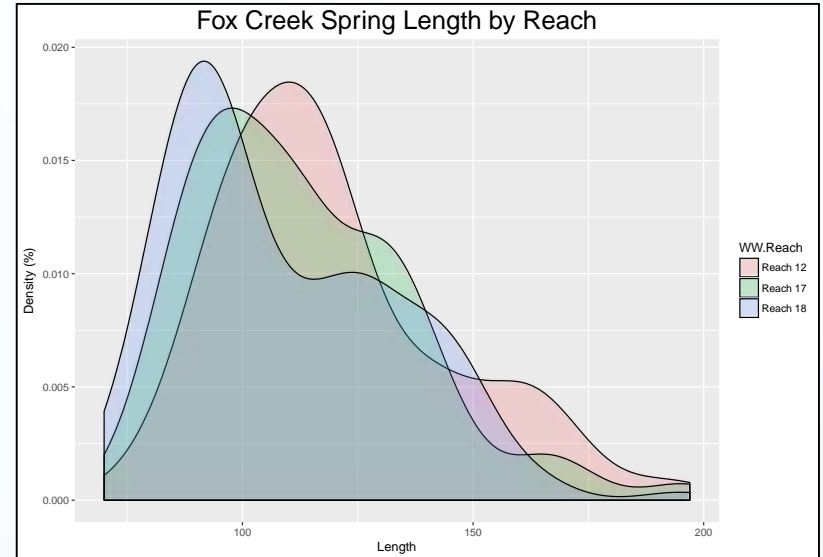
Fall EPT Composition for Drift and Benthic Samples



Adj R2 = 0.41906 Intercept = 11.694 Slope = 10.363 P = 0.025561



# Fox Creek - Fish



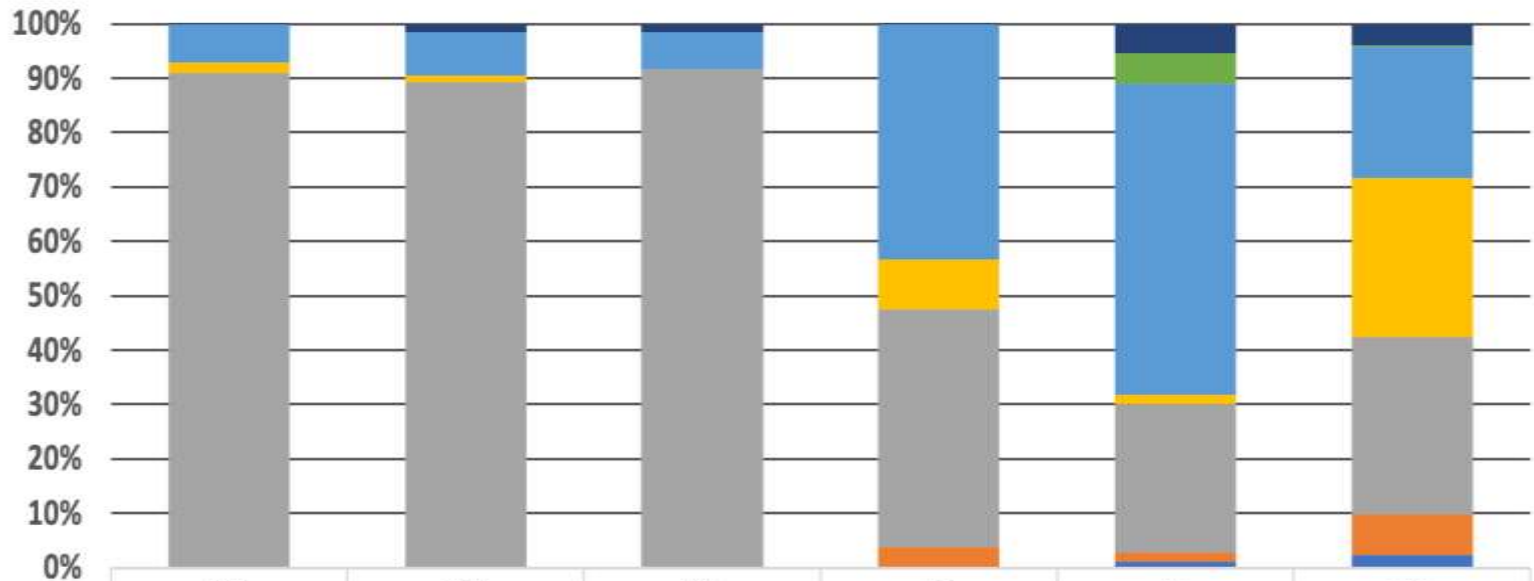
# Fox Creek - Habitat





# Fox Creek - Vegetation

Fox Creek Riparian Vegetation Structural Composition



	T1	T2	T3	T4	T5	T6
■ Bare Soil	0.1	1.5	1.6	0.1	5.3	3.9
■ Rock	0	0.1	0	0	5.6	0.1
■ Duff	6.9	7.9	6.8	30.2	57.3	23.6
■ Sedges	2	1.2	0	6.5	1.7	28.3
■ Grasses/Forbes	91	89.3	91.6	30.6	27.3	31.7
■ Shrub	0	0	0	2.6	1.5	7.1
■ Canopy Closure	0	0	0	0	1.2	2.3

# Restoration Objectives

- **Increase Spring-Time Floodplain Connection**  
Increase Extent/Duration of Floodplain Inundation
  - **Increase Summer Rearing Habitat**  
Increase # Habitat Units/km
  - **Re-establish Riparian Vegetation**  
Native Plant Propagation







ALIGNMENT

LWD#4  
SEE NOTE 4.

LWD#315  
SEE NOTE 2.

FP#52

1  
C-108

LWD#5  
SEE NOTE 5.

FP#71

FP#70

LWD#336  
SEE NOTE 3.

2  
C-108

FP#69

FP#59

FP#61

LWD#7  
SEE NOTE 4.

FP#56  
FP#58

FP#60

FP#

1  
C-108

2  
C-108

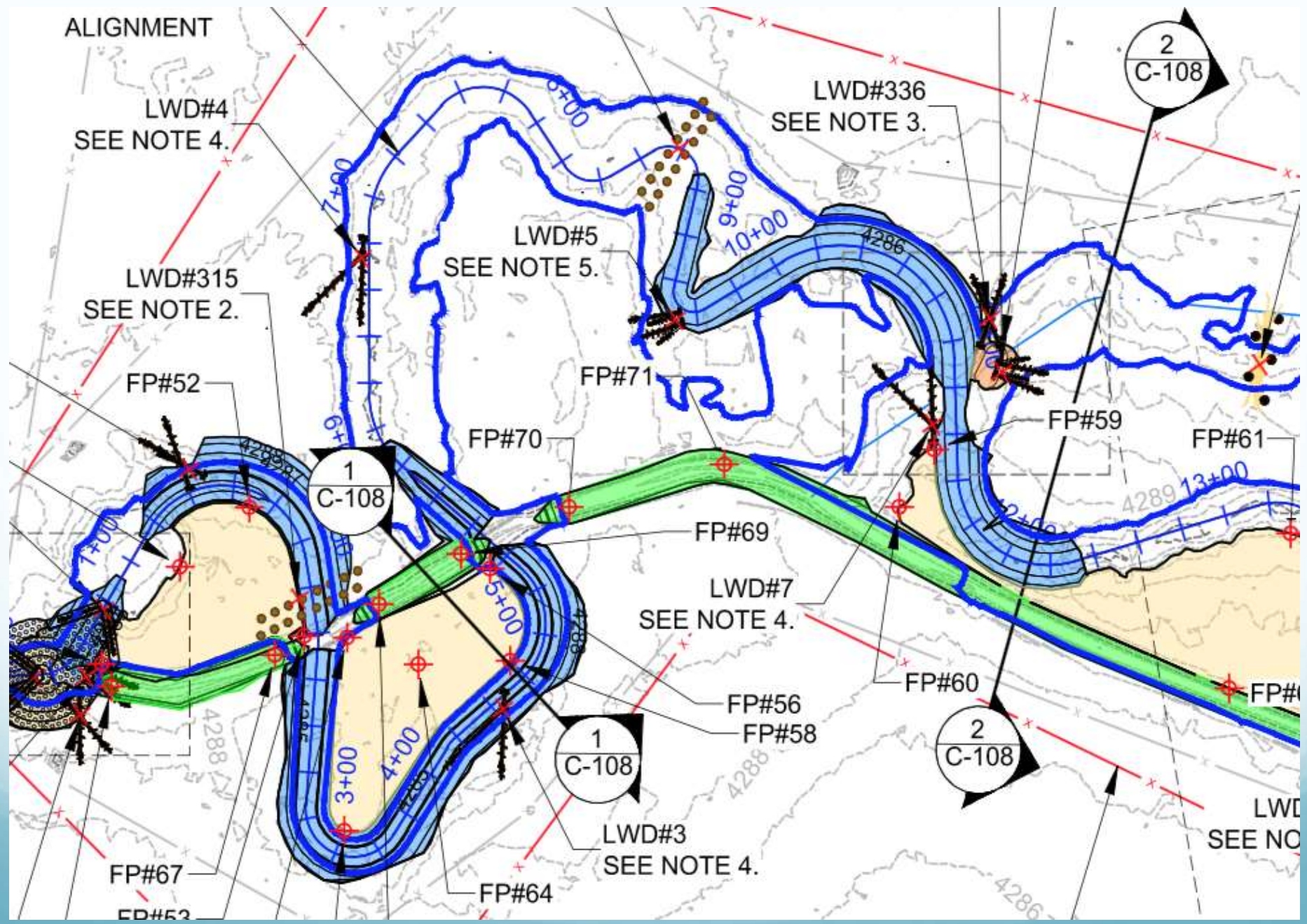
LWD#3  
SEE NOTE 4.

LWD  
SEE NO

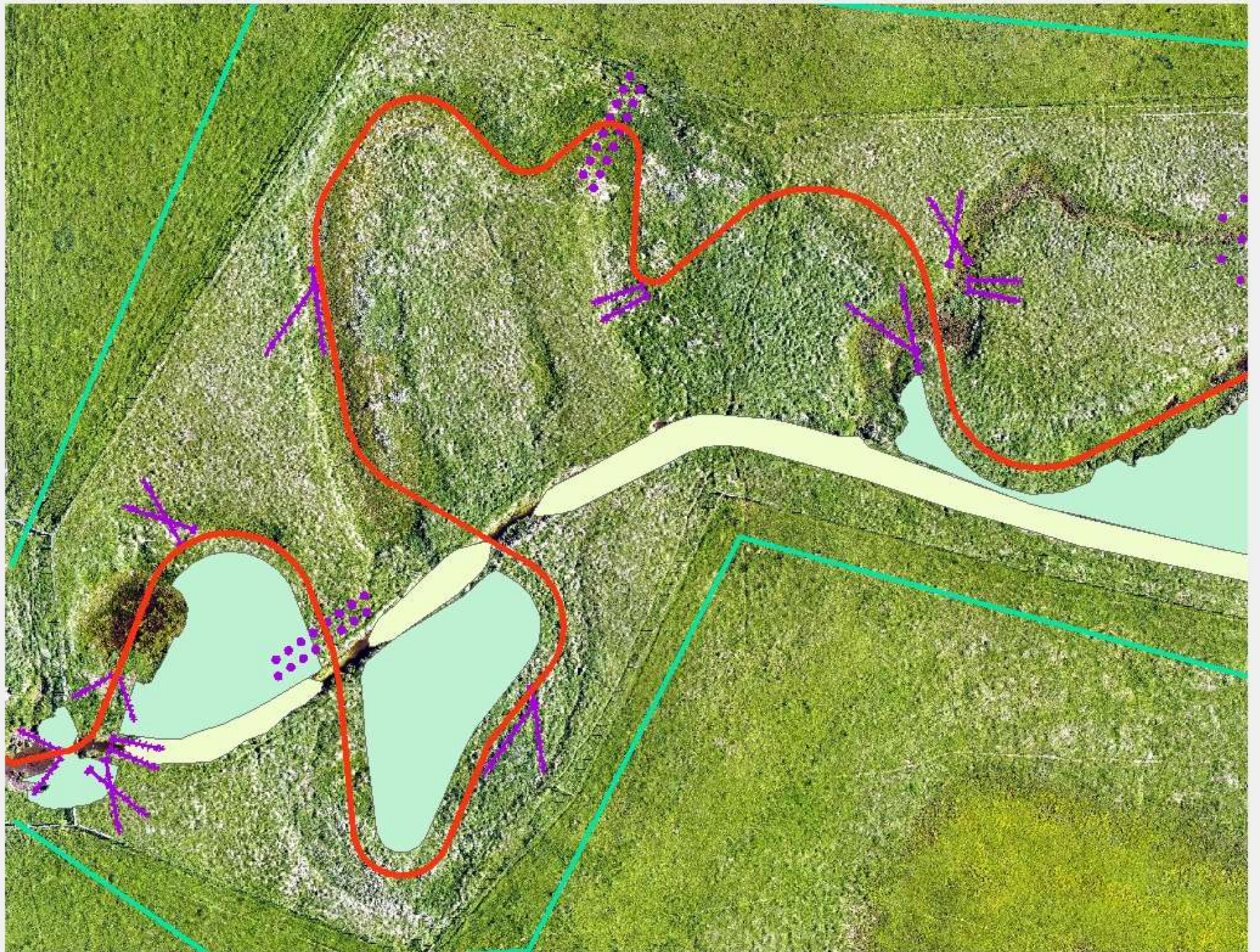
FP#67

FP#64

FP#53

























# 'Results' of Restoration

Before



After

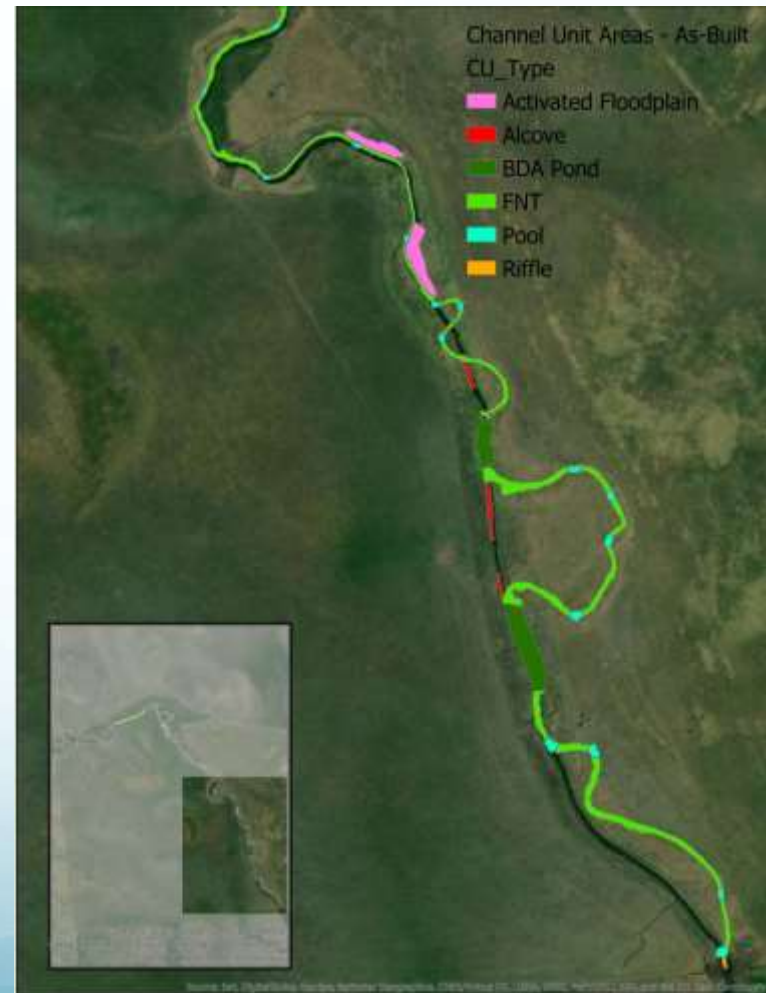


# 'Results' of Restoration

Before



After



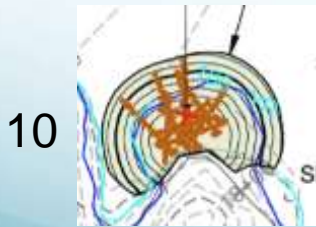
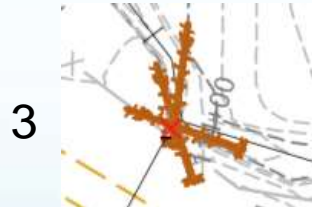
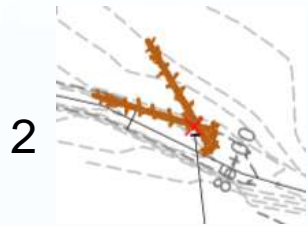
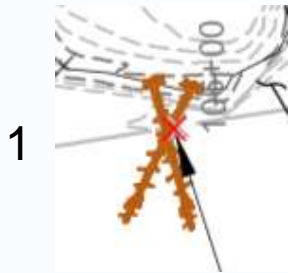




# Future Monitoring Efforts

- Project Level Effectiveness Monitoring
  - Habitat
  - Geomorphology
  - LWD Assessment
  - RTK - Riparian Vegetation Survival
- Fox Creek Ecological Response Monitoring (11 Sites)
  - *O. mykiss* capture/tagging (spring/fall)
  - Macroinvertebrate Collection
  - Habitat Assessments
  - R<sup>2</sup>IBI Assessments
- Tends toward BACI design
- Centered around capturing project-level effects on a local population scale

# Future Monitoring - LWD Assessment



## Seven Structure Types:

- (1) Type 1 - 2-Log Juniper Cross
- (2) Type 2 - 2-Log Juniper Cross
- (5) 5-Log Juniper Bank Snag
- (10) 10-Log Alcove Structure
- (3) 3-Log Channel Spanning
- (S) Single Surface Log
- Beaver Dam Analog



# LWD Assessment Cont'd

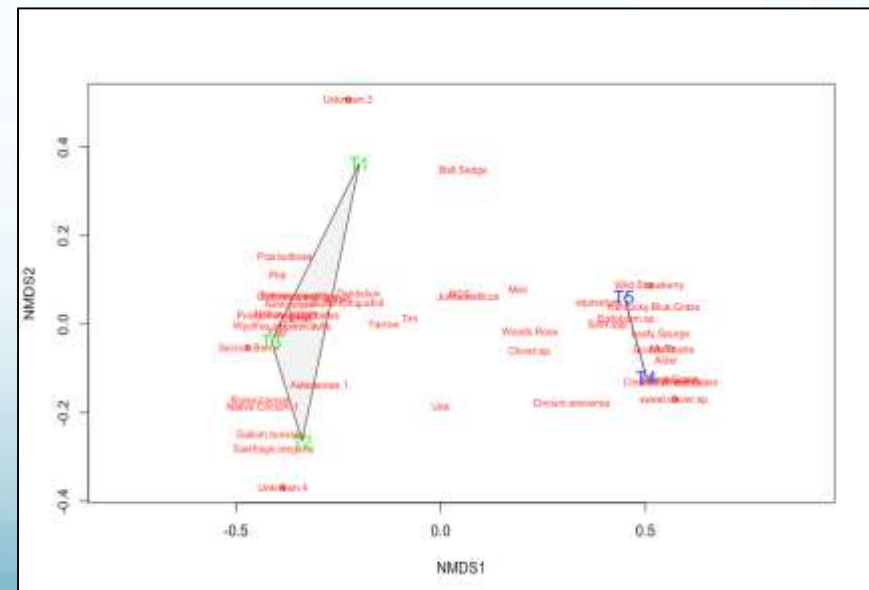
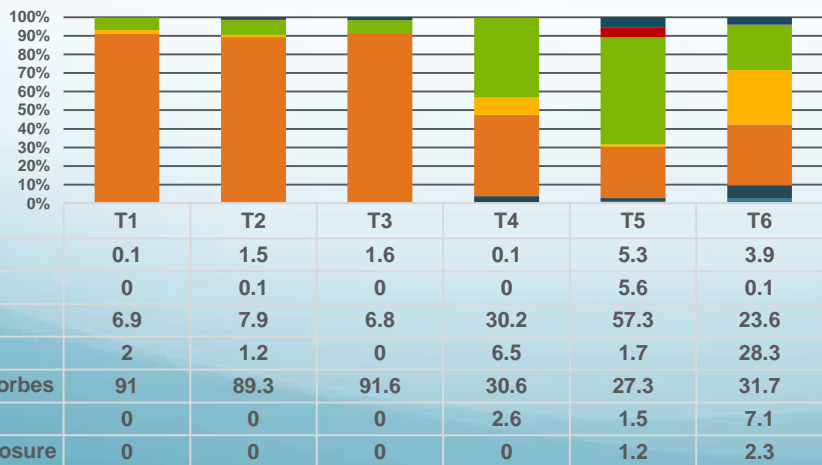
Type	Instream Habitat	Side Channel Activation	Floodplain Roughness	Pool Formation	Surface Water Displacement	Hydraulic Complexity	Bank Stabilization	# of Structures
1	X	-	Special Case	X	-	X		24
2	X	Special Case	-	X	-	Special Case		34
3	X	-	-	X	-	X		8
5	X	-	-	X	-	X	X	37
10	X	-	-	X	-	X		4
S	X	-	-	-	X	X		4
BDA	X	-	-	-	X	-		1

Instream Habitat	Side Channel Activation	Floodplain Roughness	Pool Formation	Surface Water Displacement	Hydraulic Complexity	Bank Stabilization
<ul style="list-style-type: none"> <li>H/L Flow PP's                             <ul style="list-style-type: none"> <li>Volume</li> </ul> </li> <li>% Submerged</li> <li>% Habitat</li> <li>Snorkel</li> </ul>	<ul style="list-style-type: none"> <li>H/L Flow PP's</li> <li>Intermittency</li> </ul>	<ul style="list-style-type: none"> <li>Sedimentation PP's</li> </ul>	<ul style="list-style-type: none"> <li>H/L Flow PP's</li> <li>Residual Pool Depth</li> <li>XS Sets</li> </ul>	<ul style="list-style-type: none"> <li>UAV</li> <li>Surface Water Area</li> </ul>	<ul style="list-style-type: none"> <li>H/L Flow PP's</li> <li>Velocity XS's</li> </ul>	<ul style="list-style-type: none"> <li>LWD Tags</li> <li>Erosion Meas.</li> <li>XS Sets</li> </ul>

# Vegetation Assessments

- Rapid Riparian Index of Biotic Integrity (R<sup>2</sup>IBI)
  - Quickly quantify riparian metrics
  - Measure change through time
  - Trend and Status
  - Employable by non-specialists (i.e. fish biologists)

Fox Creek Riparian Vegetation Structural Composition

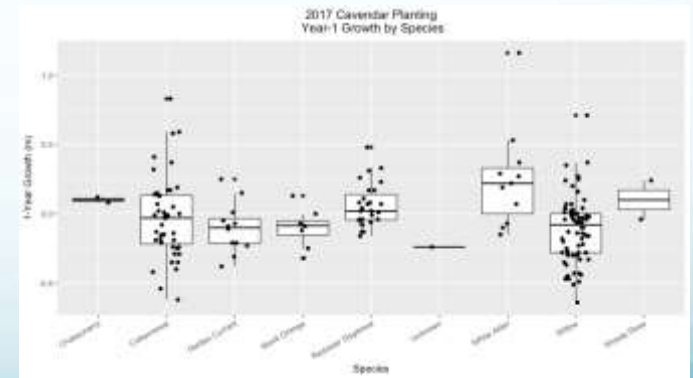
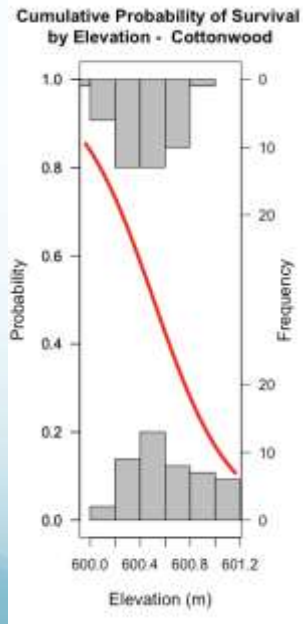
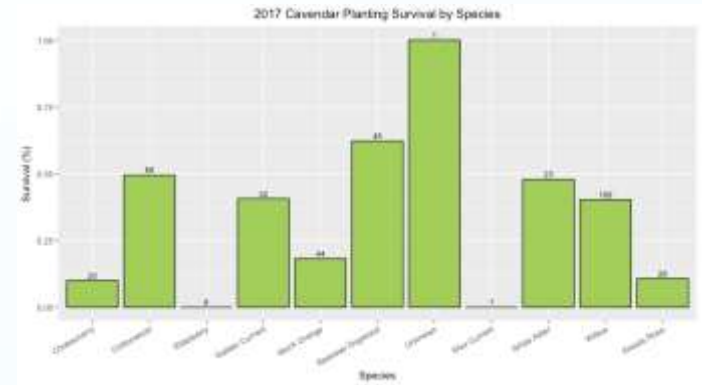
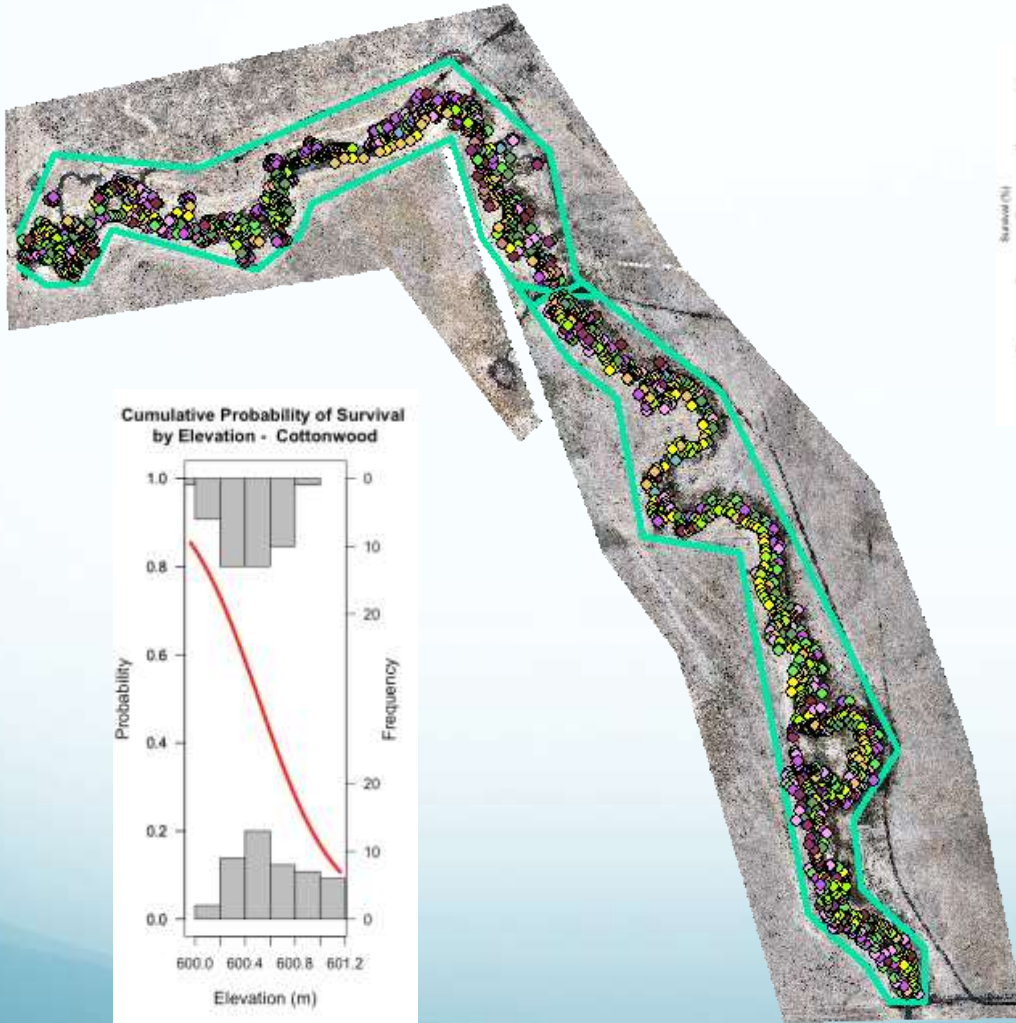




# Greenline R<sup>2</sup>IBI Metrics

- Floristic Quality Assessment (Indic. Species)
- Woody Stem Density/Recruitment (# Stems)
  - Woody Stem Growth (# Stems >1M)
    - Shrub Basal Area (Shade)
- Canopy Cover/Shade Potential (Woody Species)

# RTK Planting





# Fox Creek Ecological Response Monitoring

- O. mykiss Tagging
- Macroinvertebrates
- Habitat Assessment
- R<sup>2</sup>IBI Assessment





# Acknowledgments

- Stefan Kelly (CTWS Monitoring Bio)
- Amy Charette (CTWS-JDBO Watershed Coordinator)
  - CTWS-JDBO Project Management Crew
    - ODFW Fish Research – John Day
      - Seth White – CRITFC
- Questions??