Snoqualmie at Fall City Reach
Context for the Snoqualmie at Fall City Reach

- Deep, broad floodplain – impacts farms, roads, homes

- Raging River: sediment and steeper gradient increase channel migration and erosive flows

- Sediment and diverse habitat – important for salmon spawning/rearing

- Levees built in 1930s; do not contain floods

- Agricultural Production District - higher ground for farming
County Goals for the Reach

- Fish – protect and restore habitat consistent with Snohomish River Basin Salmon Conservation Plan
- Farm – protect agricultural resource lands, increase ag viability, improve stewardship on farms.
- Flood – reduce flood and erosion risks to homes/farms; increase storage capacity for flood waters and sediment through levee setbacks
Related Goals and Efforts

• Fish/farm/flood collaborative watershed process (R-650) involving farmers, stakeholders, etc – kicks off this fall – to “lift all boats”

• Recreational safety – countywide river safety campaign, and local work group to meet mid-September and *advise* county on local river use, project design and options to manage risks
Selection of Upper Carlson Project

- Assessment and landowner outreach during last 3 years
- Land is publicly owned
- No negative impacts on farms
- Construction 2014
Upper Carlson Floodplain Restoration Project
Upper Carlson Floodplain Restoration Project
Presentation Overview

• Project Schedule
• Snoqualmie at Fall City (SAFC) Reach Feasibility
• Why are we proposing to remove levees? What is good habitat?
• Project Purpose and Objectives
• Existing Conditions
• Proposed Actions
• Expected Response
• Effects on people, farms and fish
• Questions and Discussion
• Open house at tables
Upper Carlson Floodplain Restoration Project
Schedule Overview

*with upcoming opportunities for public input shown in yellow*

- Draft 30% design Complete
- Solicit expert opinion on 30% Complete
- Public Input via LWD meetings Complete
- Public input via Public Meeting Tonight!!
- 30% plans/LWD checklist comment period August 26- End Sept
- SEPA Comment Period September
- Local work-group meetings Mid September, Oct. Nov.
- 60% plans/lwd checklist posted October
- Final Plans Complete Feb. 2014
- Construction Summer 2014
50 year Restoration Goals and Progress to Date with Snohomish Basin Chinook Recovery Efforts

- Current population is 5.7% of historic abundance – not sustainable

**TARGETS:**

- 26 miles **Mainstem Edge Habitat**  
  PTD 1 mile = **4%**
- 420 Acres **Mainstem Off-Channel Habitat**  
  PTD 21 acres = **5%**
- 640 Acres **Riparian Habitat**  
  PTD = 81 acres = **13%**
- 100 **Mainstem Log Jams**  
  PTD = 9 jams = **8%**
Snoqualmie at Fall City (SAFC) Feasibility Study
Focus Reach

Carlson Upper
Alts 1+2

Aldair Alts 1-3

Hafner
Alts 1+2

Barfuse Alts 1-4
SAFC REACH

Historic vs. Current Conditions

1936 aerial photo

2009 aerial photo
Existing Conditions - Channel migration and sediment

Reach is currently a pipeline for sediment, wood and associated habitat-forming processes

Dec 2010 ~ 28,000 CFS
What’s wrong with the way it is?

- Small fish need refuge during small and large floods
- Wood, vegetation and connected floodplains provide that refuge
- Gravel bars are also productive habitat that provide some low velocity refuge year-round
Targeted Habitat Types

Mainstem Edge Habitat
- Gravel bars and complex flow patterns around them

Mainstem Log Jams

Gravel Retention

Off-Channel Habitat
- Close to mainstem
Historic Conditions - Channel migration and sediment

1936 aerial photo
Existing Conditions - Channel migration and sediment

2009 aerial photo
Upper Carlson Project Description

Problem Statement

Training levee & revetment disconnects the floodplain, prevents channel migration and adjustment, and interferes with wood recruitment, logjam formation and other habitat-forming natural processes.
Project Objectives

• To promote natural rate/frequency of channel & floodplain processes
• Improve salmon/steelhead spawning and rearing habitat
• Enhance and maintain native vegetation communities

While also:

• Maintaining or improving current levels of flood hazard protection
• Addressing potential impacts to recreational boater safety

Challenge – Natural Process is inherently unpredictable
Existing Conditions – Flooding and Hydraulics

2-D modeling

- 6 mile reach modeled
- Better understand existing conditions at various river stages
- Insert various project actions
- Rerun to look at project-related changes
Small Flood

Water Depth – 1.25yr (21,000cfs)

Calibrated with Gages and local landowner observations/photos

Upper Carlson Site
Moderate Flood

Velocity – December 2010

Fastest (>10ft/second)

Moderate 5ft/sec

Slower (<2ft/sec)

See Ian’s Table for more model details

Upper Carlson Site
**Existing Conditions** – Habitat and Fish

- Minimal wood
- Minimal Gravel bars
- Rock banks
- Very Narrow Channel
- One deep pool
Existing Conditions – Recreational Boating

2013 Recreational Use Study Underway

Boat Ramp Neal Rd

Boater Access Points

- Drift boats
- Jet Boats
- Some floaters (inner tubes, air mattresses)

Upper Carlson Project Site
Upper Carlson Site
Upstream 300’ @ ~1000 CFS

Flow 3-4 ft/sec

Upper Carlson Site
Remaining 1200’ @ ~1000 CFS

Flow 0.5-1.5 ft/sec
Proposed Actions – Overview

Legend:
- Floodplain Logs
- Buried Logs
- Engineered Logams
- Wetlands
- Snoqualmie River OHWM
- East Tributary OHWM
- Yarding disturbance area
- Infiltration area
- Silt Curtain
- Temporary Access Roads
- Project Limits of Disturbance
- Equipment Staging Areas
- Permanent Silt Pits Areas
- Temporary Material Stockpiles

Map highlights:
- New Setback facility
- Levee and Revetment Removal Area

Flow direction:
- Snoqualmie River

Measurement scale:
- 0 to 2,000 Feet
Proposed Actions – Tree Removal and Placement

THE DESIGN CHALLENGE
• Design good fish habitat
• Design with public safety a key consideration
• Levee removals are high priority for salmon recovery
• Natural processes after levee removal ultimately determine outcome of habitat and river safety
Reducing Risks from wood (to boaters)

Wood Design

- Extensive tree removal  
  Rather than allowing for immediate, rapid recruitment

- Placement back from initial migration area

- Design objective to mimic natural systems in terms of the rate/orientation of wood

- Design modifications to reduce immediate hazards
Proposed Actions – Levee & Revetment Removal

- Remove existing rock armor above and below flow level, thickness varies from approx. 1' to 10'.
- Remove levee core to final grade, grade as needed to remove rock. Final grade following rock removal.
- Temp construction access road, 30'.
- Vert rock removal limit, EL 63'.
- Horiz rock removal limit, 30' from bench.
- Tree removal zone (see sheet 16).
Proposed Actions

• Original design good for bank protection and fish
• Concern from LWD/Boater meetings over boater safety
• Modified design to be shorter w/ minimal flow-thru
• Current design good for protection, fish and better for boaters
Proposed Actions – Invasive Plant Control and Planting

Revegetation of Construction footprint

Natural regeneration and recruitment

Conifer underplanting

Knotweed Control and planting
Direct Effects of Construction
June – Sept Oct 2014

• **Need dirt?** - We’ve got it!!!
  – Looking for permitted places to take it next summer
  – Call Dan ASAP @ (206) 263 - 6319 or dan.eastman@kingcounty.gov

• **Noise and dust**
  – Heavy equipment, pile driving, trucks

• **Truck Traffic**
  – limited periods, mostly local

• **Temporary Road Closure or limited access**
  – Neal Rd. around project site. Alternate access under consideration

• **Possible Temporary River Closure**
  – No or limited boating, except for critical uses, during rock removal phase
Questions & Discussion

re:
Existing Conditions and Proposed Actions
(10 minutes)

Please hold questions on Expected Response and Effects on people fish and farms for 15 more minutes
Expected Response and Effects on people, fish and farms

Channel migration & sediment

Legend

- 10 Year Top of Bank
- 20 Year Top of Bank
- 50 Year Top of Bank
- Large Buried Logs
- Floodplain Logs
- 10 yr recruited trees
- 10 yr low flow wetted area
- 10 yr gravel bars
- Existing levees revetments

New Setback Revetment

Snoqualmie River

Flow
Effects on people, fish and farms

(Benefits to people/farms/agriculture/infrastructure)
Expected Responses and Effects on people, fish and farms

Hydraulic Changes predicted after levee removal

1. Water Velocity Changes
25-year Velocity Differences (~65,000 cfs = ~Jan 2009 flood)

- Most increase contained within Public Lands
- Working with landowners where it is not
- Reduction in velocity in some areas too

See Ian for more Hydraulic Modeling Details
Expected Responses and Effects on people, fish and farms

Hydraulic Changes predicted after levee removal

2. Water Surface Elevation Changes
Effects on people, fish and farms

Farms, Infrastructure and Private Property

(Flooding and overbank flow depth and velocity)

25-year “Observable” Differences in Water Surface Elevation (~65,000 cfs)

- Most increase contained within Public Lands
- Working with landowners where it is not
- Reduction in water surface elevation in some areas too

See Ian for more Hydraulic Modeling Details
Expected Response and Effects on People

Wood Recruitment and Recreational Boaters

- Reach will be *dynamic* and change over time
- Right bank erosion, channel will widen
- Trees will fall into the channel as bank erodes
- Trees, logs, wood will accumulate in reach
How Will Changes Affect Use

• Additional wood obstacles will likely be present

• Floating/boating may not be advisable under certain flows or conditions

• Reach access may need to be restricted at times based on conditions and skill level of users.

• Signage, education and outreach will be important to manage recreational use.

  Best methods TBD by local workgroup
Reducing Risks from wood
Site Management

• Warning/Advisory Signs
  Best methods/locations???

• Improvement and signage towards left bank portage
  Best methods/location ???

• Extensive public outreach and education
  Best methods/location ???

• Modification of unacceptable hazards
  When/how much/sustainable strategy???

Post-Project Adaptive Management plan
  – Developed and implemented with extensive input from local workgroup in 2013 and beyond.
  – 3 to 4 meetings planned for Sept-Nov. 2013
Snoqualmie at Fall City Corridor Reach
Signage, education, outreach is VERY important

How can begin to discourage use of this reach by people in boats that are difficult to maneuver??? (e.g inner tubes, air mattresses, etc.)

Signs, education and outreach here, elsewhere upriver, schools???
Recreational Boaters – Opportunities for Input

- 2013 recreation use survey – underway
- Input from KC Sheriff and Wave Trek - June
- 2 public meetings - June
- Current Public meeting - Now
- 30% checklist and plans online for comment Now thru Sept
- Convening recreational workgroup to get further input - Sept
- 60% checklist and plans online in October

http://www.kingcounty.gov/environment/watershed/general-information/large-wood/project-list.aspx
Effects on people, fish and farms

Legend

- Large Buried Logs
- Floodplain Logs
- 10 yr recruited trees
- 10 year mainstem enhanced
- 10 yr gravel bars
- 10 yr off-channel enhance
And many thanks to our funders who make this all possible....

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• Washington Resource Conservation Office
• King County Department of Natural Resources and Parks
Questions Discussion

Expected Response

and

Effects on People, Farms and fish
The Project Team

**King County Design Team**
- Diane Concannon – Project Sup.
- Dan Eastman – PM and Fish Bio
- Will Mansfield – Sup engineer
- Todd Hurley – Geologist
- Cindy Young – Landscape ecologist
- Kay Kitamura - CAD

**Herrera Consultant Design Team**
- Ian Mostrenko – senior engineer
- Brian Scott – PM and engineer
- Todd Prescott – CAD

**Other Team Members**
- Mary Maier – Basin Steward
- Sally King – RFMS representative
- Claire Dyckman – Agriculture rep.
- Rick Reinlasoder – Agriculture rep.
Thank you for your time !!!

Table Discussions