Designing For Geomorphic Process: South Fork Nooksack River

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What does designing for geomorphic process mean?

• Recognizing that existing conditions are a snapshot

• Understanding the geomorphic context of the site
  – Spatially
  – Temporally

• How did the river get here?
• Where are the current processes taking it?

• Work with current processes to achieve site specific objectives
South Fork Nooksack River: River Mile 20

- Lummi Indian Nation
  - Overall Project Management
  - Baseline Studies
  - Ongoing Monitoring Program

- GeoEngineers
  - Project layout and Design
  - Construction Direction and Oversite
  - Permitting Assistance
Pre-Project Conditions

Project Objectives

- Increase holding pool habitat
- Increase channel length and complexity
- Promote wood and sediment retention
- Sort suitable spawning gravels
- Eliminate landslide inputs
- Increase floodplain connectivity
- Reverse channel incision
- Peak flow attenuation
Project Components

Effects on the channel alignment
Engineered Log Jam #1

Engineered Log Jam #2
1800 new feet of side channel habitat
Channel connectivity at 75 percentile flow
Engineered Log Jam #1

Channel evolution
Engineered Log Jam #4

Channel plan form changes
Channel bed changes

Landslide at ELJ #5 Site
Landslide failure into the storage area
Multiple flow paths below #5
Revisiting Geomorphic Process

- Set the stage for high flows to develop side channel habitat
- Provided structure that scoured pools redefining the riverbed
- Retained landslide sediments, allowed for reestablishment of an adjacent terrace
- Sorted sediments creating spawning areas
- Enhanced floodplain connectivity
- Reversed channel incision

First floodplain inundation in over 10 years