

Channel and Habitat Monitoring in the Countyline Reach of the Lower White River

Presented by Sarah McCarthy and Terry Butler

River and Floodplain Management Section
King County Water and Land Resources Division

November 01, 2012
King County Science Seminar



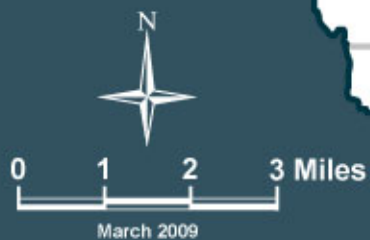
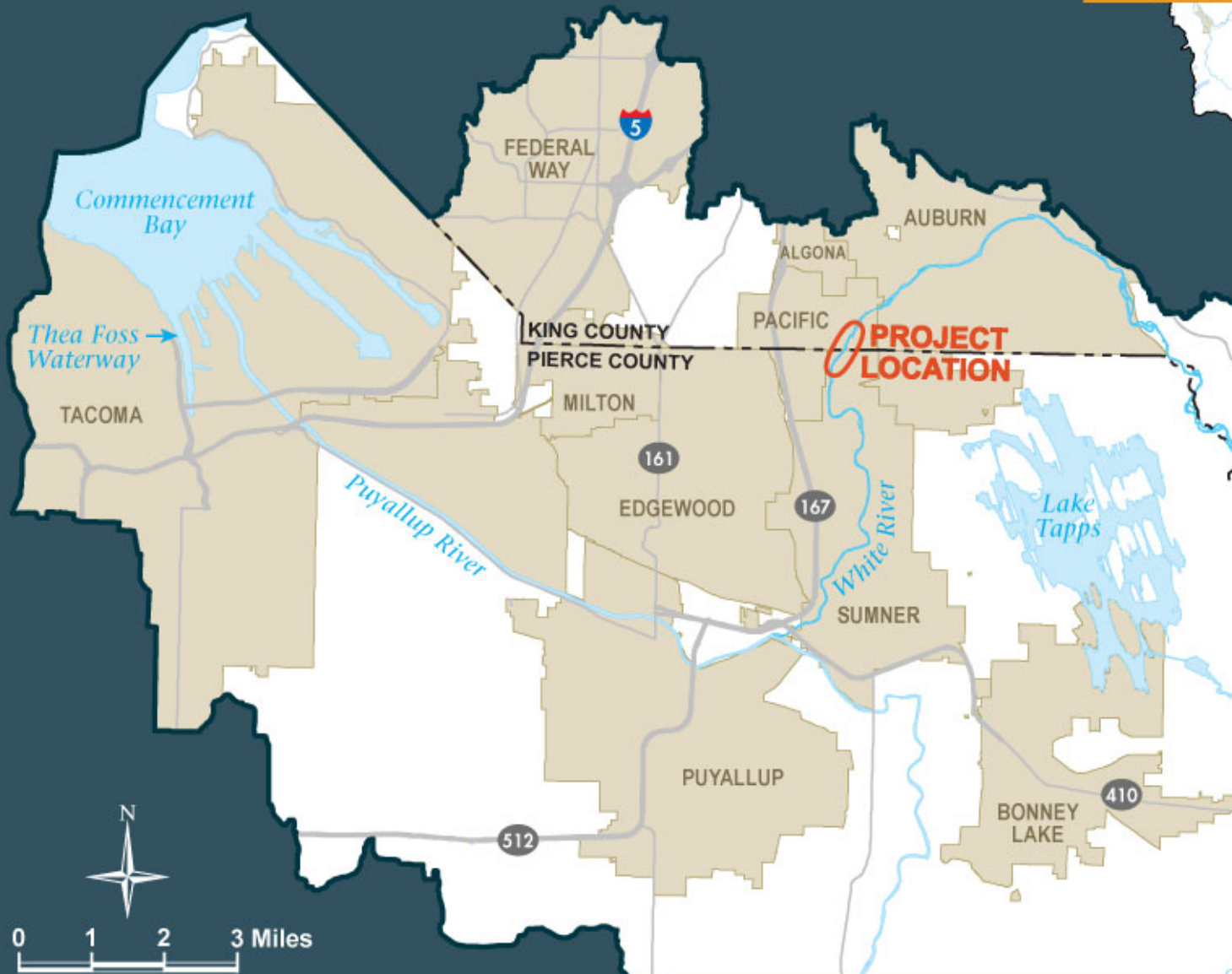


Vicinity Map

FOCUS AREA



WRIA 10
White/Puyallup
Watershed



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Conceptual Design

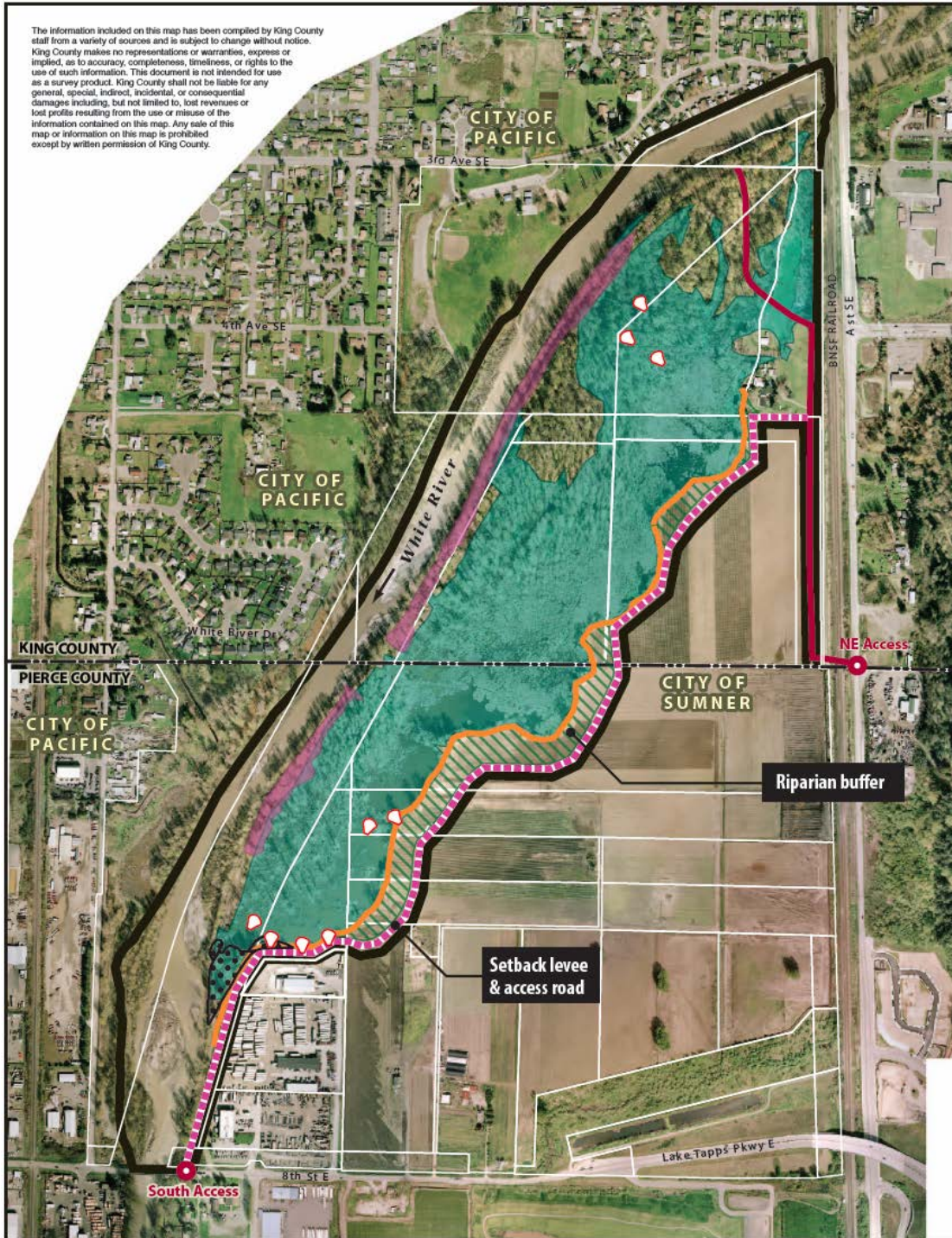
WHITE RIVER (COUNTYLINE) LEVEE SETBACK PROJECT

DRAFT (August 2012)



King County

Department of Natural Resources and Parks
Water and Land Resources Division
River and Floodplain Management Section



- Project Ingress/Egress
- Engineered Log Structure
- Setback Levee & Access Road
- Access Road
- Bioengineered Retention
- Project Area Boundary
- Parcel of Interest
- Wetland
- Retention & Levee Removal
- Planting Plan Area
- Culvert Removal, Outlet Channel & Fill Removal

Monitoring Questions

Have the projects:

1. Met the design specifications?
2. Improved riverine processes and functions?
3. Reduced or maintained current levels of flood risk?
4. Reduced the need for remedial actions?

Implementation
Monitoring

Project
Effectiveness
Monitoring

Project Effectiveness Monitoring Categories

- Channel Dynamics
- Aquatic Habitat
- Riparian Processes
- Fish & Amphibians
- Flood Risk





Aquatic Habitat Monitoring

Hypothesis	Monitoring Objective
AH1: The area of slow-water rearing habitat will increase.	Map slow water edge habitat (<1.5 ft/sec).

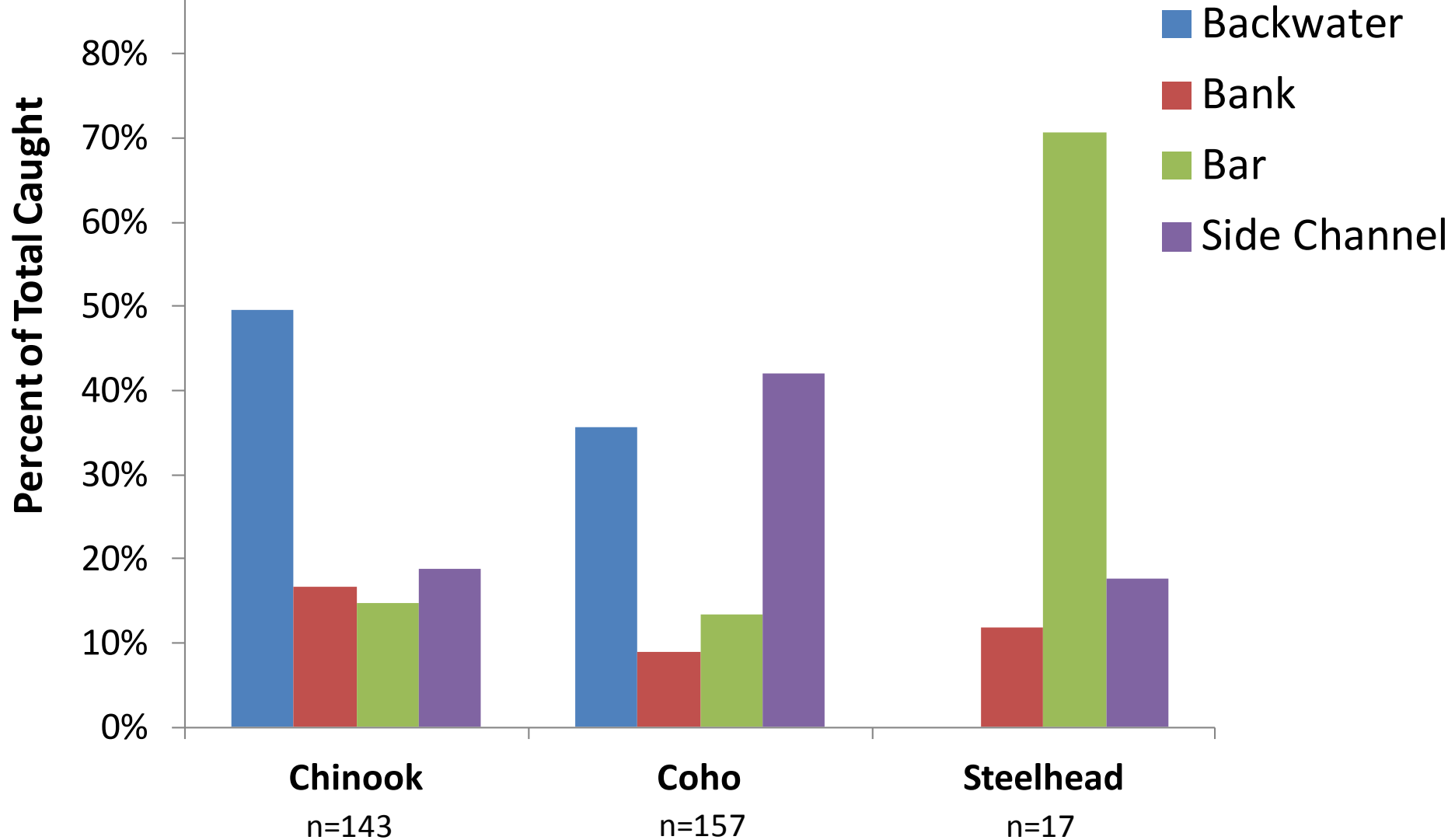
Aquatic Habitat Monitoring



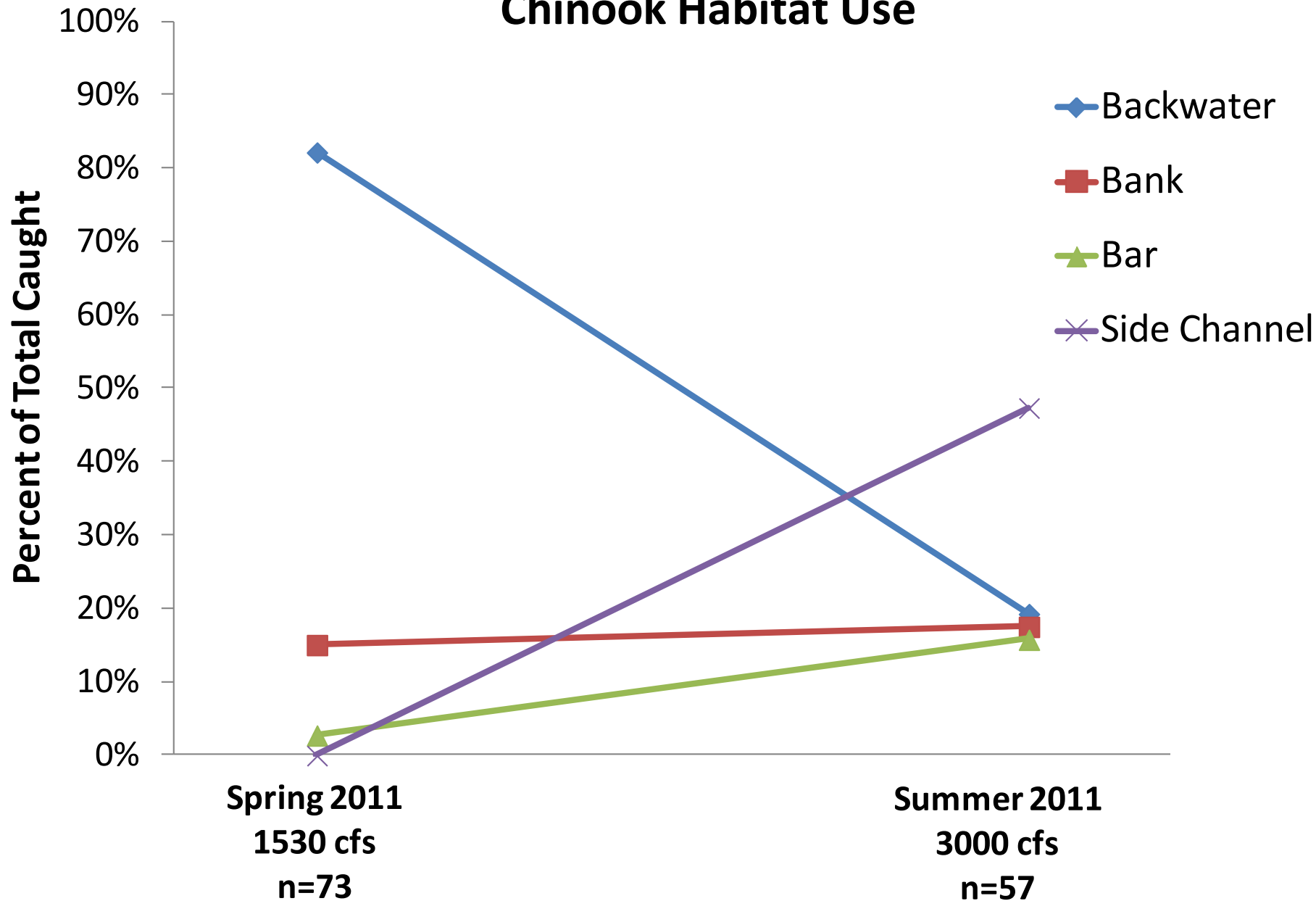
Fish Monitoring

Hypothesis	Monitoring Objective
FA1: Juvenile salmonids will occupy low velocity rearing habitats resulting from floodplain reconnection actions. Density will increase proportional to habitat availability.	Map habitat types and conduct fish surveys.

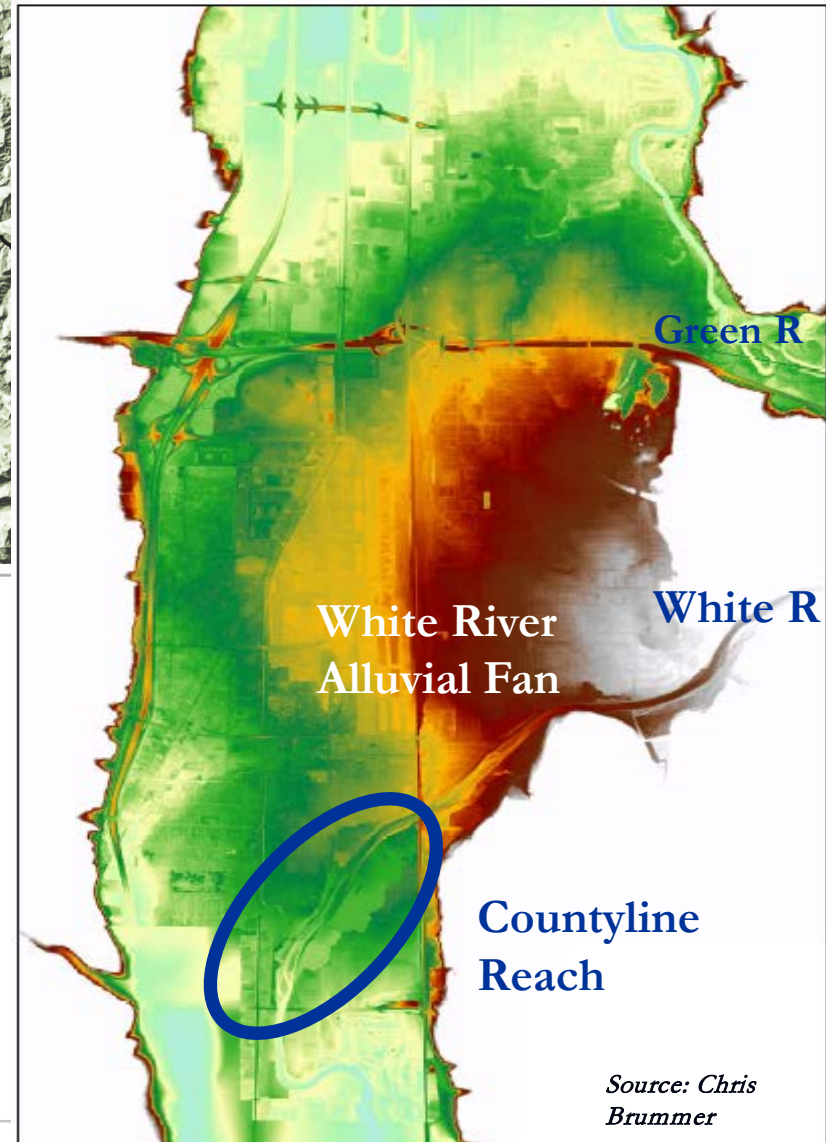
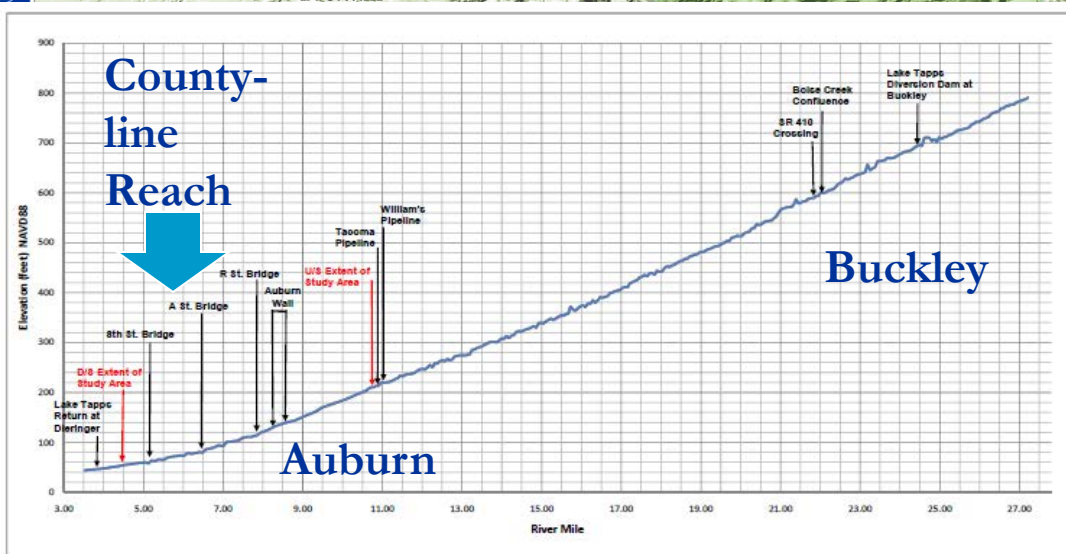
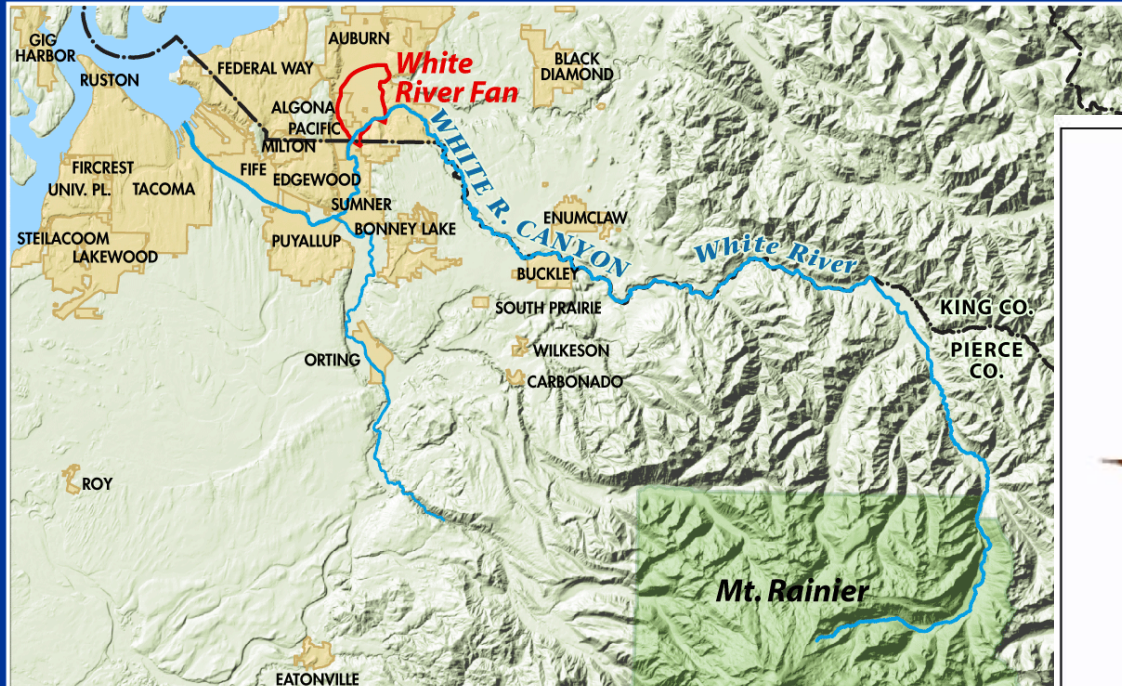
Juvenile Salmonid Habitat Use (All Seasons)



Chinook Habitat Use



White River Setting



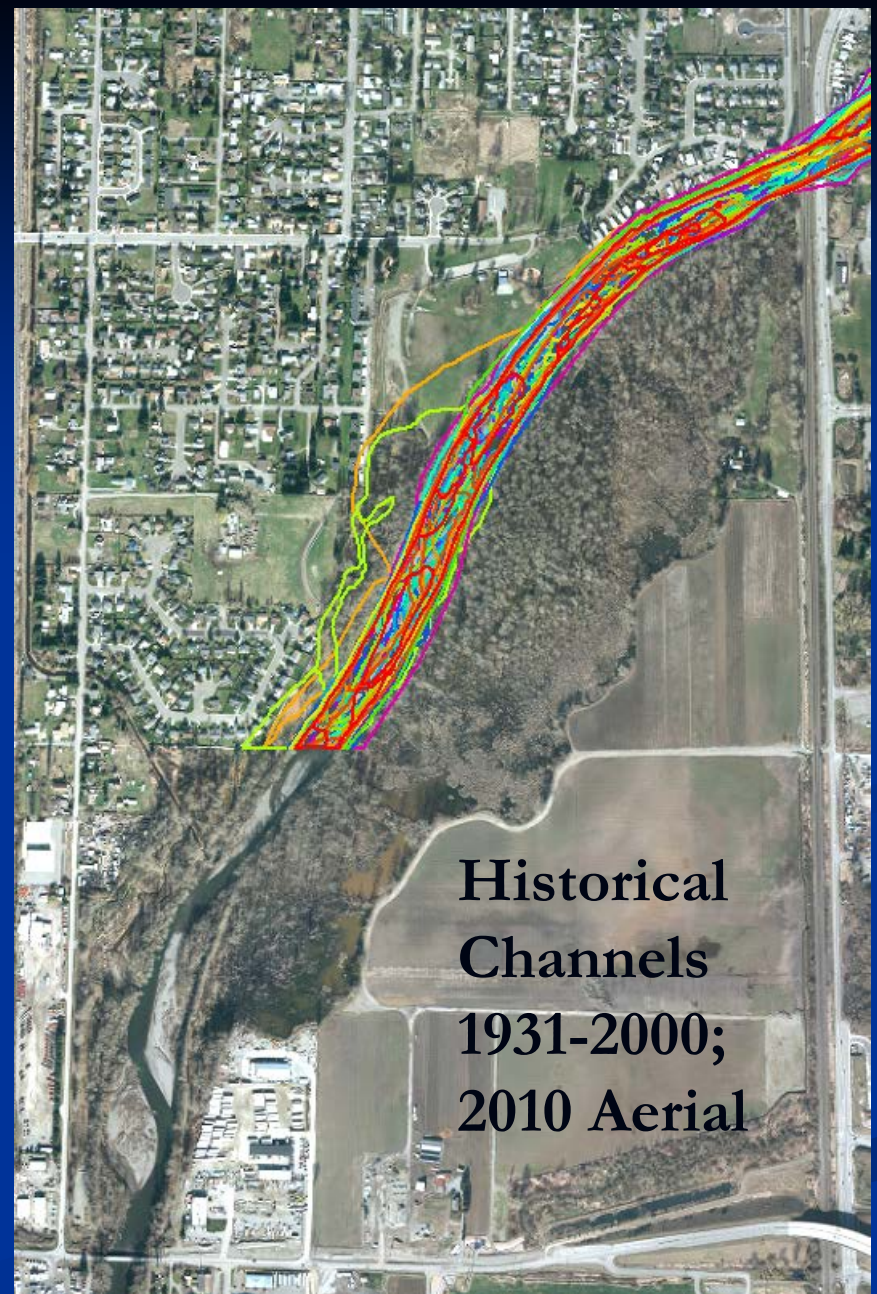
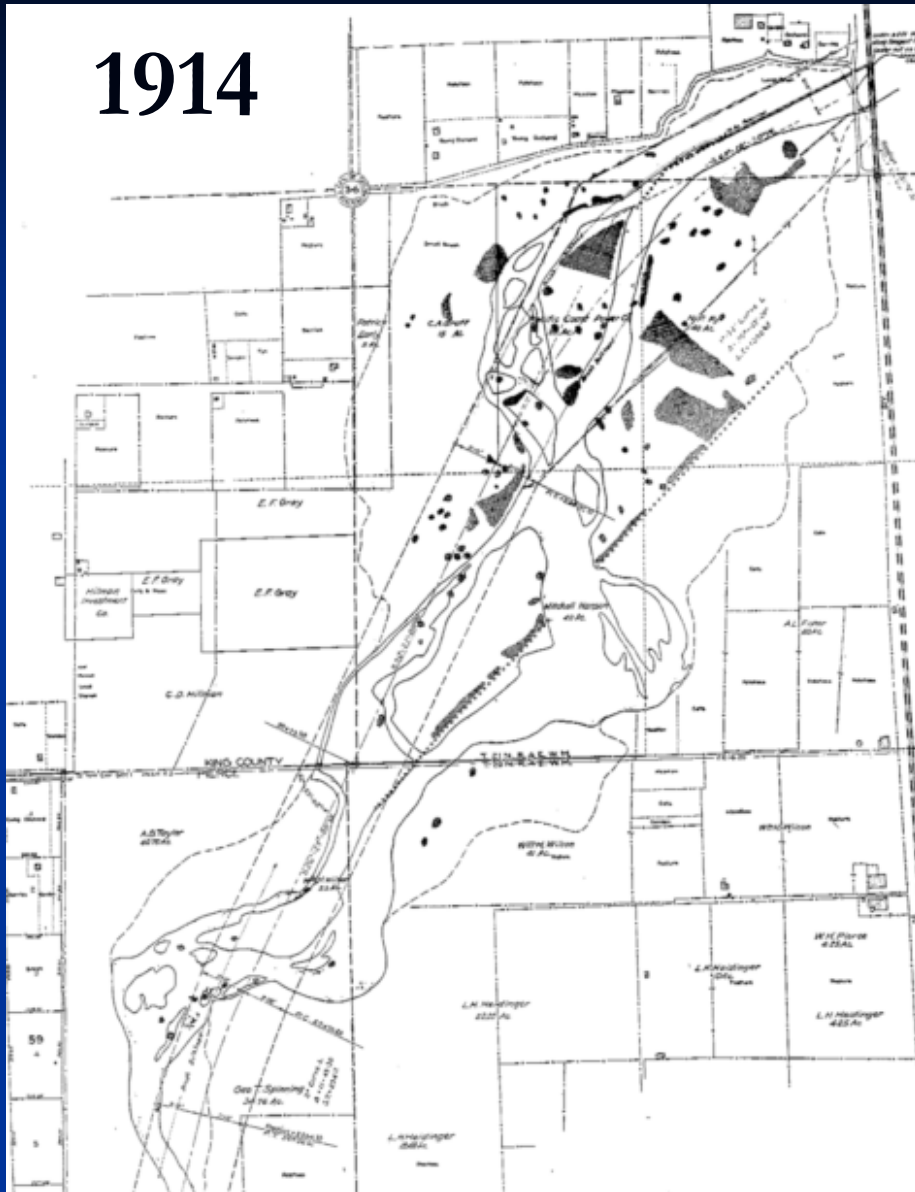
Source: Chris Brummer

Figure 3. Longitudinal profile of the White River from RM 27.2 to 3.5 (adapted from Herrera 2005, Collins 2009, and King County 2009b).

Channel Dynamics

Hypothesis	Monitoring Objective
CD1: Channel meandering will increase.	Analyze channel movement using digital airphotos.

1914



Historical
Channels
1931-2000;
2010 Aerial

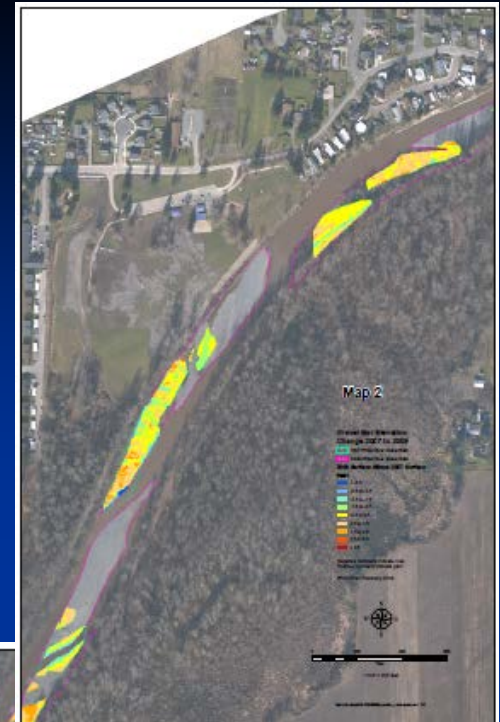
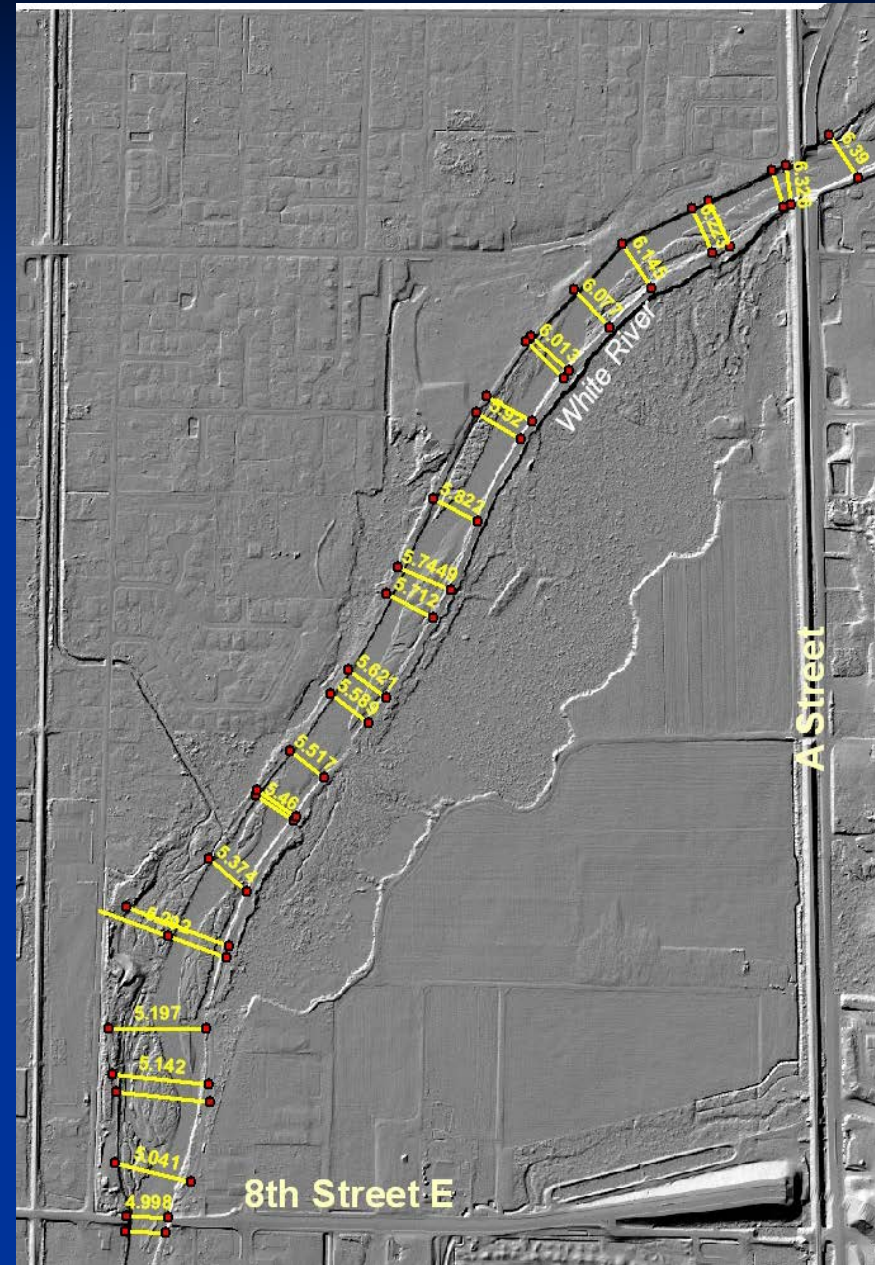
Countyline Channel 1914 to Present

This aerial map illustrates the White River project area, spanning the border between Pierce County and King County, Washington. The river is shown in light blue, with various restoration features highlighted in green and red. Key features include a 'Narrowed active channel' near the top left, a 'Deep incised pool' near the bottom left, and 'Forested islands' and 'Forested bench' areas. A 'Levee' is also indicated. The 'Right Bank Project Site' and 'Countyline Project Site' are marked along the river. The 'City of Puyallup' is visible in the upper right. The map includes a scale bar (0 to 0.5 miles) and a north arrow.

Channel Dynamics

Hypothesis	Monitoring Objective
CD2: Stream and floodplain heterogeneity will increase.	Map elevation changes using LiDAR and cross section surveys.

LiDAR Imagery, Cross Sections



Change in
Gravel Bar
Elevations
(2007-09) by
Comparison
of DEMs

Channel Dynamics

Hypothesis	Monitoring Objective
CD3: Distribution of spawning sediments may shift but the overall extent will not decline.	Quantify and map longitudinal changes in substrate particle size distributions.

Substrate Particle Size Distributions



24 Channel-Conveyance, Channel Change, Sediment Transport, Lower Puyallup, White, and Carbon Rivers, Washington

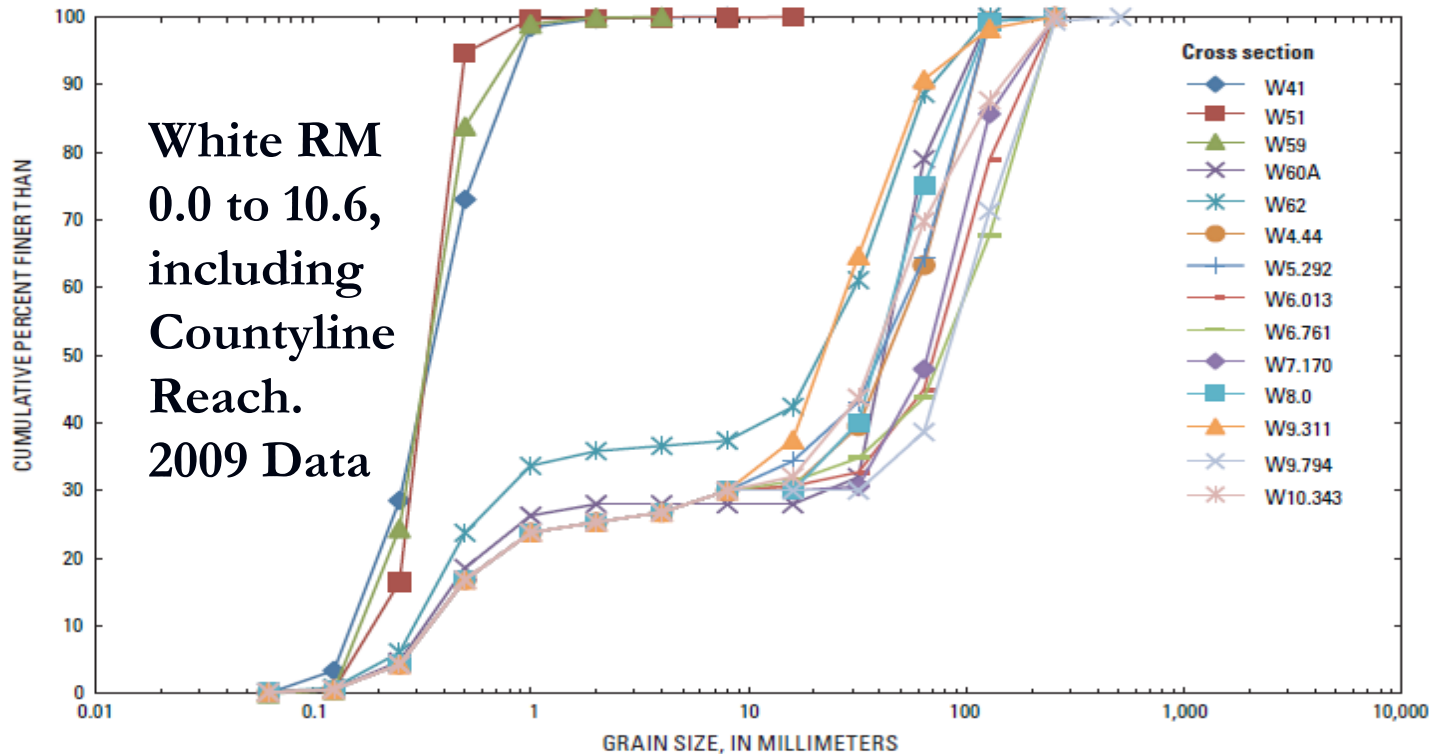


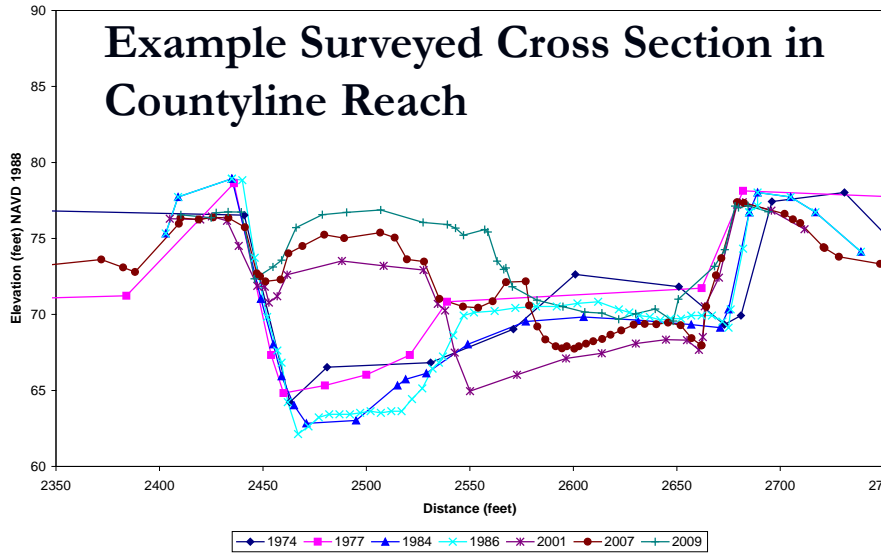
Figure 15. Bed-material grain-size distributions for the White River, western Washington.

Source:
Czuba et al.
(2010)

Flood Risk

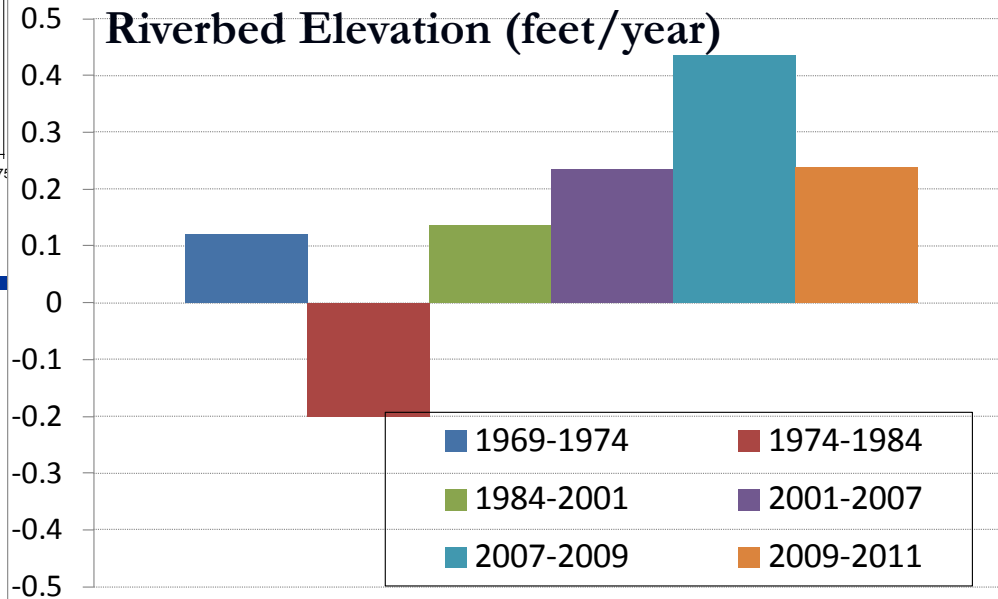
Hypothesis	Monitoring Objective
FR2: Flood risk outside of the project area has decreased or remained the same.	... Survey channel cross sections, calculate changes in sediment volume and rates of deposition, and model changes in flood surface elevations.

Example Surveyed Cross Section in Countyline Reach



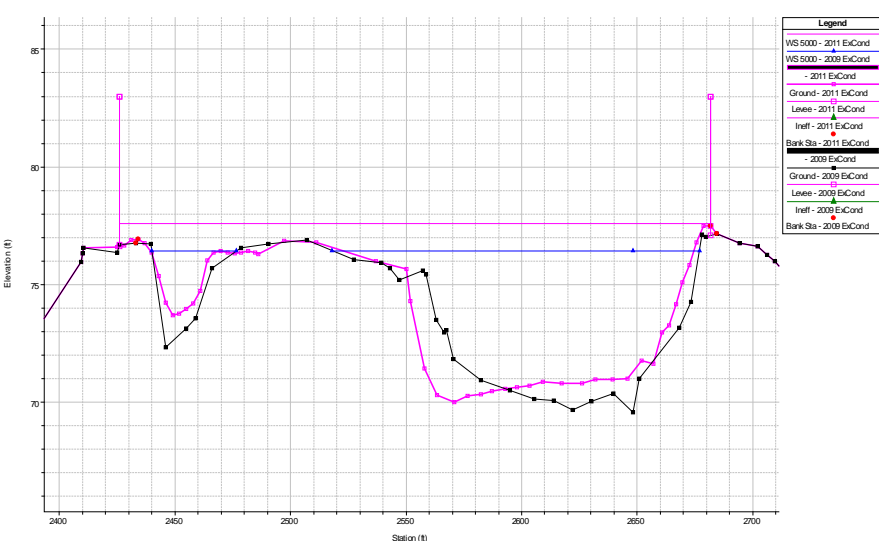
Cross Section Data: Volumes, Rates and Elevation Calculations

Reach-Averaged Rate of Change in Riverbed Elevation (feet/year)



Change in Water Surface Elevation, 2009 to 2011, at 5000 cfs

2011 Lower White River HECRAS Gravel Plan: 1) 2009 ExCond 2) 2011 ExCond
RS = 5.621 River Station 29678.17 ft



Hydraulic Modeling In 1-D HEC-RAS

Monitoring Schedule

Monitoring Category	Pre-Project Monitoring (2011-2014)	Construction & Implementation Monitoring (2014-2016)	Post-Project Monitoring: Years 1, 3, 5, 10 (2016-2025)
Project Implementation (Left and Right Banks)		X	
Channel Dynamics	X		X
Aquatic Habitat	X		X
Riparian Processes	X		X
Fish & Amphibians	X		X
Flood Risk	X		X

Acknowledgements

Monitoring Plan Authors:

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