

Juvenile Salmon Ecology and Restoration of Tidal Freshwater Habitats

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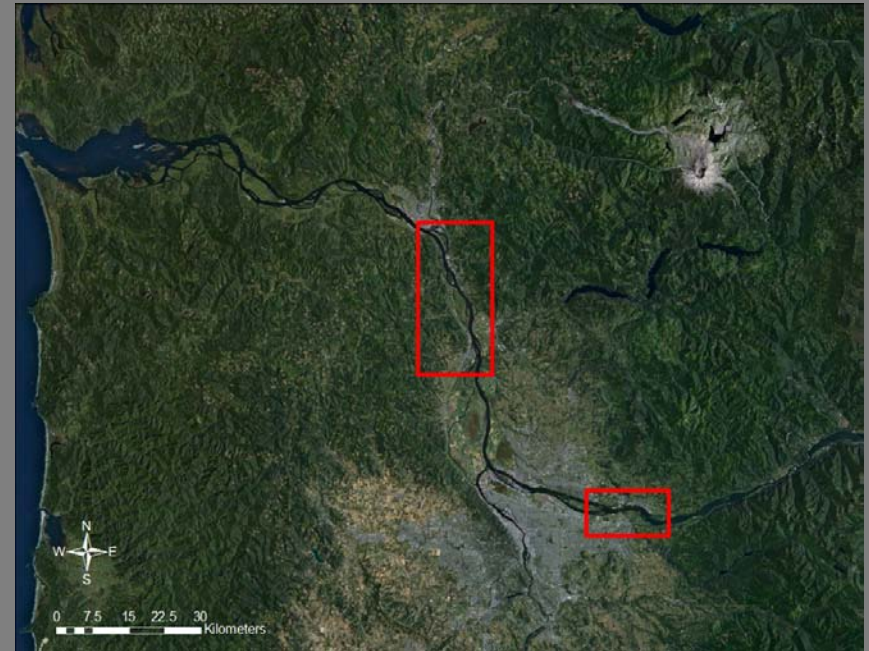
⁴University of Washington



Proudly Operated by Battelle Since 1965

Overview

- ▶ Background
- ▶ Trends from SRD
- ▶ Landscape scale comparison
 - Fish community
 - Environmental Covariates
- ▶ Ecosystem-based research
- ▶ Implications for ecosystem restoration



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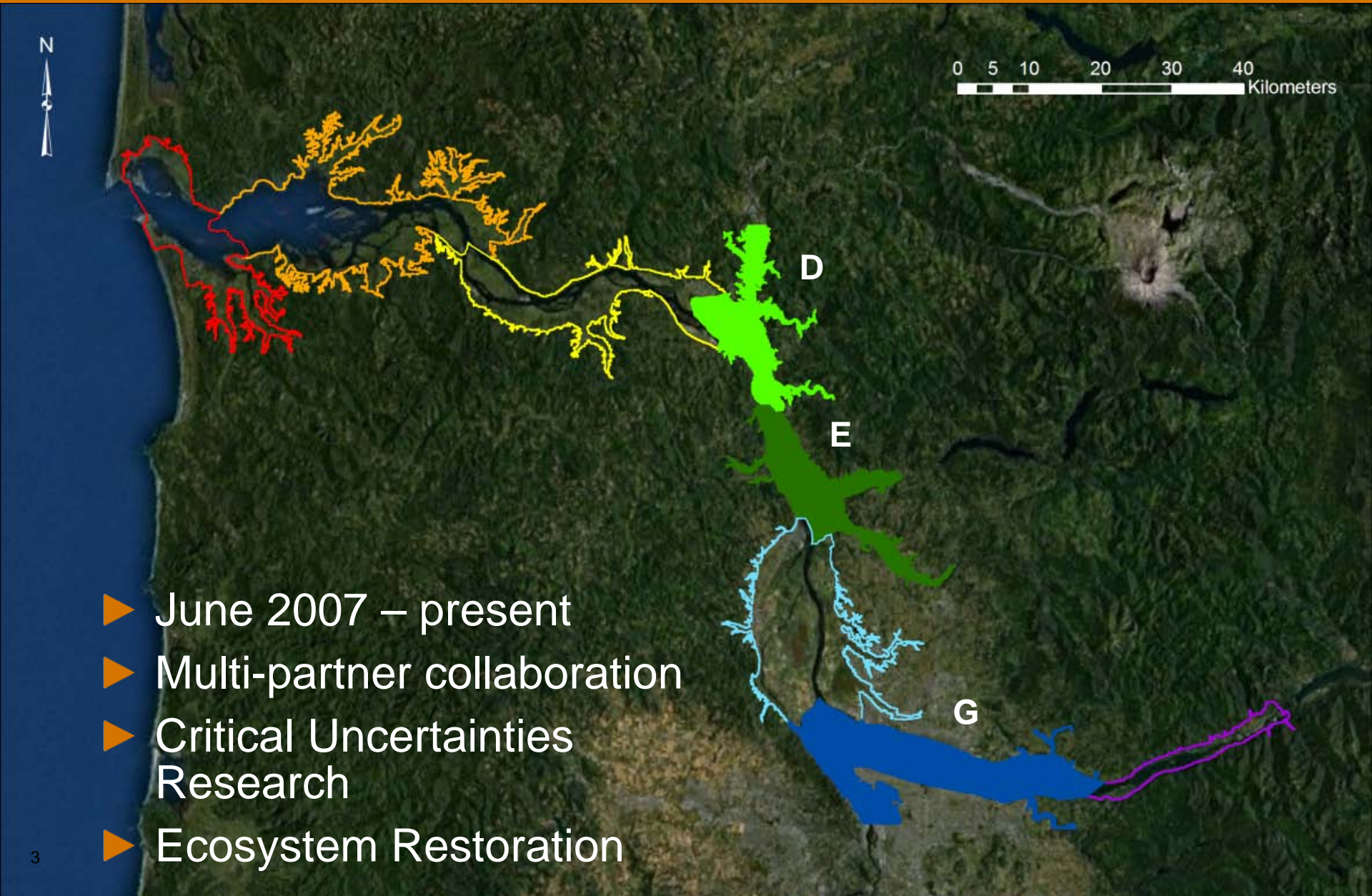
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Project Background



0 5 10 20 30 40 Kilometers

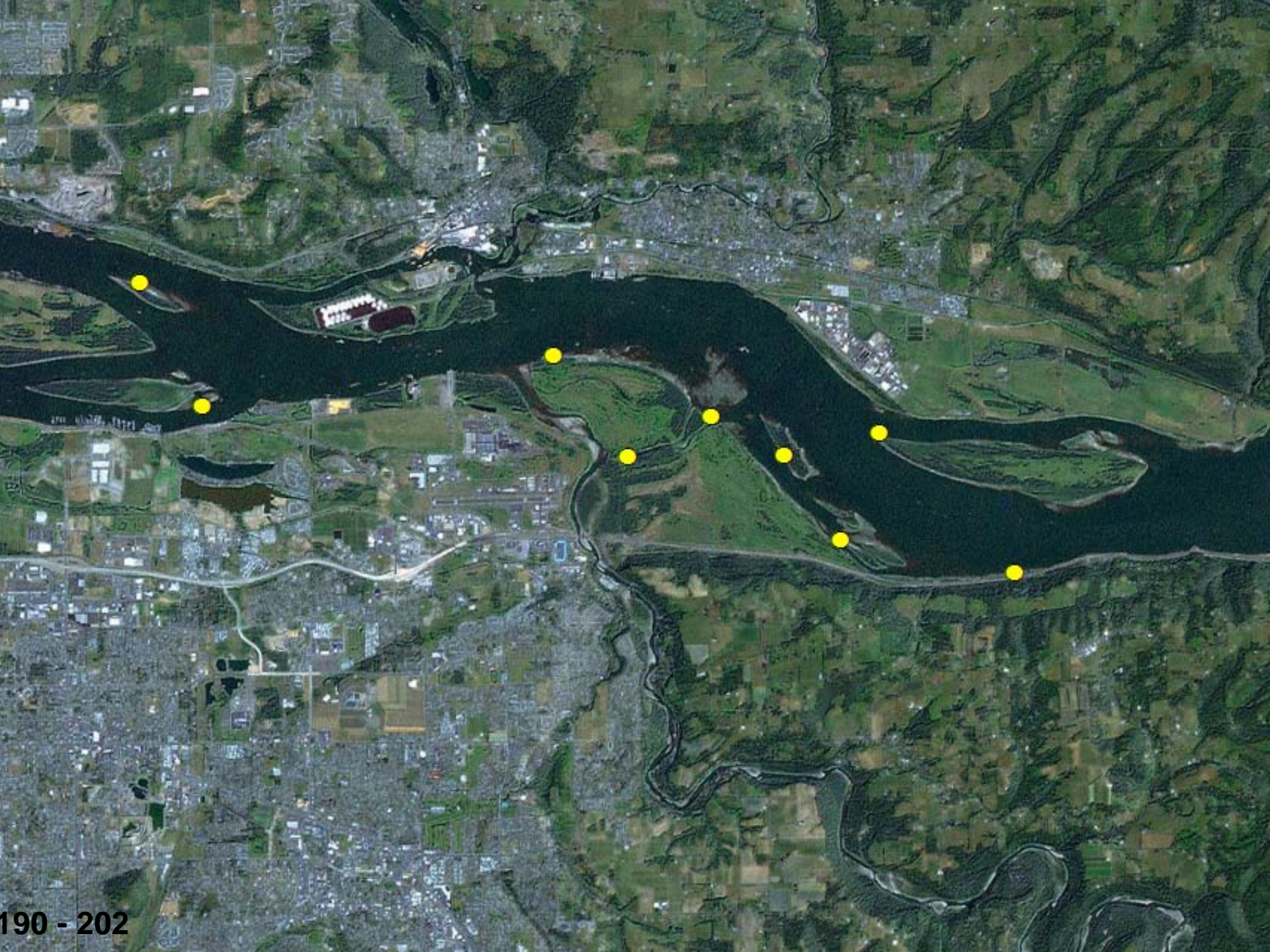
- ▶ June 2007 – present
- ▶ Multi-partner collaboration
- ▶ Critical Uncertainties Research
- ▶ Ecosystem Restoration



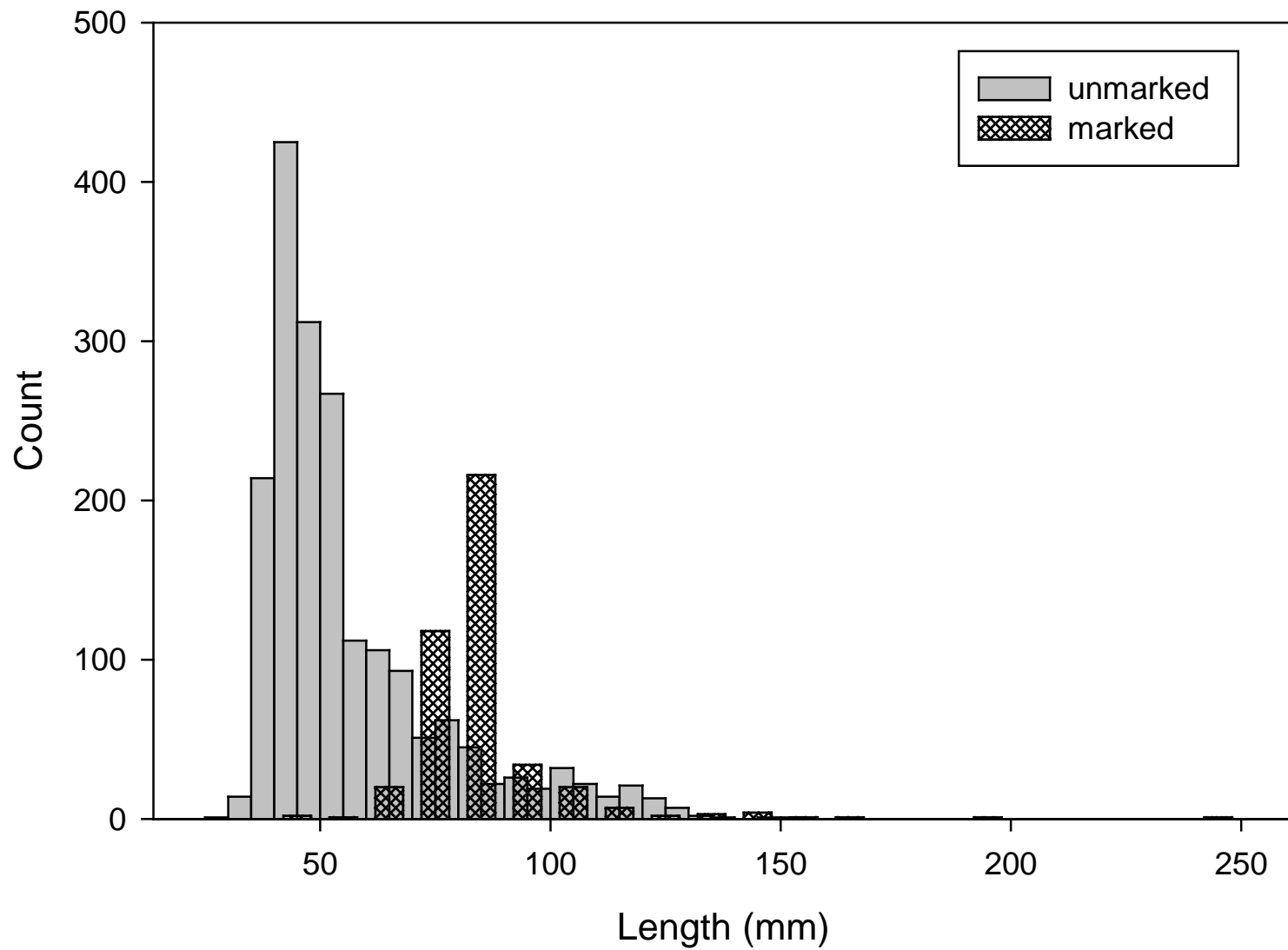
Research Goals for Tidal Freshwater

- ▶ Determine the types of habitats within the LCRE where juvenile salmon are found, when are they present, and under what environmental conditions?
- ▶ What is the ecological contribution these habitats to the recovery of ESA-listed salmon in the Columbia Basin?

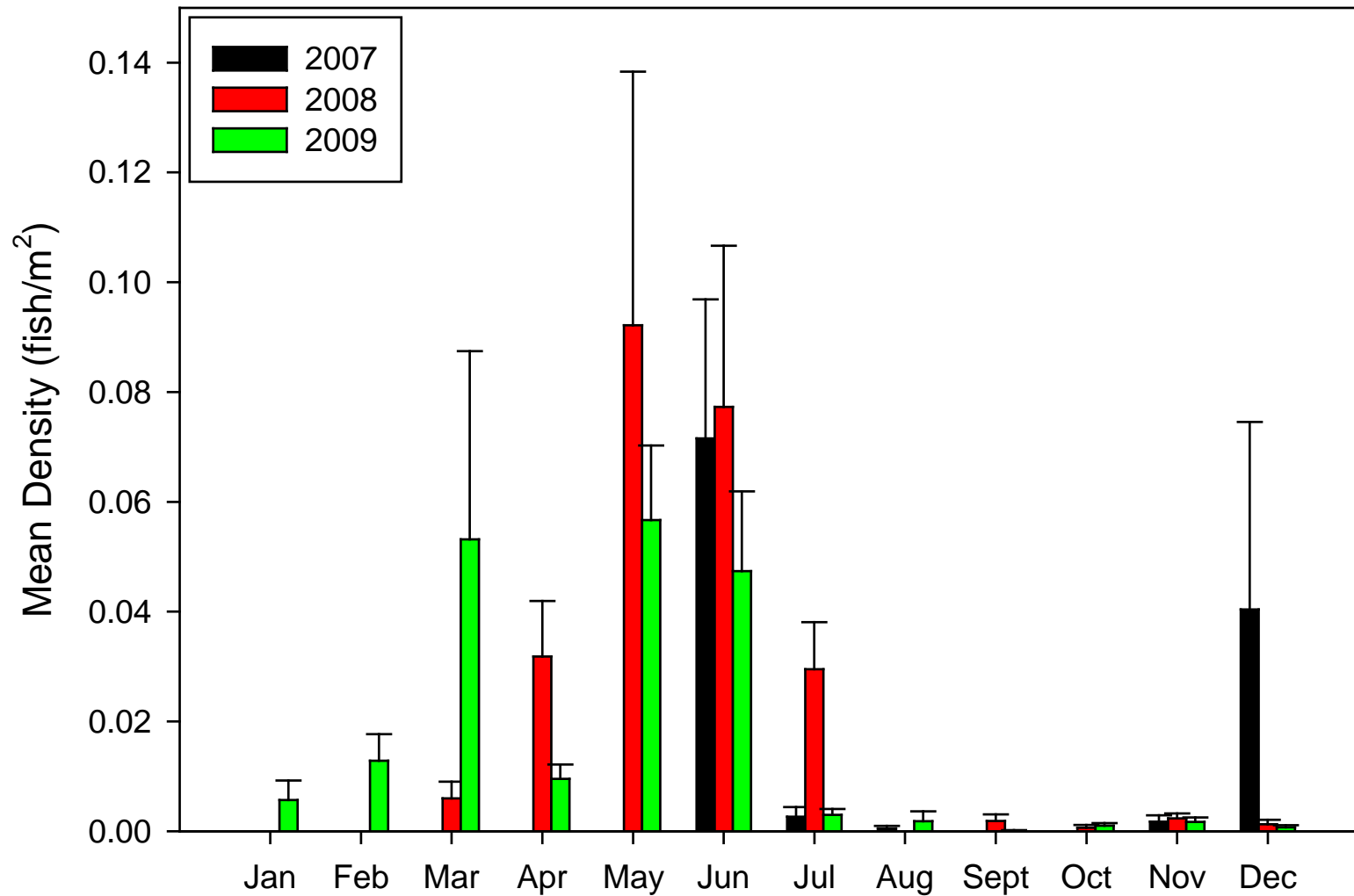




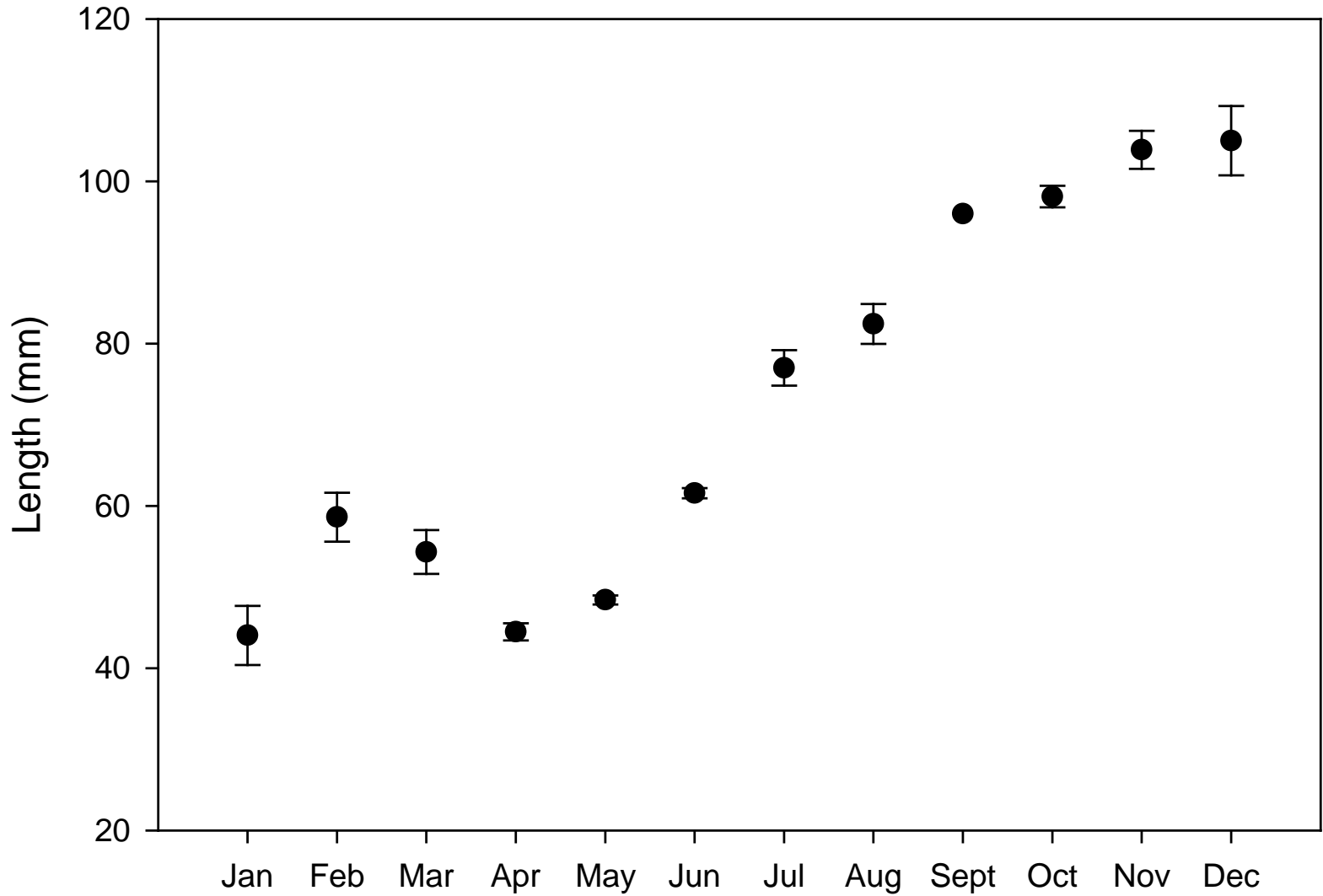
Chinook Salmon - 2009

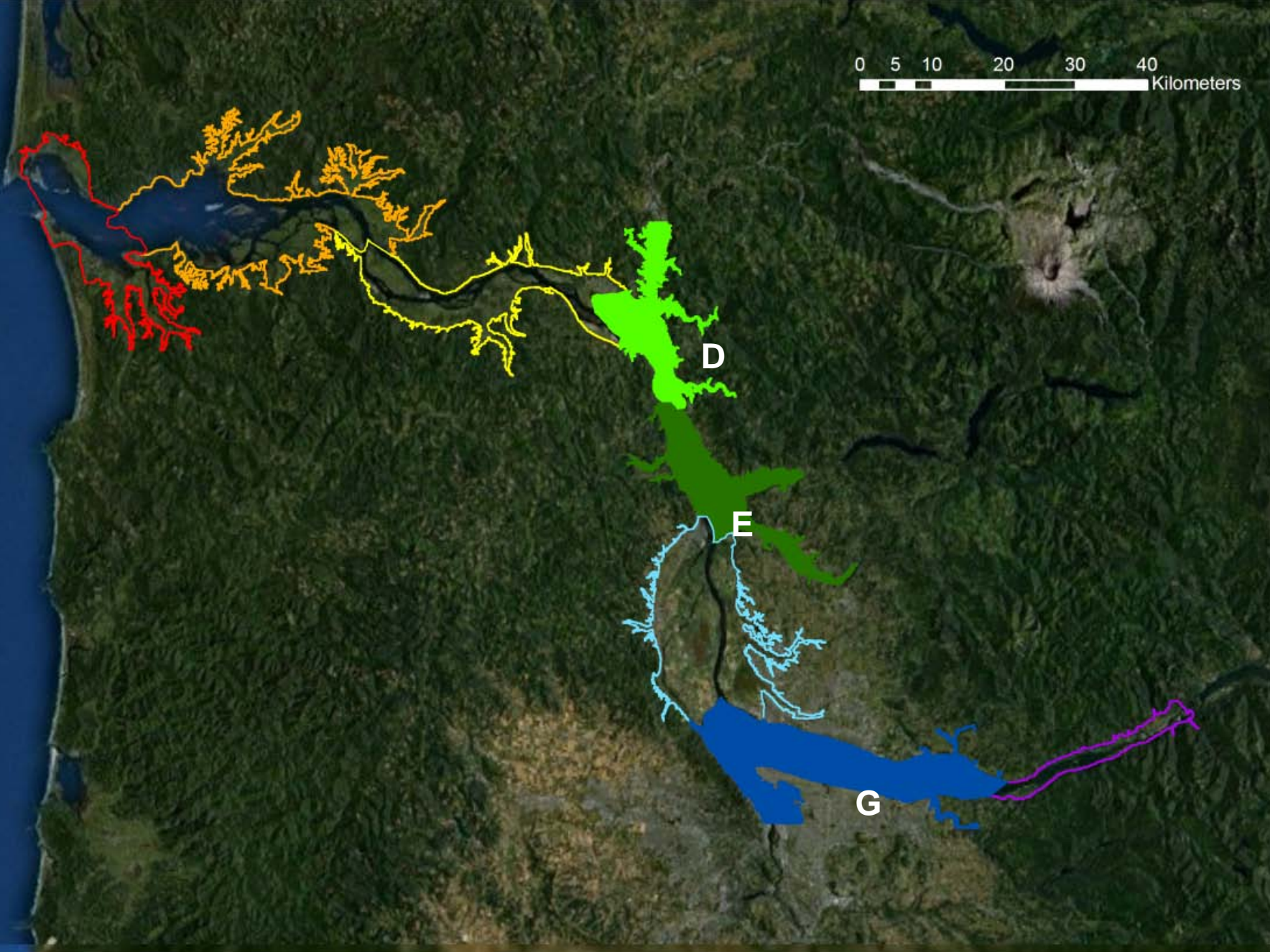
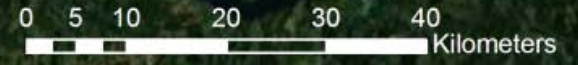


Unmarked Chinook Salmon

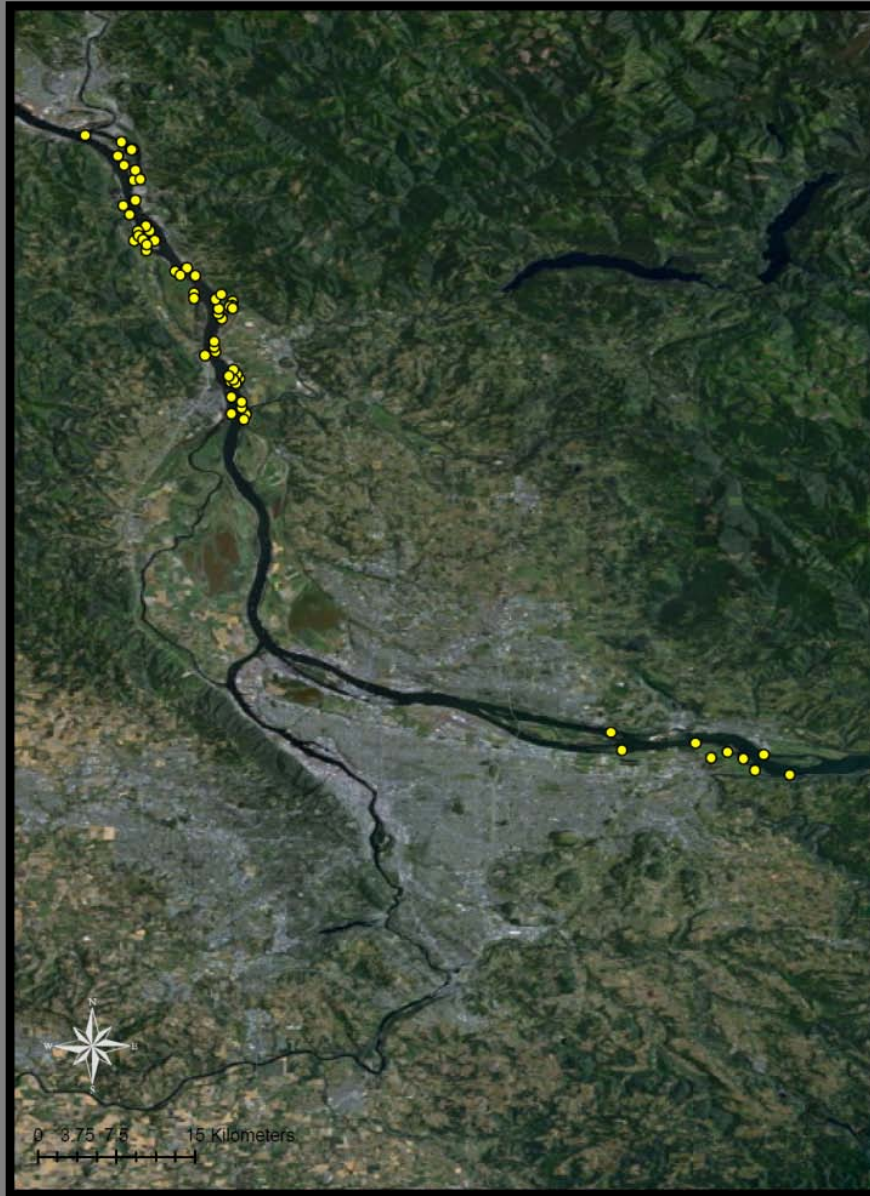


Unmarked Chinook Salmon - 2009



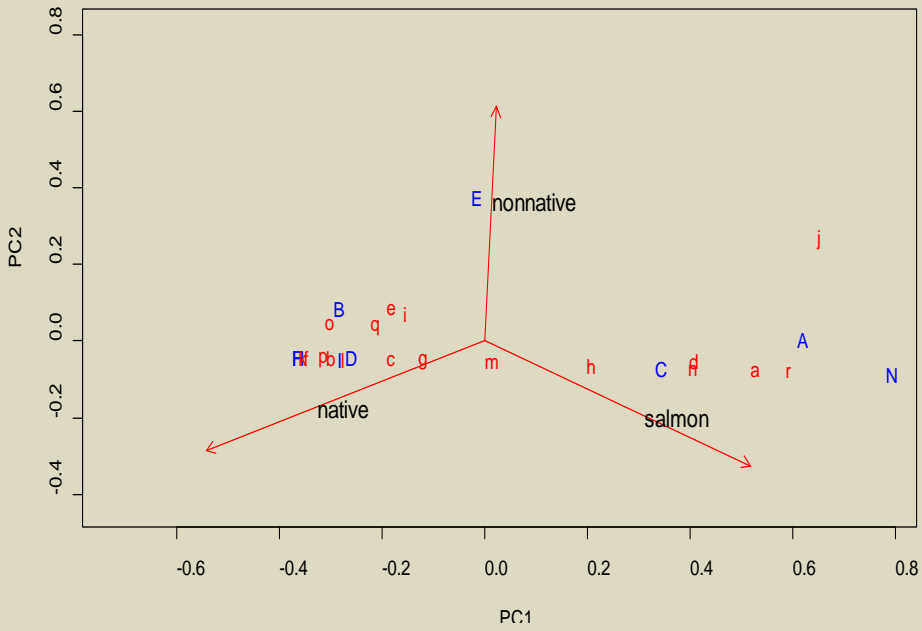


Landscape Scale Patterns

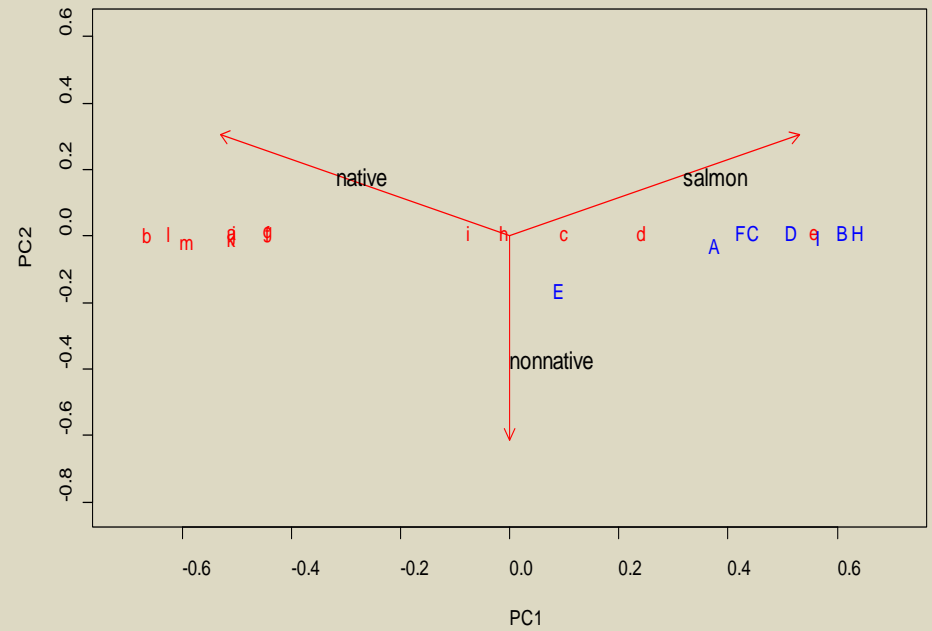


- ▶ 2009-2010
 - Jan, Feb, May Aug, Nov, Feb
- ▶ Random Stratified Sampling
 - Cowlitz to Lewis
 - RKM 109-141
- ▶ Principal component analysis (PCA)
- ▶ Analysis of Distance (ANODIS)

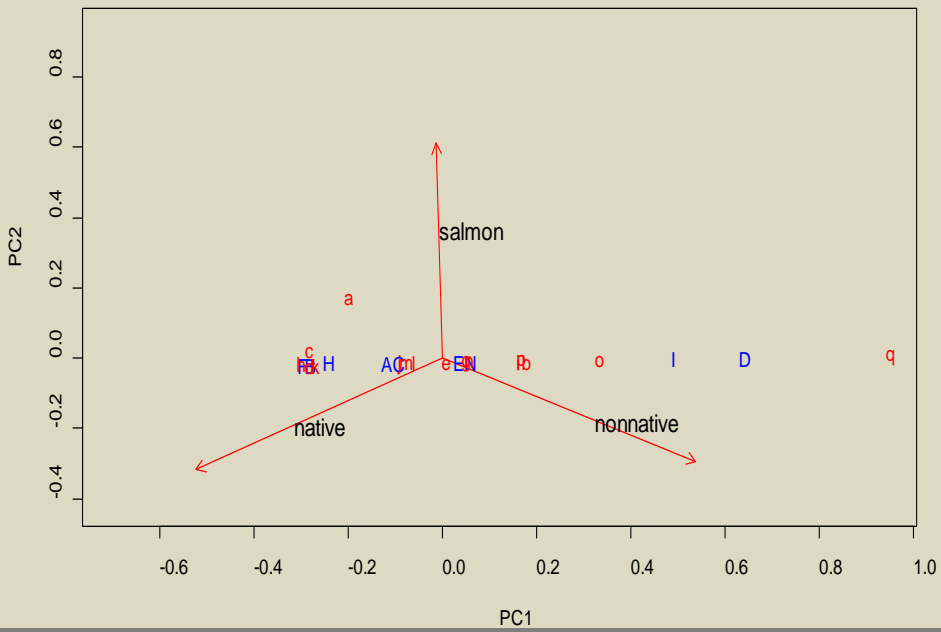
February 2009



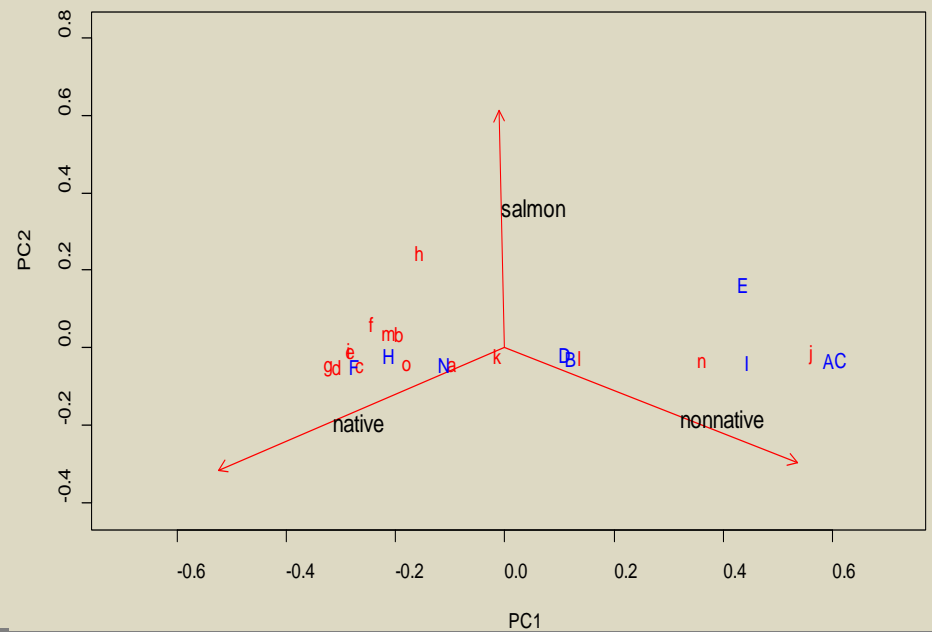
May 2009



August 2009



November 2009



Covariates and Fish Communities

► Metrics

- Temperature
- DO
- Salinity
- Velocity
- Habitat strata
- Beach slope
- Water depth
- vegetation



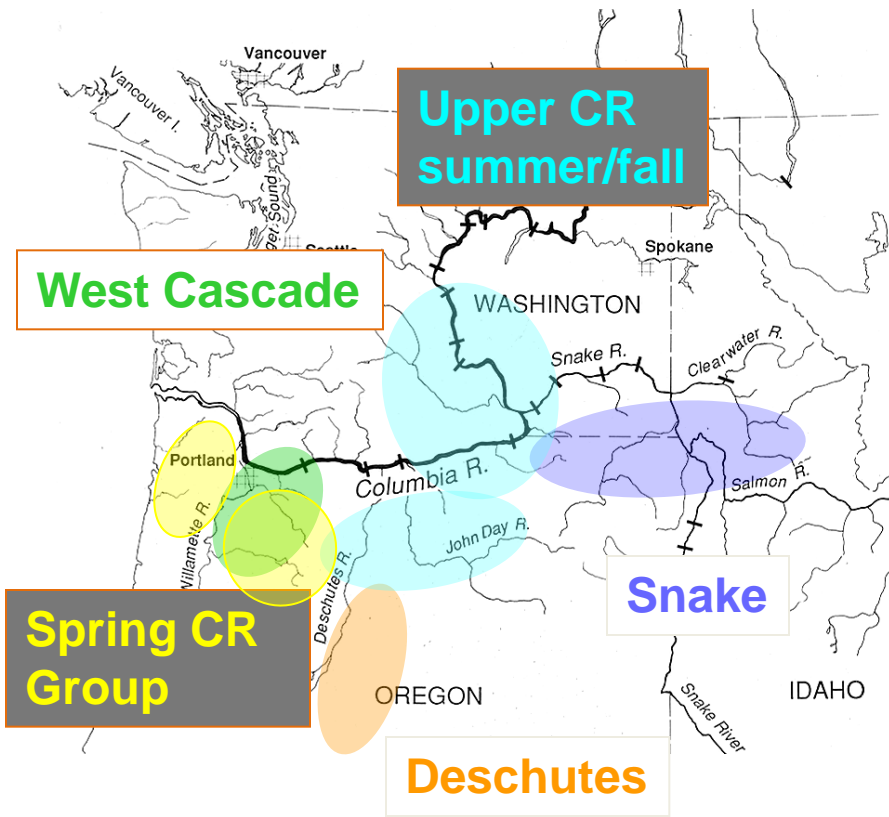
► Variation

Prey and Diet

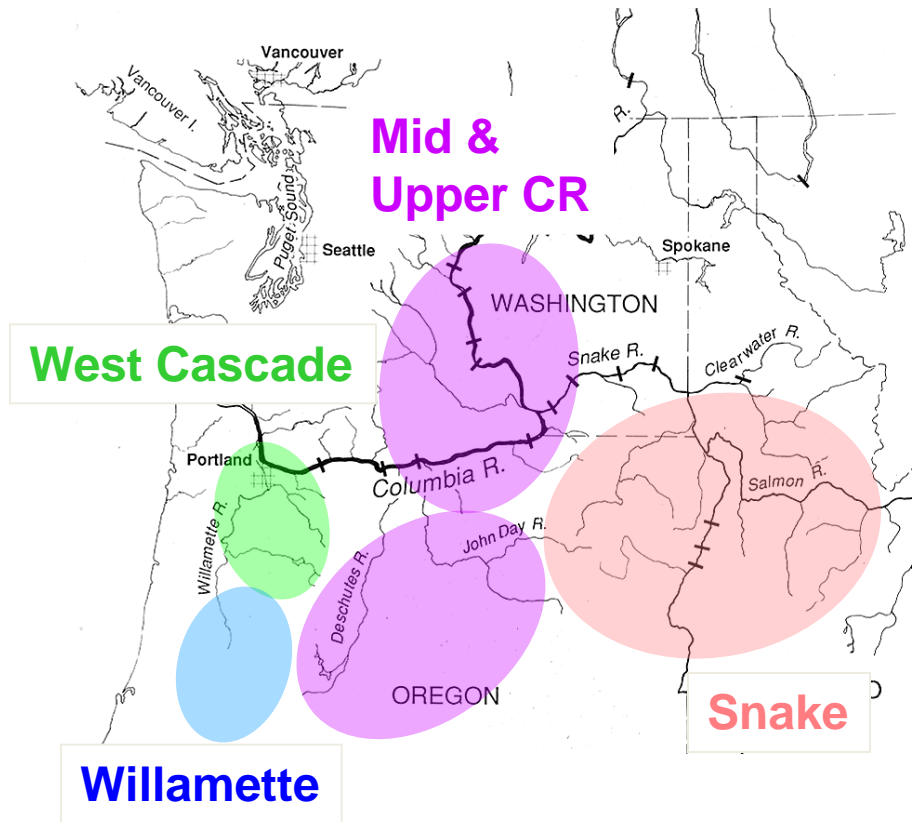


Columbia River Basin Chinook Salmon Genetic Stock Groups Resolved with GAPS Microsatellite Loci

Fall Run

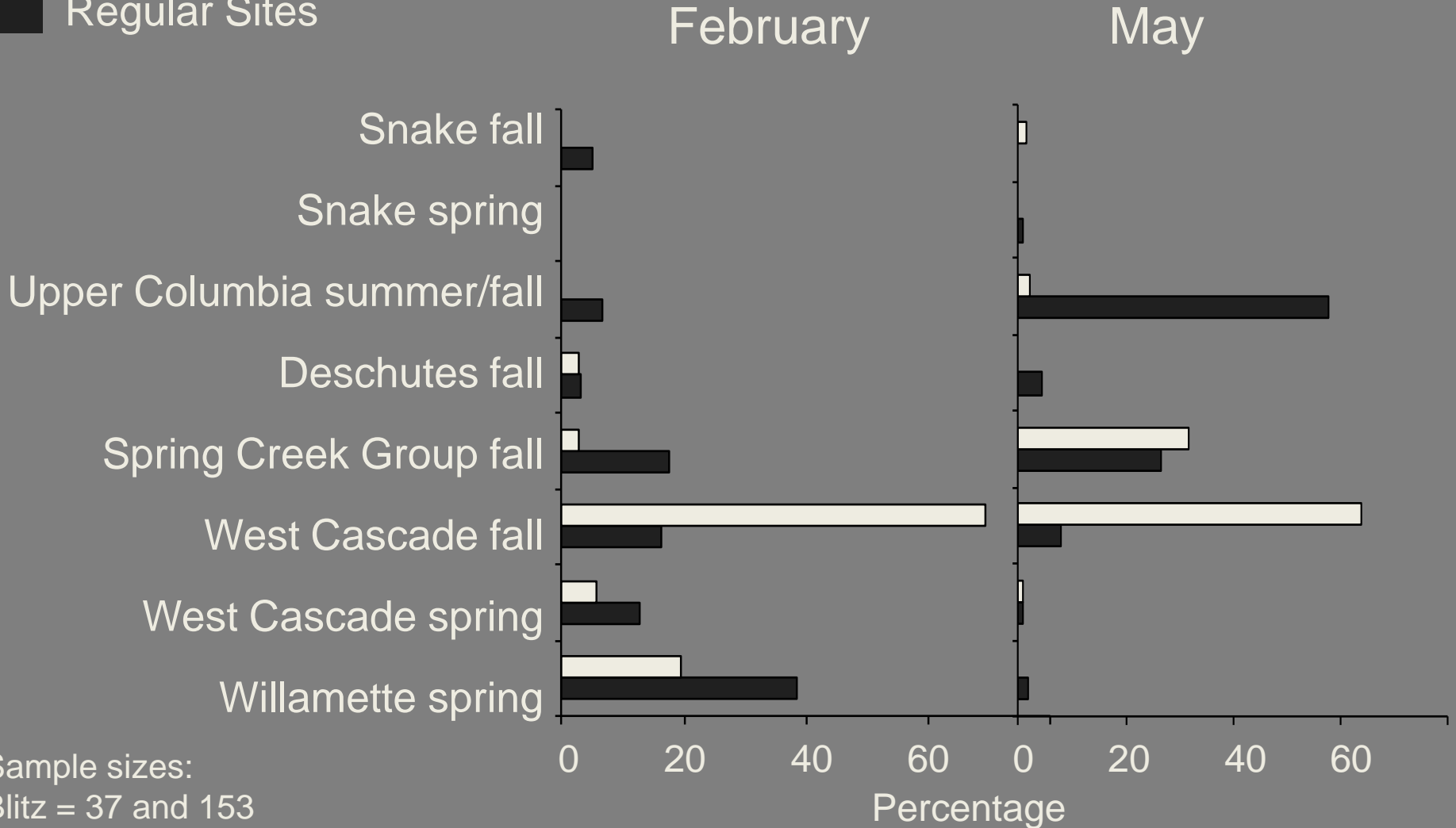


Spring Run



Chinook Salmon Genetic Stock Composition

Blitz Sites
Regular Sites

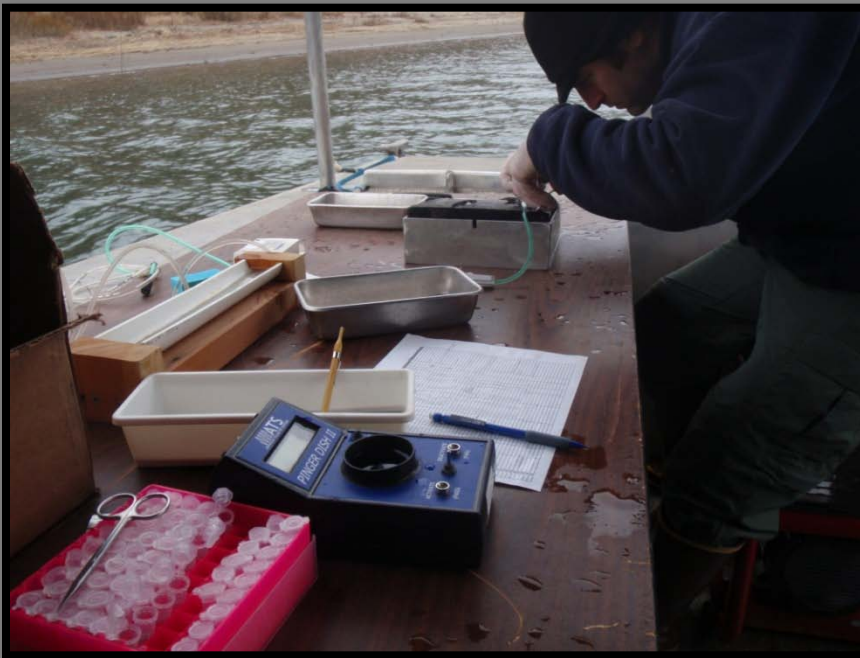
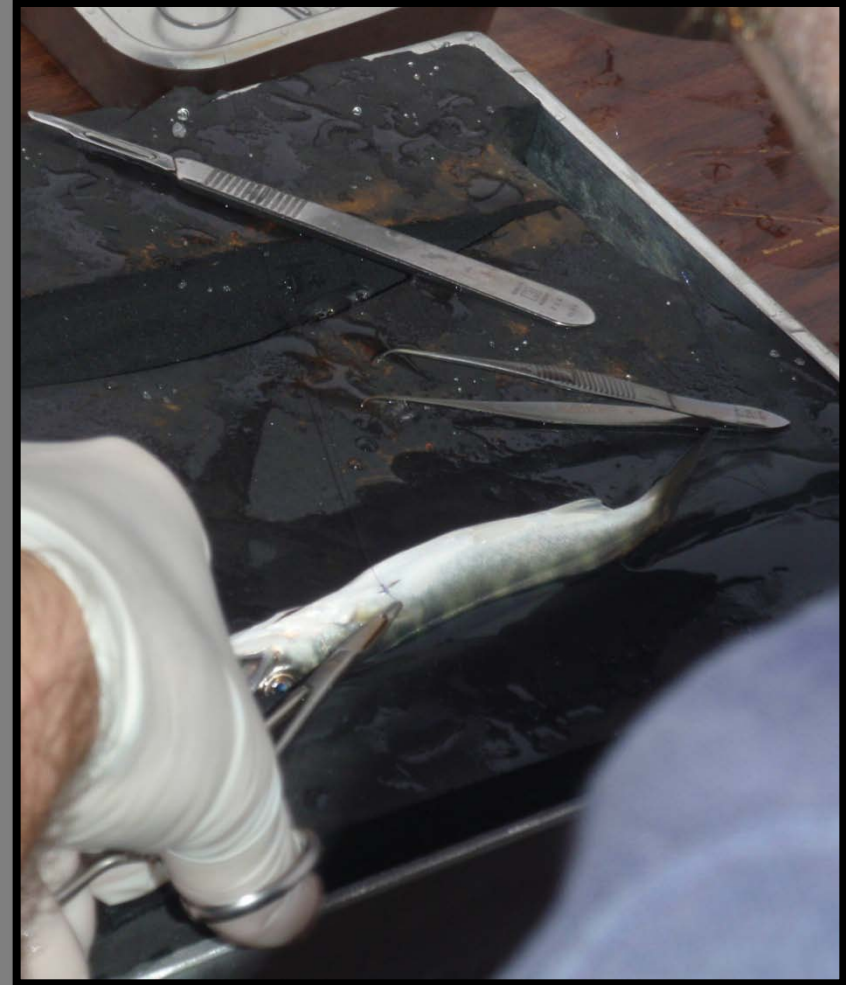


Sample sizes:

Blitz = 37 and 153

Regular = 25 and 110

Over-wintering residence time



Continued Work & Research

- ▶ Synthesis report; 2010
- ▶ Empirically based monitoring design for AE
- ▶ Genetic analysis
- ▶ Diet & Prey Resources
 - Salmon
 - native and non-native species.



Ecosystem Restoration

- ▶ Sizes
- ▶ Genetic Stock Composition
- ▶ Habitats
- ▶ Variation



Acknowledgements

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