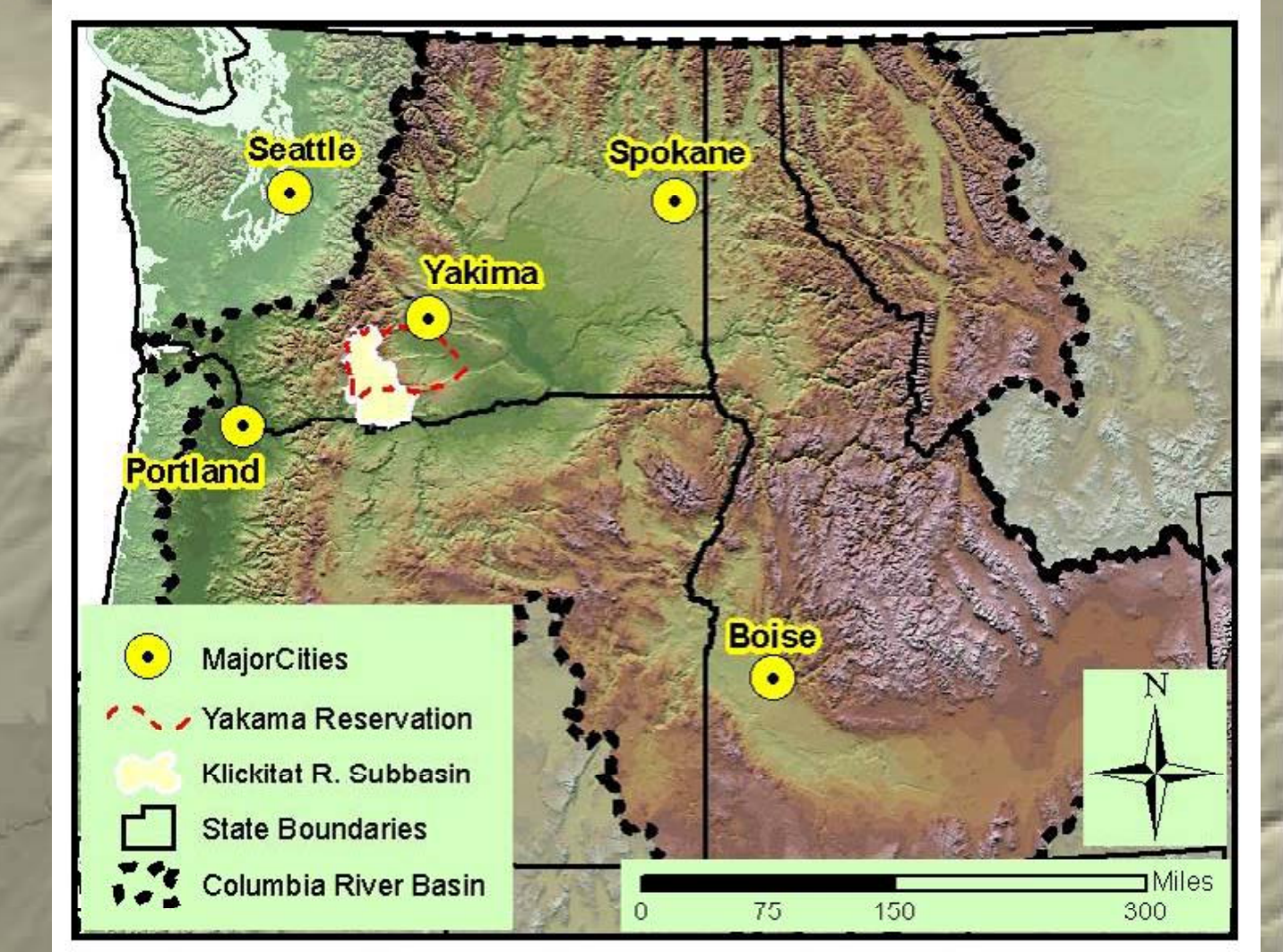


# Habitat Enhancement Effectiveness Monitoring Klickitat River Subbasin

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RRNW - Stream Restoration Design Symposium  
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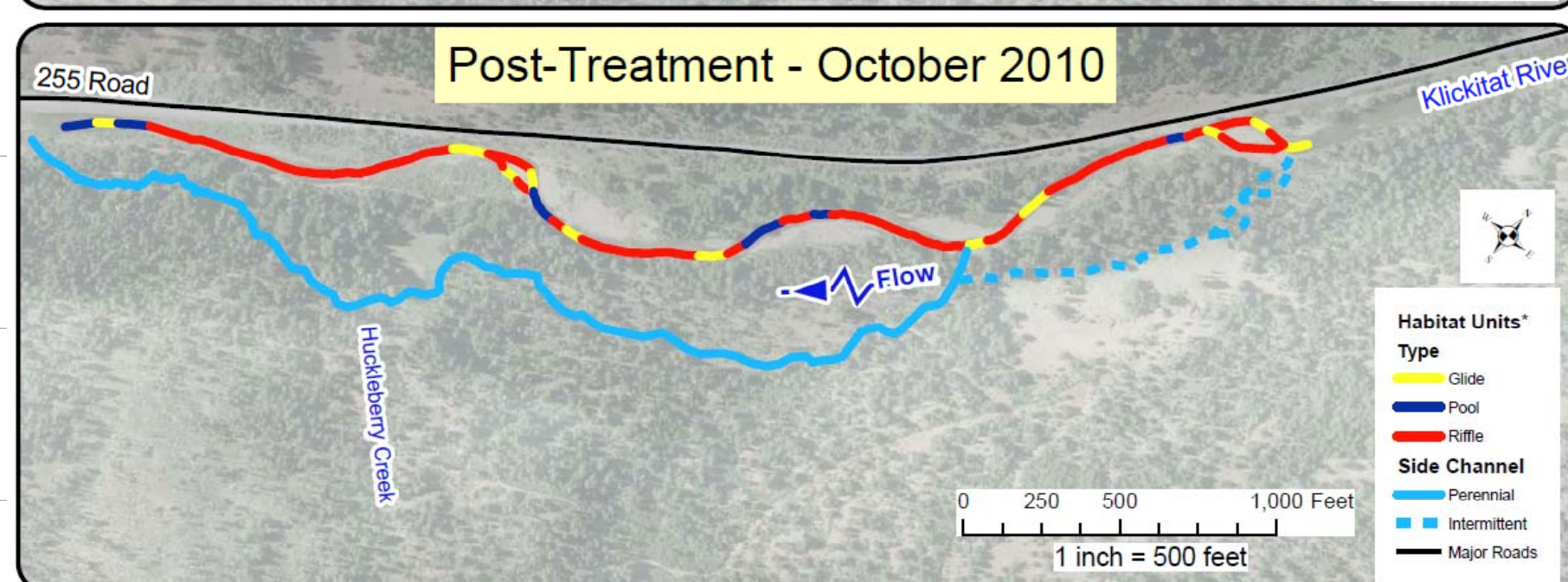
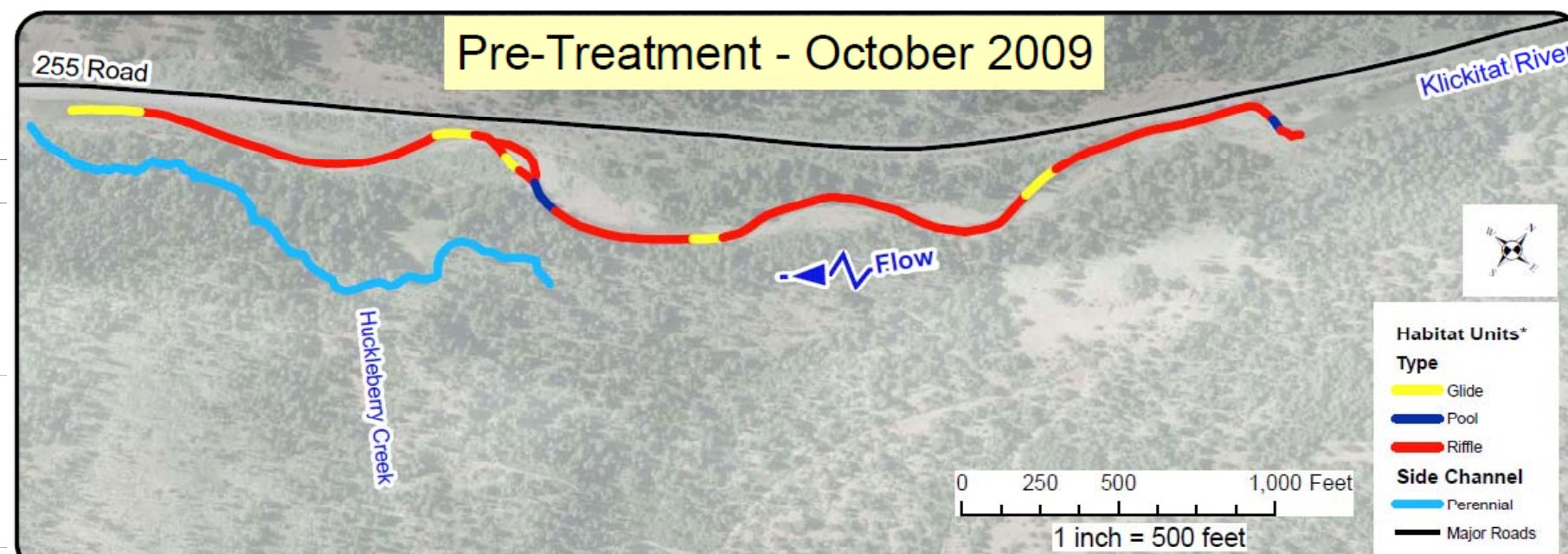


The Klickitat Watershed Enhancement Project (KWEP) restores, enhances, and protects watershed function within the Klickitat River subbasin. KWEP and the Klickitat Monitoring and Evaluation Project (M&E) collaboratively engage in habitat enhancement effectiveness monitoring to assess project design, implementation, objectives, and guide future work. Current monitoring samples salmonid populations, shallow groundwater, instream habitat, riparian vegetation, and macroinvertebrates.

Mt. Adams

## Upper Klickitat River – Phase 2

The Upper Klickitat River In-Channel and Floodplain Enhancement project constructed 35 LWD jams, excavated 4 mainstem pools, and constructed nearly 3,000' of side channel to increase habitat complexity.



\* Habitat units are defined as channel spanning



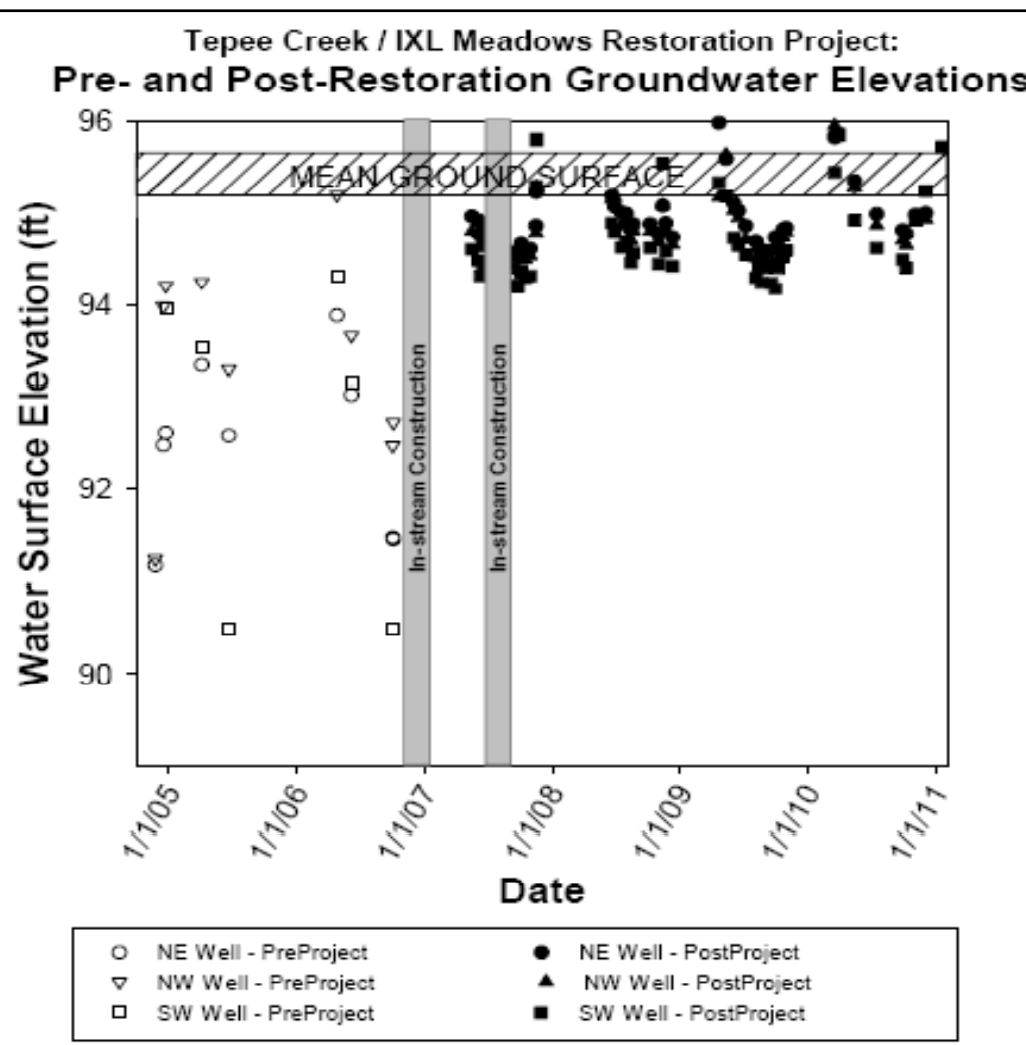
Klickitat & Columbia River Confluence

## Tepee Ck/IXL Meadows Project

The Tepee Creek/IXL Meadows Restoration Project imported gravels to raise the bed elevation and reconstruct pool-riffle sequences along 2,000' of previously incised reach.

### Post-treatment Results:

- Flow Duration:** perennial pools maintained all four years following treatment (only observed 1 of 4 years pre-treatment)
- High Flow Access:** activation of four side channels totaling 835 linear feet



- Pools:** increased from 15 to 23 (53%) and 1' increase in the mean residual pool depth
- Wetlands:** ~3100 ft<sup>2</sup> of emergent wetland created
- Higher Water Table:** 2' – 4' rise and less variation between and amongst wells

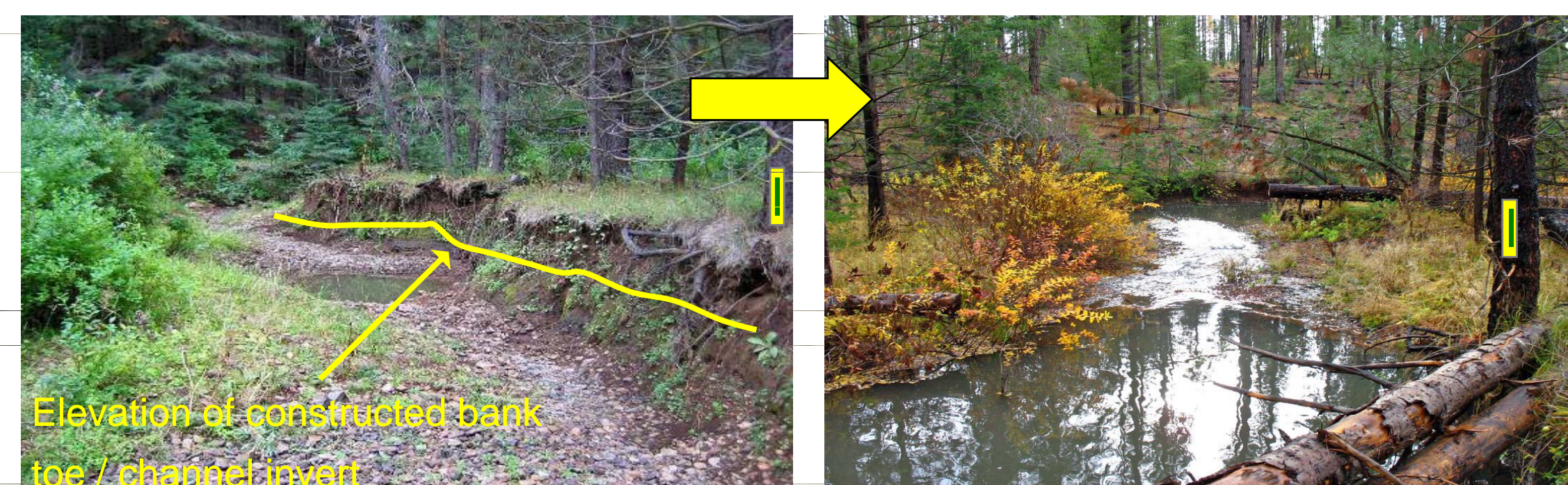
## Steelhead Spawning – Tepee Ck IXL (Treated) and Tepee Ck (Untreated)

	Tepee Ck IXL (Treated)	Tepee Creek (Untreated)
<b>Total Redds (redds/mi)</b>		
2007	2 (5.0)	3 (0.4)
2008	0 (0)	2 (0.2)
2009	4 (10.0)	12 (1.5)
2010	3 (7.5)	8 (1.0)

## O. Mykiss - Tepee Ck IXL (Treated) and Tepee Ck (Untreated)

	2009		2010	
	Tepee Ck IXL	Tepee Creek*	Tepee Ck IXL	Tepee Creek*
<b>Physical</b>				
Distance Sampled (ft)	1,090	5,740	1,090	5,740
Total Area Sampled (ft <sup>2</sup> )	9,047	47,642	9,047	47,642
% of Total Area Sampled (ft <sup>2</sup> )	16	84	16	84
<b>Density</b>				
Total # Tagged	154	396	175	258
% of Total # of Fish Tagged	28.0%	72.0%	40.4%	59.6%
Fish Abundance per 1000 ft <sup>2</sup>	17.0	8.3	19.3	5.4
<b>Site Fidelity</b>				
Total Fish Recaptures	12	15	-	-
% of Total # of Fish Recaptures	7.8	3.8	-	-
Fish Recaptures per 1000 ft <sup>2</sup>	1.3	0.3	-	-
<b>Out-migrants</b>				
Total Fish Detections (WC Array)	37	74	-	-
% of Total # of Fish Detected	24.0	18.7	-	-
Fish Detections per 1000 ft <sup>2</sup>	4.1	1.5	-	-

\* Consists of 7 pooled sites exclusive of the Tepee IXL treated reach



## Tepee Ck Restoration – Phase 2

Tepee Creek Restoration – Phase 2 applies the same approach as the Tepee Ck/IXL Meadows Project over a 4,500' reach.

### Food Web Design

- BACI design (before-after-control-impact)
- Within-year sampling (Spring, Summer, Fall)
- Five year study
  - 1 year pre-treatment sampling (Fall 2009 - Fall 2010)
  - 1 year of treatment - no sampling (2011)
  - 3 years post-treatment sampling (2012-2014)

