Restoration Effectiveness Monitoring in the Columbia River Estuary: 
Response in Fish Communities

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Who is monitoring restoration effectiveness for fish in the CRE?

- EP Monitoring Matrix listed practitioners
  - NOAA, CREST, Watershed Councils, USACE, USGS, USFWS, PNNL, NRCS, Univ. Washington, BPA, EPA, CLT, BES and others.

- CREST performs multiple parameters at multiple sites based on:
  Monitoring Protocols for Salmon Habitat Restoration Projects in the Lower Columbia River and Estuary
  Roegner et al 2008
Who is CREST?

- **Special District (b. 1974)**
  - **Members**: Port of Astoria, Wahkiakum Port Dist. #2, Port of Peninsula, Port of Ilwaco, City of Seaside, City of Warrenton, City of Astoria, City of Ilwaco, Pacific County, Clatsop County, Wahkiakum County, Clatsop Soil & Water Dist.

- **Col. River Estuary Data Development Program (CREDDP)**

- **Current Services**:
  1. Coastal/Estuarine Planning
  2. Habitat Restoration
  3. Ecosystem Monitoring
CREST monitoring

- Grants vs. Contracts

- Who we employ:
  - Biologist/Ecologist (2)
  - Wetlands Monitoring Specialist
  - Field Technician (2)
Monitoring Strategies

- Baseline (several CRE tributaries)
- Restoration Sites (BACI)
- Reference Sites
- Core Metrics vs. Higher Order Metrics; Extensive vs. Intensive Monitoring
Methods

Presence/Absence (juvenile salmonids):

- Seine*
- Trap net*
- Smolt trap
- Snorkel

*Twice per month, January – June
Methods

Fish Usage:

- Diet (lavage > 60mm FL)
- Prey Availability (fallout / benthic)
- Residence Time (pit tagging / marking)
- Genetics
Case Study: Columbia Land Trust
Grays River Restoration Sites
Chinook Chum Coho

Kandoll Farm

Percent occurrence

2006

Reference

N=15 N=50 N=68

N=5 N=29 N=452

Percent occurrence

2007

Reference

N=83 N=137 N=35

Fork length (mm)
• Analyses of prey availability and Chinook genetic stock in progress
Case Study: Fort Clatsop Culvert Removal

- Phase II
- Dike Breach
- Phase I
- Dike Breach

[Map showing location of Fort Clatsop and Lewis & Clark River with labeled phases and breaches]
Additional Metrics Planned for May 2008 at Ft. Clatsop:
- prey utilization
- prey availability
- residence time
- genetics
- otolith/lipid analyses
Case Study: Big Creek Fish Passage

- Fish passed above diversion
- Artificial velocity barrier removal (summer, 2008)

Methods:
- Pit tag adult salmon
- Smolt trap & snorkel for juvenile salmon
- Habitat assessment
Coho Density on Big Creek (2006)
• Baseline telemetry data under analysis
• Post-construction: adult telemetry (2008), juvenile production (2010)
What we’ve learned so far:

• Fish occupy restoration sites in accordance with their life histories.

• Salmonids appear to be utilizing the dominant prey types available in the site.

• Recruitment, density-dependent, and migration corridor factors may control variability, regardless of habitat conditions.

• Site-specific success

• Growth / Survival?
LESSONS LEARNED:
• Reference sites
• Sampling standardization
• Timescale response

NEXT STEPS:
• Gear refinement
• Improved conceptual modeling
• Tributary-scale studies & long-term funding
• Higher order metrics
• Cumulative effects
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