

# EF 21

## Side-Channel Habitat Enhancement – Conceptual Design

<b>Reach:</b>	<b>EF Lewis 8A</b>
<b>River mile:</b>	<b>10.3 to 10.8</b>
<b>Reference page in main document:</b>	<b>51</b>

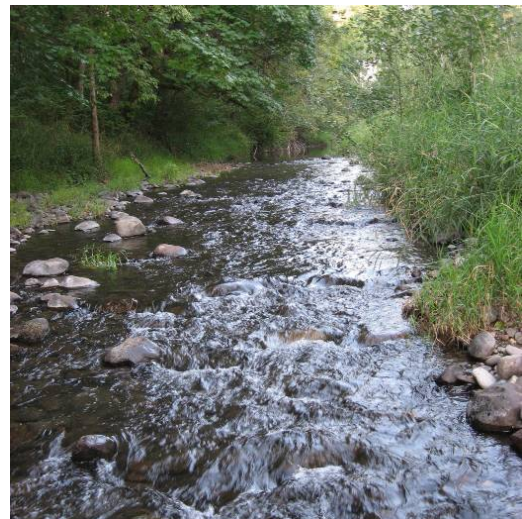
### Site Description

This is the large active side-channel on river-left upstream of Daybreak Park (see overview photo on page 3). The outlet is located at approximately East Fork Lewis river mile 10.3. The side-channel is approximately 1,500 feet long and has an average gradient of 0.6%. This side-channel has increased its flow over the last decade and site observations suggest that it conveys approximately 30% of the summer flow. Under existing conditions, portions of the side-channel have good habitat structure and diversity but other areas exhibit uniform channel conditions with very little complexity and wood cover. The channel offers a good opportunity to increase habitat diversity and pool quantity and quality. Apex log jam complexes have been present in various configurations at the channel inlet over the past several years. These jams affect channel conditions at the inlet and likely have a large influence on seasonal flow conditions into the side-channel. There is a small levee at the upstream end on the left bank that may be having an impact on channel location at the side-channel entrance. The project area was the site of extensive river bar gravel mining (scalping) in the early-to-mid 1900s (see 1939 aerial photograph included in Project EF-20 Conceptual Design).

This project scored high in the project evaluation process due to its benefit to multiple species life-stages and due to its large size.



*Log jam near side-channel entrance, September 2008*



*Existing conditions at downstream end of side-channel, September 2008*

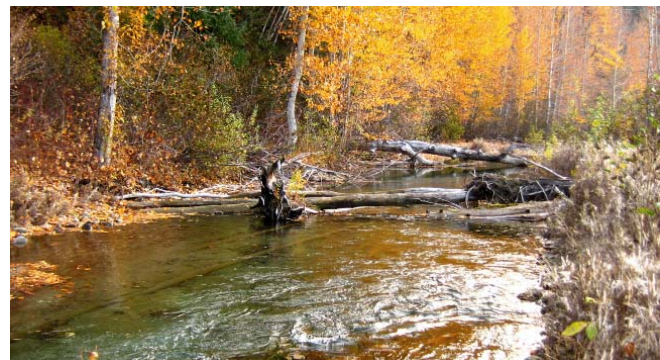
### Treatment Strategy and Alternatives

Recommended treatments:

- Add large wood habitat structures along 1,500 ft long side-channel and connected backwater areas. Place structures to encourage pool-riffle development and habitat complexity.
- Construct bar apex log jam at head of side-channel to encourage continued summer flow into side-channel.
- Remove remnant levee at upstream end of side-channel.

Alternatives:

- There may be opportunities for excavating additional connected backwater habitat to the side-channel.



*Example of restored side-channel*

### Expected Benefits – Limiting Factors Addressed

*Physical habitat* – 1) Enhanced quantity and quality of habitat features including pools and riffles, bank complexity and cover, and instream woody debris.

*Biological* – 1) Enhanced winter high flow refuge for coho and steelhead, 2) Enhanced spawning for coho and steelhead, with potential benefits to chum and Chinook spawning, 3) Enhanced quality of cool-water summer rearing for coho and steelhead, 4) Increased habitat complexity and cover for rearing fish that will provide diverse foraging opportunities and protection from predators.

**Access and Landownership**

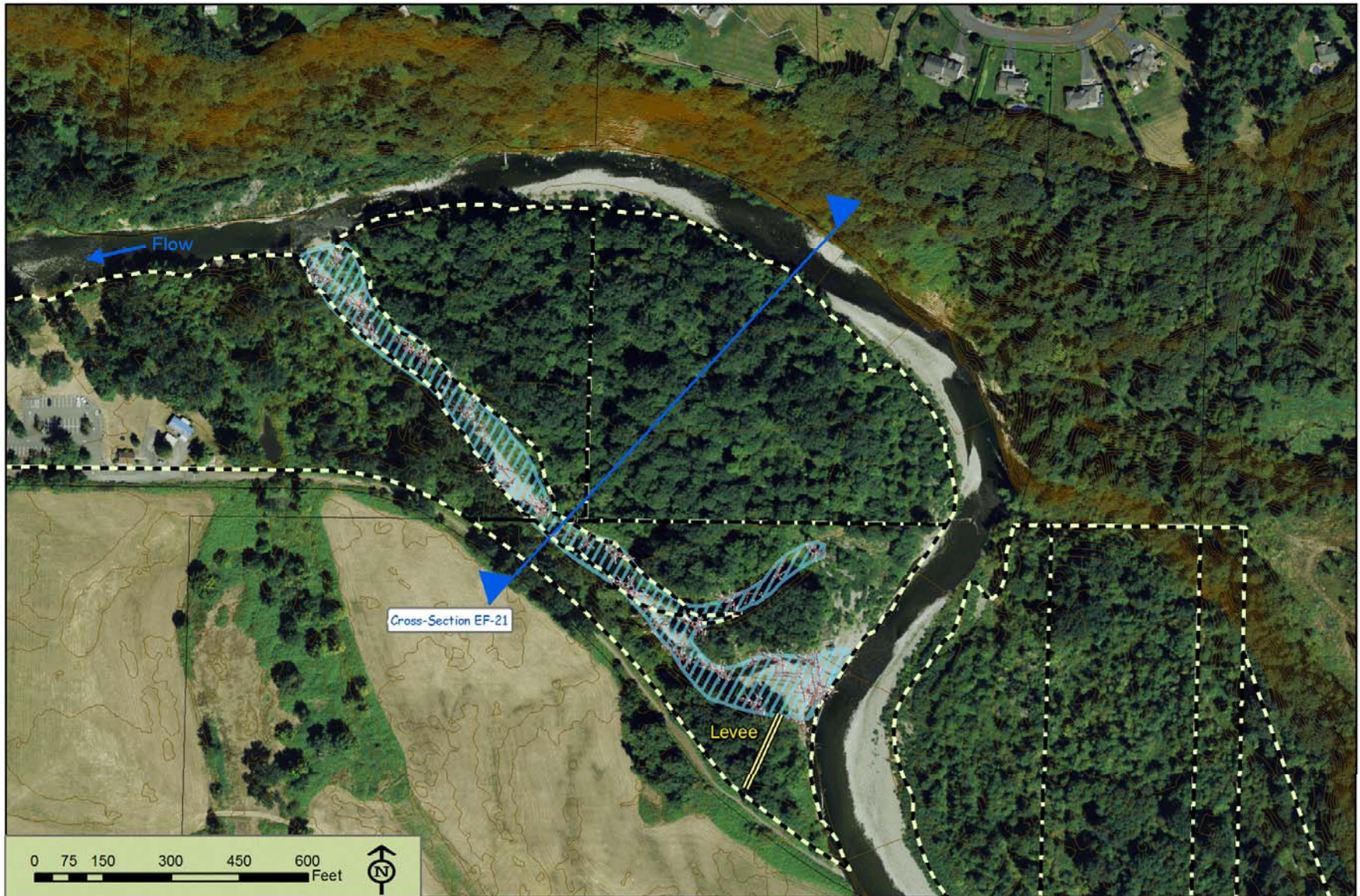
The site is located on Clark County property just upstream of Daybreak Park. Access can be obtained from the park and from an access road on the south side of the project area.


**Data and Analysis Requirements**

Hydraulic analysis, scour analysis, flood inundation analysis, and a geomorphic assessment will be required to support final designs. Continued rapid erosion of the unvegetated south bank of the mainstem at project EF-18 should be addressed in order to reduce avulsion risk into the EF-20 project area, which could de-water the side-channel at EF-21.

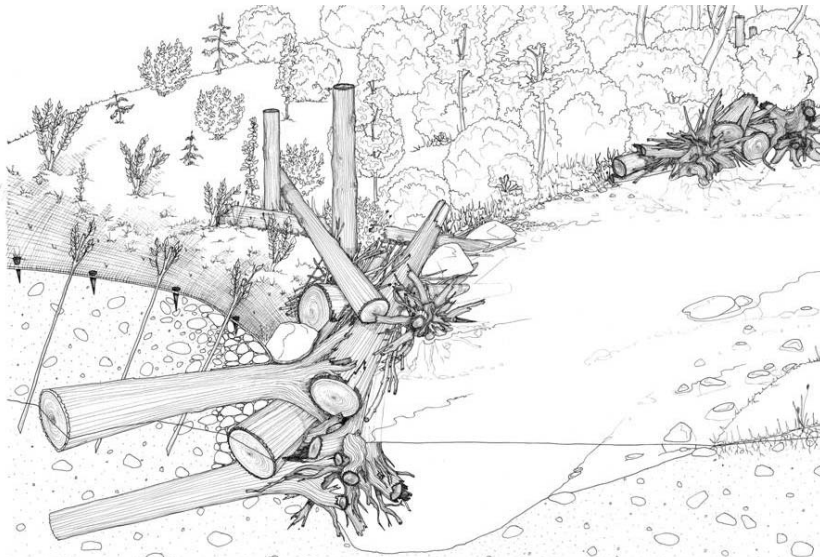
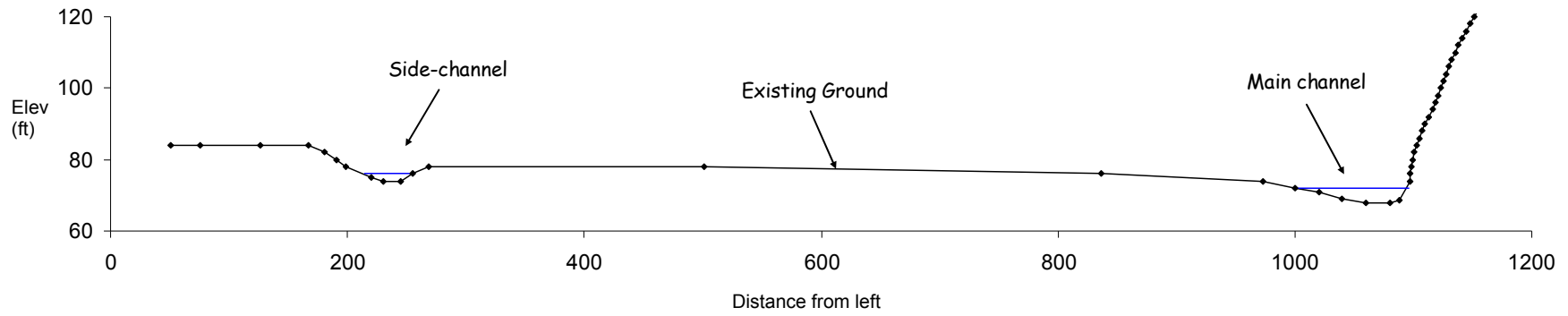
**LCFRB Habitat Strategy Summary**

EF Lewis 8A							
	Tier						
	1						
	Length (m)	2,011					
	Population	WSTH	SSTH	FCH	Coho	Chum	Multi Species
Recovery Plan Priority	P	P	P	P	P	P	
Species Reach Potential (H,M,L)	M	L	H	H	H	H	
Restoration Value	68%	25%	33%	83%	52%	52%	
Preservation Value	32%	75%	67%	17%	48%	48%	
Access to blocked habitats	-	-	-	-	-	-	L
Stream channel habitat structure & bank stability	H	L	H	H	H	H	H
Off channel & side channel habitat	H	M	H	H	H	H	H
Floodplain function and channel migration processes	H	L	H	H	H	H	H
Riparian conditions & functions	H	M	M	H	M	M	H
Water quality	H	M	M	M	L	L	H
Instream flows	H	M	H	H	H	H	H
Regulated stream management for habitat functions	-	-	-	-	-	-	L
Watershed conditions & hillslope processes	H	M	H	H	M	M	H



	<ul style="list-style-type: none"> <li> Habitat Enhancement Area</li> <li> 2-foot LIDAR contours</li> <li> Parcel boundaries</li> <li> Clark County Parcels</li> <li> Log placements</li> </ul> <p><small>*Enhancement features are approximate. Specific location and extent of features will require additional analysis and design Contour data and 2007 aerial photography provided by Clark County</small></p>	<h2 style="margin: 0;">EF 21</h2> <h3 style="margin: 0;">SIDE-CHANNEL HABITAT ENHANCEMENT</h3> <p style="margin: 0;">OVERVIEW AND LOCATOR MAP</p>
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**Cross-Section EF-21**



*Typical lateral boundary log jam construction (high energy setting)*



*Example large wood habitat enhancement in side-channel*

	<p><b>CROSS-SECTION, 3-D RENDERING, AND SAMPLE PHOTO</b></p>	<p><b>EF 21</b></p>
	<p><b>Notes:</b>                  Cross-section EF-21 is derived from LiDAR contours. Bathymetry is estimated based on site and aerial photograph observations. In some cases, minor corrections are made to LiDAR data that is believed to be representative of vegetation and not the ground surface.</p>	<p><b><u>SIDE-CHANNEL HABITAT ENHANCEMENT</u></b></p>

## Planning-level cost estimate for EF 21

Note: This is a preliminary cost estimate for planning purposes. Actual costs for design and construction activities may vary substantially from these estimates. Assumptions for time requirements and material quantities have been made based on limited information that is available for the site. Additional information obtained during site investigations will be needed to determine actual quantities and costs. Estimates based on 2009 costs.

Description	Unit	Quantity	Unit Cost	Total Cost	Comment
Mobilization and demobilization	LS	1	\$13,000	\$13,000	Calculated at 5% of construction sub-total
Temporary access road	LF	100	\$40	\$4,000	Assumes access can be obtained from dirt road at south boundary of site.
Large wood purchased and delivered to site	EA	150	\$500	\$75,000	Assumes 30% delivered with root wads attached. Assumes 25 pieces per jam plus floodplain wood. Frequency of LWD = >30 pieces/100 meters.
Boulder ballast purchased and delivered to site	EA	225	\$100	\$22,500	Assumes 1.5 - 2 yard boulders. Assumes 1.5 boulders per log.
Log jam construction	EA	6	\$10,000	\$60,000	Wood placed in jams to withstand Lewis River floods. Ballast will be completed through burial, attachment to existing trees, and cable boulder ballast.
Dewatering and sediment control	LS	1	\$25,000	\$25,000	Assumes water will be encountered during log jam construction.
Revegetation	SF	36,000	\$1	\$36,000	Assumes 6,000 SF revegetation associated with each log jam.
Construction oversight	HR	270	\$130	\$35,100	Assumes 3 weeks of construction oversight, construction staking and associated coordination, 12 hour days, 1.5 staff.
<b>Construction Sub-Total</b>				<b>\$270,600</b>	
Concept Level Construction Contingency (20%)				\$54,120	
<b>Construction Total</b>				<b>\$324,700</b>	
<b>Project Delivery</b>					Items below are calculated as a percent of the construction sub-total
Permitting (4%)				\$10,824	
Detailed Engineering Design (15%)				\$40,590	
Contract Administration (5%)				\$13,530	
<b>Project Delivery Sub-Total</b>				<b>\$64,900</b>	
<b>TOTAL ESTIMATE</b>				<b>\$390,000</b>	rounded to nearest \$1,000

### General Notes:

Cost includes a 20% construction contingency

Costs assume all materials (wood and rock) are purchased and hauled to the site from a nearby source. Significant savings could be accrued if materials are donated.

Reducing the number of log jams will reduce costs

### Key

LS = Lump sum

CY = Cubic yard

LF = Lineal foot

SF = Square foot

AC = Acre

EA = Each

FF = Face foot (square foot of bank face)

HR = Hours