PROJECT: 21-1153 PLAN, SF NOOKSACK SKOOKUM EDFRO PH 3 DESIGN

Sponsor: Lummi Nation Program: Salmon State Projects Status: Board Funded

Parties to the Agreement

PRIMARY SPONSOR

Lummi Nation
Address 2665 Kwina Rd
City Bellingham **State** WA **Zip** 98226-9298
Org Type Native American Tribe
Vendor # SWV0025069-10
UBI
Date Org created
Org Notes

link to Organization profile
link to PRISM Organization page
☐ Org data updated

SECONDARY SPONSORS

No records to display

LEAD ENTITY

WRIA 1 Watershed Management BD

QUESTIONS

#1: List project partners and their role and contribution to the project.

Not applicable

Project Contacts

Contact Name Primary Org	Project Role	Work Phone	Work Email
Kelley Turner	Project Contact	(360) 312-2315	KelleyT@lummi-nsn.gov
Alex Levell Lummi Nation	Alt Project Contact	(360) 312-2307	alexl@lummi-nsn.gov
Becky Peterson WRIA 1 Watershed Management BD	Lead Entity Contact	(360) 392-1301	Genevaconsulting@comcast.net
Talesha Finkbonner Lummi Nation	Billing	(360) 312-2171	taleshaF@lummi-nsn.gov
Alissa Ferrell Rec. and Conserv. Office	Project Manager	(360) 867-8618	alissa.ferrell@rco.wa.gov
Jim Lochner Rec. and Conserv. Office	MAgy Fiscal Contact	(360) 902-3007	Jim.Lochner@rco.wa.gov

Worksites & Properties

#	Worksite Name
#1	SF Nooksack River 4 miles upstream from Acme, WA

Planning	Property Name
✓	DNR Aquatics
✓	Russell Pfeiffer Hoyt
✓	Heidi Nelson
✓	Whatcom Land Trust
✓	Whatcom County Public Works
✓	DNR Statelands
✓	Michael and Paula Miller

Worksite Map & Description

Worksite #1: SF Nooksack River 4 miles upstream from Acme, WA

WORKSITE ADDRESS

Street Address

City, State, Zip

Worksite Details

Worksite #1: SF Nooksack River 4 miles upstream from Acme, WA

SITE ACCESS DIRECTIONS

This site has expanded slightly to include 0.1 miles downstream of the Saxon Bridge in the Saxon Reach. The site continues upstream to the Skookum Edfro Phase 1 project boundary in the Skookum Reach.

TARGETED ESU SPECIES

Species by ESU	Egg Present	Juvenile Present	Adult Present	Population Trend
Chinook-Puget Sound, South Fork Nooksack River, Threatened	✓	✓	✓	Stable
Coho-Puget Sound/Strait of Georgia, Species of Concern	✓	✓	✓	Rising
Steelhead-Puget Sound, Threatened	✓	✓	✓	Stable
Chum-Puget Sound/Strait of Georgia, Not Warranted	✓	✓	✓	Stable

Reference or source used

Data sources used: Lummi South Fork Juvenile Salmonid Beach Seine Database, Lummi Spawner Survey Chinook Redd Database, Lummi Spawner Survey Chinook Carcass Database, Lummi Spawner Survey Fish Count Database, and personal communication with Lummi Natural Resources Stock Assessment Team.

TARGETED NON-ESU SPECIES

Species by Non-ESU	Notes
Bull Trout	Upper South Fork Nooksack Population (Federal Threatened; State Candidate)

Questions

#1: Give street address or road name and mile post for this worksite if available.

Saxon Road, from upstream end of the Saxon Reach project to Skookum Hatchery. Project is located on South Fork Nooksack River miles 12.8 to 13.9.

Project Location

RELATED PROJECTS

Projects in PRISM

PRISM Number	Project Name	Current Status	Relationship Type	Notes
No related project selected				

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Related Project Notes

Questions

#1: Project location. Describe the geographic location, water bodies, and the location of the project in the watershed, i.e. nearshore, tributary, main-stem, off-channel, etc.

The Skookum Edfro Phase 3 project is located on the South Fork Nooksack River southeast of Saxon, Washington in Whatcom County (RM 12.8 to 13.9) in the Saxon and Skookum reaches (Figure 1). It includes the main stem and floodplain.

#2: How does this project fit within your regional recovery plan and/or local lead entity's strategy to restore or protect salmonid habitat? Cite section and page number.

The 2005 WRIA 1 Salmonid Recovery Plan (Plan) identified the South Fork (SF) and North Fork/Middle Fork Nooksack early Chinook populations as the highest priority for actions that benefit recovery and production of salmonid populations (WRIA 1 Salmonid Habitat Restoration Strategy (Strategy) Version 2.5a 2005, pp.5). Restoring habitats used by early Chinook populations in the South Fork is the highest priority for recovery of South Fork early Chinook (WRIA 1 2005). The Skookum Edfro Phase 3 Project reach (between just below Saxon Bridge and Skookum Hatchery (Figure 2)), is among the highest priority areas for restoration for South Fork early Chinook in terms of expected improvement in abundance, productivity and diversity for the population (WRIA 1 Strategy Version 2.5a 2005, Table C-1 pp.41, Jones Cr to Skookum Cr). This project addresses the habitat limiting factors of habitat diversity, high water temperatures, and key habitat quantity (Section 4.1.3.3.8 (pp.112-116) and Fig. 4.5 (p.143) of the WRIA 1 Plan). The Skookum Reach is a WRIA 1 Tier 1 priority for two restoration strategies: 1) engineered logjams (ELJs) to form deep complex pools: cool-water inflow areas and 2) ELJs to form deep complex pools: other areas. It is also a Tier 2 priority for three restoration strategies: 1) Replace riprap with wood bank structures, 2) Reconnect floodplains, and 3) Reconnect and restore side channels and restore historic channel pattern (Fig.3; WRIA 1 2021 SRFB Grant Restoration and Protection Strategy Matrices). This is a critical section of the river to improve habitat as Chinook return to spawn upstream and return to the Skookum Hatchery as part of the Lummi Natural Resources (LNR)-sponsored SF Chinook Rescue Program. The Skookum Edfro Phase 3 project is included as a "Chinook priority habitat project" in the WRIA 1 2020 4-Year Work Plan (20-4YWP-LNR). The project also addresses the 2018 - 2022 Puget Sound Action Agenda Regional Priority CHIN7. "Continue to restore degraded habitat and fish populations" by following the Priority Approach CHIN7.1: "Protect and/or restore critical habitat for salmon populations" (PSP 2018, Table 3-4, pp.28). The South Fork Nooksack River is considered critical habitat for ESA-listed threatened Puget Sound Chinook salmon, as well as bull trout and steelhead (USFWS 2010, NOAA 2016).

#3: Is this project part of a larger overall project?

Yes

#3a: How does this project fit into the sequencing of the larger project?

The Skookum Edfro Phase 3 project is part of a 20-year effort to restore salmonid habitat in the South Fork Nooksack River (Figure 4). The project addresses a 1.1-mile untreated reach of the South Fork Nooksack River between the Saxon Reach Restoration Project and the Skookum Edfro Phase 1 Restoration Project. The project is part of a larger Skookum Edfro suite of projects (between RM 12.8 and RM 15.5). Skookum Edfro Phases 1 and 2 were treated between 2016 and 2018 (Figure 2). The Saxon Reach Restoration Project (RM 11.6 to 12.7) is downstream from the Saxon Bridge and was treated in 2011 and 2012 (Figure 4). The Skookum Edfro Phase 3 project is integral to watershed-wide restoration, encouraging natural channel and habitat forming processes that will provide cumulative restoration benefits and improve connectivity between salmonid holding, spawning, and rearing habitats just downstream from the Skookum Hatchery.

#4: Is the project on State Owned Aquatic Lands? Please contact the Washington State Department of Natural Resources to make a determination. **Aquatic Districts and Managers**

Yes

Property Details

Property: DNR Aquatics (Worksite #1: SF Nooksack River 4 miles upstream from Acme, WA)

Property: Russell Pfeiffer Hoyt (Worksite #1: SF Nooksack River 4 miles upstream from Acme, WA)

Property: Heidi Nelson (Worksite #1: SF Nooksack River 4 miles upstream from Acme, WA)

Property: Whatcom Land Trust (Worksite #1: SF Nooksack River 4 miles upstream from Acme, WA)

Property: Whatcom County Public Works (Worksite #1: SF Nooksack River 4 miles upstream from Acme, WA)

Property: DNR Statelands (Worksite #1: SF Nooksack River 4 miles upstream from Acme, WA)

Property: Michael and Paula Miller (Worksite #1: SF Nooksack River 4 miles upstream from Acme, WA)

Project Proposal

Project Description

LNR will use this grant to study feasibility and develop conceptual designs for an instream restoration project on the SF Nooksack River southeast of Saxon, WA in Whatcom County (RM 12.8 to 13.9). The goal is to restore SF early chinook spawning, rearing and holding habitat to recover self-sustaining runs to harvestable levels by addressing limiting factors of high temperature, low habitat diversity, and lack of key habitat. LNR will hire an engineering firm to hydraulically model design alternatives for a project that restores habitat-forming processes. Design alternatives may include instream ELJs, a road set back, removing 600 feet of riprap, covering up to 1,400 feet of riprap with wood, raising a bridge to remove a pinch point, excavating side channels, and riparian planting. Alternatives will be evaluated on benefits to chinook per hydraulic modeling and expected channel and biological response. Stakeholders will help select a preferred alternative to be developed into a conceptual design, basis of design report and construction cost estimate. South Fork early chinook are one of the highest priority populations essential for recovery of the ESA-listed Puget Sound ESU (WRIA 1 2005). The project will benefit LNR's native chinook broodstock hatchery program supporting recovery, and address a temperature TMDL on a river threatened by climate change. It will also benefit ESA-listed steelhead and bull trout, other salmonids, and the Southern Resident Killer Whale.

Project Questions

#1: Problem statement. What are the problems your project seeks to address? Include the source and scale of each problem. Describe the site, reach, and watershed conditions. Describe how those conditions impact salmon populations. Include current and historic factors important to understand the problems.

The South Fork Nooksack River (SF) is home to nine salmonid species; three are listed as threatened on the Endangered Species Act: chinook, steelhead, and bull trout. Recovery of SF chinook is essential for the recovery of the threatened Puget Sound ESU (64 FR 14308 1999). Habitat degradation is the leading cause for the decline of WRIA 1 salmonid populations (WRIA 1 2005). Current habitat conditions are substantially less productive than historically. Estimated adult capacity for each Nooksack early Chinook population is less than 10% of historical capacity and estimated adult productivity and life history diversity are less than 15% and 45% of historical levels, respectively (Mobrand 2003). Adult returns increased in recent years due to the SF Chinook Rescue Program, but functional, high-quality habitat is needed now for program success.

The project reach is used for chinook spawning with over 90 redds observed since 1986 (Fig. 5). More recently, spawning has been limited to a few areas and only six redds were observed in 2020. The project reach is a hot spot for adult holding chinook as they migrate to the hatchery and upstream spawning grounds (Fig. 6). Land use in the project reach is conservation forestry on the left bank and rural residential on the right bank. Saxon Road follows the right bank before crossing to the left bank via the Saxon Bridge. Habitat and geomorphic assessments of the project reach found degraded instream habitat for chinook salmon (Maudlin et al. 2002, Brown and Maudlin 2007, Element Solutions 2015). Historical disturbances include loss of mature forested floodplain and riparian areas, logjam removal, loss of forest canopies, levee and bank armoring, and channel modifications (i.e. straightening). Loss of anastomosing channel morphology and floodplain connectivity was likely the most significant historical impact to habitat function. Removal of woody debris and the transition to a single-thread channel form led to the loss of high-functioning habitat conditions like bedform complexity, velocity refugia, habitat diversity, and deep pools. The project reach is considered the most impaired part of the Skookum Reach (Herrera 2016).

A 2015 geomorphic assessment found an incised channel lacking sinuosity but with some developed point bars. The channel had reduced coarse bedload armoring compared to upstream, minimal pools and large woody material, low channel and bedform complexity, some potential side channels and floodplain connectivity at moderate flows (Figs. 7, 8c and 9). Bank composition in the reach was erodible alluvium, colluvium and glacial deposits, aside from riprap. Immature to maturing stands of deciduous trees provide margin complexity, shade, and a future LWM source. The channel exhibited some evidence of lateral migration.

There is evidence of continued incision: LiDAR subtraction between 2013 and 2017 showed between 1-3 ft of channel bed loss (Figs. 10, 11 and 12). Incision adversely impacts fish habitat by disconnecting floodplains, coarsening channel substrate, scouring spawning beds, eliminating refugia, reducing channel and edge habitat, and contributing to high temperatures (NSD 2013).

The lack of large wood in the system has led to simplified habitat conditions with reduced habitat diversity and key habitats, including a lack of deep, complex pools with woody cover, backwater pools, complex edge habitats, and perennial side channels (Figs. 7, 8a, 13, 14a, 14c and 15). The project is dominated by fast velocity habitats such as riffles and runs, with only one primary pool and no large wood (NNR and LNR 2020). The Saxon Bridge pinch point and bank armoring on ~2,000 feet upstream of the Saxon Bridge has exacerbated these issues (Fig. 8a). Herrera (2016) found the 100-yr discharge routing west and out of the project area and downstream, complicating the hydraulics of the reach (Fig. 16).

#2: Describe the limiting factors, and/or ecological concerns, and limiting life stages (by fish species) that your project expects to address.

Skookum-Edfro Phase 3 will address the limiting factors of high temperature, low habitat diversity and lack of key habitats in the South Fork (SF) for early Chinook. Restoration treatments will be designed to benefit SF early Chinook adults (migrating, holding and spawning), incubating eggs, and juveniles (post-emergence, oversummer, overwinter). The project will also benefit ESA-listed steelhead (eggs, juveniles, adults) and bull trout (juveniles, adults); coho (eggs, juveniles, adults), sockeye (eggs, juveniles, adults), and pink salmon (eggs, juveniles, adults).

South Fork temperatures approach the lethal limit for salmonids in late summer during holding, spawning and egg incubation. Pre-spawn mortality of SF early Chinook has occurred in recent years. A temperature Total Maximum Daily Load (TMDL) for the SF has been developed (Ecology 2020) and the project reach is listed for temperature impairment on the WA 2010 303(d) list per the Clean Water Act (Figure 17). Aquatic life uses protected under the TMDL are core summer salmonid habitat, char spawning and rearing, and salmonid spawning and incubation. Without any change, temperatures will increase 3.4-5.9°C by the 2080s. Improving riparian function, floodplain reconnection and instream rehabilitation is recommended to address existing and projected climate change impacts. Due to high spawning, holding, and incubating use in this area, restoration of ecosystem processes has the potential for great benefit to the South Fork early Chinook population.

Habitat diversity refers to the extent of habitat complexity (e.g. woody cover, undercut banks) and variation of habitat types (e.g. pools, side channels; WRIA 1 2005). In the USF, loss of habitat diversity from reduced riparian function, decreased size of instream wood, low wood residence time, channel straightening, channel encroachment and floodplain disconnection has impacted SF early Chinook rearing, holding and spawning life stages (Brown and Maudlin 2007). Primary pools are the key habitat type limiting holding, fry and rearing life stages, followed by backwater pools, complex edge habitats and perennial side channels. The Upper South Fork Habitat Assessment? Brown and Maudlin (2007) recommended multiple project actions to increase habitat diversity, including: increase the number of wood-formed pools, increase area of secondary channels by increasing the stability of forested islands, increase woody cover in rearing and holding habitats, riparian treatment to improve wood recruitment, and increase flow impedance in unconfined reaches.

#3: What are the project goals? The goal of the project should be to solve identified problems by addressing the root causes. Then clearly state the desired future condition. Include which species and life stages will benefit from the outcome, and the time of year the benefits will be realized. **Example Goals and Objectives**

The project goal is to engage stakeholders in developing a design concept that restores spawning, rearing and holding habitat to recover self-sustaining salmon runs to harvestable levels by addressing the limiting factors of high temperature, low habitat diversity, and lack of key habitat. An outreach plan will allow LNR to work alongside stakeholders to achieve a common goal of recovery of SF early Chinook. ELJs will be designed to form primary and secondary pools for adult chinook holding and juvenile rearing, combat channel incision and redd scour, improve floodplain connectivity to increase flood refugia for rearing, and promote hyporheic exchange to improve egg to fry survival. Increased side channel connectivity will improve rearing. Removing riprap will increase the length of natural edge habitat for rearing. Adding large woody material to riprap will provide additional cover habitat and roughness, like the successful log complex at the Saxon Reach (Figure 8b). The Nooksack Tribe found a more than 4°C difference between surface and bottom temperatures in the scour pool created by the Saxon Reach log complex. Relocating Saxon Road will increase floodplain connectivity and rearing habitat. Modifications to the Saxon Bridge would lessen instream velocities, shear stresses, and downstream incision, improving rearing habitat and egg to fry survival. Riparian plantings will provide shade and recruit wood. Steelhead, bull trout and other salmonids will also benefit.

#4: What are the project objectives? Objectives support and refine biological goals, breaking them down into smaller steps. Objectives are specific, quantifiable actions the project will complete to achieve the stated goal. Each objective should be SMART (Specific, Measurable, Achievable, Relevant, and Time-bound). **Example Goals and Objectives**

1. Engage the public and stakeholders often with an Outreach Plan.
a. Contracting with a consultant focusing on outreach
b. Lead meetings with stakeholders: landowners, co-managers, Whatcom County, and SRST

2. Hydraulically model infrastructure alternatives to benefit habitat-forming processes, including:
a. Creating a dry bridge or series of culverts on the east bank of the Saxon Bridge to alleviate pressure from pinchpoint
b. Setback up to 1,200 feet of Saxon Road to move out of 100-year floodplain

3. Identify and hydraulically model instream and planting alternatives to enhance chinook limiting factors of habitat diversity, key habitat quantity and water temperature, which may include:
a. Designing between 10 and 20 ELJs to form primary and secondary pools
b. Excavation of 2 to 3 starter side channels for spawning and rearing
c. Improve cover, edge habitat and roughness for rearing and migrating salmonids by removing up to 600 feet of riprap and covering over 1,400 feet of riprap w/ a fish-friendly log complex.
d. Reduce stream temperatures and recruit large woody debris by interplanting 5.4 acres of riparian floodplain forest with native conifers.

4. Produce a preferred alternative that maximizes channel migration zone and chinook habitat potential, addresses landowner interests, with resiliency to climate change.

See WRIA 1 Habitat Indicators (Fig. 18) for proposed habitat uplift based on potential conceptual alternatives.

#5: Scope of work and deliverables. Provide a detailed description of each project task/element and how they will lead to the objectives. With each task/element, identify who will be responsible for each, what the deliverables will be, and the schedule for completion.

Task 1: Grant and Contract Management - LNR – Oct 2021-Sep 2023
Manage grant and budget. Develop and manage contract with consultants.
Deliverables: Progress reports, payment requests, signed contracts

Task 2: Stakeholder Outreach – LNR, consultants – Oct 2021-Sep 2023
LNR will hire a consultant to help develop an outreach plan with approaches for specific landowners. Outreach will be coordinated with other local restoration practitioners. The outreach plan will be implemented early and continue throughout project development to reach design consensus. The outreach plan may include meetings between adjacent landowners and the Whatcom County Acme Van Zandt subzone. In addition, meetings between the LNR, engineering team and Whatcom County Public Works (WCPW) will be held to discuss options for the Saxon Bridge and Saxon Road setback. Additional meetings including WCPW, WDFW, ACOE, and DNR State Lands, Forest Practices and Aquatics will be held to review large wood placement, rise mitigation strategies and CLOMR/LOMR permitting requirements.
Deliverables: Outreach plan, meeting minutes

Task 3: Geomorphic and Hydraulic Assessment - LNR, consultants – Dec 2021-Nov 2022
LNR and the engineering firm will conduct field data collection and geomorphic assessment. A detailed geomorphic characterization of the reach will describe the processes in the reach and restoration opportunities. A 2-D hydraulic model of existing and proposed conditions using LiDAR and topographic survey data will be developed to evaluate average discharge during early spring Chinook spawning (August 1st through October 15th), as well as a least the 2-yr, 10-yr, and 100-yr flows. A report will be developed providing context to understand how flows affect river processes, and to inform restoration approaches to stakeholders. The report will be shared with WRIA 1 Salmon Recovery Staff Team (SRST) for comment.
Deliverables: Hydraulic and geomorphic assessment report

Task 4: Conceptual Design – LNR, consultant - Nov 2022-Sep 2023
Using the hydraulic and geomorphic assessment, the consultant will develop conceptual design alternatives. The hydraulic model will be used to evaluate proposed restoration elements and refine the design to address channel instability, sedimentation, and other concerns related to scour and hydraulic forces. The hydraulic analysis will also compare engineering parameters within the project area for pre- and post-project conditions. Each conceptual design alternative will be evaluated based on the benefits to early Chinook. The alternatives analysis will be presented to landowners and stakeholders for feedback, and a preferred alternative will be selected. The preferred alternative will be used to develop conceptual design drawings, basis of design report and conceptual cost estimates.
Deliverables: Conceptual basis of design report, conceptual design drawings, cost estimates

#6: What are the assumptions and physical constraints that could impact whether you achieve your objectives? Assumptions and constrains are external conditions that are not under the direct control of the project, but directly impact the outcome of the project. These may include ecological and geomorphic factors, land use constraints, public acceptance of the project, delays, or other factors. How will you address these issues if they arise?

The Outreach Plan will be an essential part of this feasibility study. Stakeholder approval and acceptance of road relocation and bridge work alternatives will affect the outcome of the project's goals and objectives. Uncertainty in meeting project objectives depends on factors that may affect the final project design, especially feedback from regulatory agencies and landowners. The outreach consultant will help LNR strategize any land use constraints that arise, such as:

-Incentives in a "win-win" scenario to landowners resistant to infrastructure change.
-Incorporating landowners' ideas into the alternatives
-Redirecting 100-yr discharge flow paths toward dry bridge away from private property
-Tree planting parties following road relocation

Project designs in a no-rise FEMA floodway is a challenge that LNR and the engineering team will overcome to meet habitat objectives. New state guidelines will require a CLOMR/LOMR for any WSE rise in the floodway (FEMA 2020). We see this as a long-term opportunity to more freely enhance the habitat outcomes. Additional engineering and outreach meetings are included in the attached budget to account for the CLOMR process during this planning stage of the project.

The engineer of record for the first two phases believes that upstream deflector structures, side channel excavation, and some channel expansion at the left (west) bank inside meander will help alleviate rise in the 100-yr water surface. Encouraging channel expansion to the west will aggrade upstream and direct more water into the left bank vegetated floodplain (Figures 9, 19 and 20). Setting back Saxon Road may open up to five acres of rearing habitat while lowering 100-yr water surface rise. We are in discussions with Whatcom County about a dry bridge or culvert(s) on the right (east) side of Saxon Bridge, encouraging flows under Saxon Road to lesson instream velocities, shear stresses and downstream incision.

#7: How have lessons learned from completed projects or monitoring studies informed this project?

This project builds on lessons learned from two decades of logjam projects in the South Fork. ELJ projects in the lower South Fork require several strategic meetings, presentations and site visits with stakeholders – this feasibility study will help ensure long-term project success. Effectiveness monitoring, adaptive management, and recovery plan chapter updates are underway in WRIA 1. LNR and the Nooksack Tribe completed an effectiveness monitoring report of instream restoration projects in the Nooksack Forks (Nooksack Tribe Natural Resources and LNR 2020). This study found that many projects in the SF were effective at meeting their objectives to improve edge habitat and cover through riprap removal and to form primary pools using ELJs. Another effectiveness monitoring report by Natural Systems Design (NSD 2020) incorporated SF Nooksack habitat and geomorphic data with 2D hydraulic models to evaluate project success in the upper SF. Key lessons learned: 1) ELJs built on channel edges and on dry gravel bars due to past permitting constraints were often ineffective at causing channel response, building floodplain habitat, or sustaining habitat features; 2) the mainstem channel can migrate towards the path of least resistance away from ELJs ; and 3) ELJ placement was not dense enough to reliably create low flow pool habitat or activate off-channel habitats. Phase 3 design will use these lessons to ensure project effectiveness.

#8: Describe the alternatives considered and why the preferred was chosen.

Alternatives were first developed during the Skookum Edfro planning project (#13-1279), including the lower reach (Phase 3, Figure 21). The development and refinement of the project design elements and alternatives relied on a collaborative team effort to integrate existing information, observational data, and analyses from multiple disciplines. Three alternatives were presented for each sub-reach based on low, medium, and aggressive levels of intervention. The conceptual design for the lower reach was not selected for additional design development in 2015 because the upper two reaches had less land ownership and floodway restrictions. This project proposes to revisit this important reach of the South Fork to reengage with key stakeholders and bring new infrastructure and instream restoration treatment ideas to the table. The science and practice of river restoration is constantly evolving as more projects are implemented in the Pacific Northwest and hydraulic modeling and river engineering improves. the incumbent engineering team lends us confidence that new alternatives can overcome the previous constraints in this project reach.

The conceptual restoration design will be informed by historical conditions in the reach, limiting factors and priority restoration actions in the WRIA 1 Salmonid Recovery Plan and Chapter Update, as well as lessons learned from similar projects. Hydraulic modeling and geomorphic characterizations will help the design team and LNR to select the most alternative with the greatest fisheries/habitat uplift. The engineering team and the LNR will present the conceptual design alternative analysis to stakeholders, including the WRIA 1 Salmon Recovery Staff Team for feedback.

#9: How were stakeholders consulted in the development of this project? Identify the stakeholders, their concerns or feedback, and how those concerns were addressed.

LNR established relationships with some key landowners during the Saxon Reach Restoration, Skookum Edfro Design, and Skookum Edfro P1 Restoration projects (Fig. 22). Conceptual design alternatives for the Skookum Edfro Design project were discussed with landowners between 2013-2015. At the time, one landowner expressed concern about moving Saxon Road. We reached out to landowners in 2020 and at the time of this 2021 application, have received acknowledgement forms from all but one landowner. The final acknowledgment form will be included as a project deliverable. The landowners we have reached have expressed support for instream restoration, including ELJs to create pools with woody cover and adding wood to riprap to provide habitat. Some have expressed concerns about increased flooding to their property. The infrastructure design alternatives we are considering, such as moving Saxon Road and changes to Saxon Bridge will be addressed with landowners after development of the Outreach Plan. We are already in contact with Whatcom County Public Works about these alternatives. Whatcom Land Trust owns most of the left bank and has indicated project support. DNR Aquatics manages all property below the ordinary high water and is supportive of restoration. Stakeholder outreach is a primary objective of this project and we will provide many opportunities for landowner engagement. WRIA 1 co-managers and SRST will also be included in the planning process.

#10: Does your project address or accommodate the anticipated effects of climate change?

Yes

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#10a: How will your project be climate resilient given future conditions?

Temperature is a limiting factor for salmonid production in the South Fork during the hot, low flow summer and early fall months (Mobrand 2003). South Fork temperatures are commonly above 16 degrees Celsius and can approach the lethal limit for salmonids. Climate change will further increase water temperatures. The project reach is 303(d) listed for temperature impairment per the Clean Water Act, and the South Fork TMDL recommends improving riparian function, floodplain reconnection, and instream rehabilitation to address climate change (Ecology 2018). Climate change is also expected to lead to increased peak flows and decreased low flows (Beechie et al. 2006), which will be factored into hydraulic modeling input numbers. ELJs will provide woody cover over newly built scour pools near a known cool groundwater input, creating thermal refugia in late summer. Floodplain reconnection and ELJs will provide high-flow refugia. Riparian plantings will provide shade and recruit large wood.

#10b: How will your project increase habitat and species adaptability?

Design alternatives to be considered for Skookum Edfro Phase 3 will increase habitat diversity and key habitats by using ELJs to form primary and secondary pools. Deep pools will improve thermal refugia near known cool groundwater inputs. ELJs and possible side channel excavations could activate up to 8 acres of floodplain habitat during rearing flows. More than 5 acres of riparian plantings will offer shade and long-term wood recruitment. A potential road setback could widen the floodplain by up to 300 linear feet. These habitat improvements will enhance salmonid resilience to higher temperatures and flows with climate change (Ecology 2020).

#11: Describe the sponsor's experience managing this type of project. Describe other projects where the sponsor has successfully used a similar approach.

The LNR has been restoring chinook and other salmonid habitat in WRIA 1 for nearly 30 years. This includes 285 instream habitat structures built, including 161 ELJs and 542 acres of riparian plantings along 95 miles of stream. LNR successfully completed similar restoration projects in the FEMA floodway: Hutchinson Creek (2007), the Saxon Reach (2011-12) and Skookum Edfro Phase 1 (2016-17). In 2018, LNR completed Skookum Edfro Phase 2 (Figures 2 and 4), just upstream from the floodway. LNR has extensive experience developing and implementing successful large-scale restoration projects in the Nooksack Watershed, including grant and contract management, working closely with project engineers, stakeholders and regulatory agencies, permitting, construction oversight, environmental compliance monitoring, riparian planting, and project effectiveness monitoring.

#12: Will veterans (including the veterans conservation corps) be involved in the project? If yes, please describe.

No

Planning Supplemental

#1: Is the project an assessment / inventory?
No

#2: Is your project a Barrier / Screening Diversion Inventory Project?
No

#3: Is this a fish passage design / screening design project?
No

#4: Will the project develop a design?
Yes

#4a: Will a licensed professional engineer design of the project?
Yes

#4b: Will you apply for permits as part of the project scope?

No. The LNR will work with regulatory agencies but not apply for permits during this project scope.

Planning Metrics

Worksite: SF Nooksack River 4 miles upstream from Acme, WA (#1)

Area Encompassed (acres) (B.0.b.1)	47.3
Miles of Stream and/or Shoreline Affected (B.0.b.2)	1.10

DESIGN FOR SALMON RESTORATION

Conceptual Design (B.1.b.11.a RCO)

Total cost for Conceptual design	$107,134
Project Identified in a Plan or Watershed Assessment. (2457) (B.1.b.11.a)	WRIA 1 Salmonid Recovery Plan 2005 WRIA 1 2018-2021 4-Year Work Plan (Salmon Recovery Actions). WRIA 1 Watershed Management Board. 2020.
Priority in Recovery Plan (2458) (B.1.b.11.b)	Listed as a Priority in the Chinook tab in the 4-Year Work Plan

AGENCY INDIRECT COSTS

Agency Indirect

Total cost for Agency Indirect	$10,517

Overall Project Metrics

COMPLETION DATE

Projected date of completion	03/31/2023

Planning Cost Estimates

Worksite #1: SF Nooksack River 4 miles upstream from Acme, WA

Category	Work Type	Estimated Cost	Note
Agency Indirect Costs	Agency Indirect	$10,517	

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Category	Work Type	Estimated Cost	Note
Agency Indirect Costs	Agency Indirect	$10,517	
Design for Salmon restoration	Conceptual Design (B.1.b.11.a RCO)	$107,134	
	Subtotal:	$117,651	
	Total Estimate For Worksite:	$117,651	

Summary

Total Estimated Costs:	$117,651
Total Estimated Planning Costs:	$117,651

Cost Summary

	Estimated Cost	Project %	Admin/AA&E %
Planning Costs			
Planning	$117,651		
SUBTOTAL	$117,651	100.00 %	
Total Cost Estimate	$117,651	100.00 %	

Funding Request and Match

FUNDING PROGRAM

Salmon State Projects	$100,000	85.00 %

SPONSOR MATCH

OTHER MONETARY FUNDING	GRANT - FEDERAL		
Amount			$17,651.00
Funding Organization			
Grant Program			
	Match Total:	$17,651	15.00 %
	Total Funding Request (Funding + Match):	$117,651	100.00 %

Questions

#1: Explain how you determined the cost estimates

> Costs were estimated from similar design projects on the South Fork.

Cultural Resources

Worksite #1: SF Nooksack River 4 miles upstream from Acme, WA

#1: Describe any planned ground disturbing pre-construction/restoration work. This includes geo-technical investigation, fencing, demolition, decommissioning roads, etc.

> The only pre-construction work expected is on the ground field surveys. There may be a piezometer containing temperature probes/water level loggers installed in a few locations.

#2: Describe the existing project area conditions. The description should include existing conditions, current and historic land uses and previous excavation/fill (if depths and extent is known, please describe).

> The project area was considered the most impaired reaches of the Skookum Edfro area due to the loss of anastomosing channel morphology. Adjacent properties are owned by Whatcom Land Trust and private residential landowners. Current nearby land use is conservation, residential and agriculture. There is existing riprap on about 1,400 feet of the right bank and 600 feet on the left bank.

#3: Will a federal permit be required to complete the scope of work on the project areas located within this worksite?

No

> This is only a design grant

#4: Are you utilizing Federal Funding to complete the scope of work? This includes funds that are being shown as match or not.

No

#5: Do you have knowledge of any previous cultural resource review within the project boundaries during the past 10 years?

Unknown

We are not aware of any cultural resource review that has been completed in the last 10 years. A cultural resource review of the right bank floodplain between RM 13.7 and 13.9 was completed in 2009 under Section 106 of the Army Corps of Engineers Nationwide Permit for the Skookum Edfro Phase 1 Restoration Project.

#6: Are there any structures over 45 years of age within this worksite? This includes structures such as buildings, tidegates, dikes, residential structures, bridges, rail grades, park infrastructure, etc.

Yes

#6a: List the structure(s) and the properties that they are located within the project area. Identify which structures will be removed or altered as part of this proposal. Attach at least one photo of each structure. The photo must be labeled so that the structure may be geographically located within your project area.

Saxon Bridge is at the downstream boundary of this worksite (Photo 11a). The design will evaluate options for adding a dry bridge or culvert(s) on the north side of the bridge to encourage flows under Saxon Road. Riprap lies in the middle of the worksite and the design will evaluate methods to cover with wood (Photo 12a). The age of the riprap is unknown, but may have originated more than 45 years ago.?As this is a design project, no structures will be removed or altered as part of this proposal.

Project Permits

Permits and Reviews	Issuing Organization	Applied Date	Received Date	Expiration Date	Permit #
None - No permits Required					

Attachments

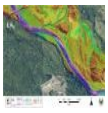
Required Attachments	5 out of 5 done
Applicant Resolution/Authorizations	✓
Cost Estimate	✓
Map: Planning Area	✓
Photo	✓
RCO Fiscal Data Collection Sheet	✓

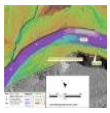
PHOTOS (JPG, GIF)

Photos (JPG, GIF)


422037


422038


433430


433445


470526

PROJECT DOCUMENTS AND PHOTOS

Project Documents and Photos

File Type	Attach Date	Attachment Type	Title	Person	File Name, Number Associations	Shared
	10/11/2021	Project Review Comments	Proj Review Comments Final, 21-1153P(compl 10/11/21 13:04)	MarkJ	Project Review Comments Report - 21-1153 (compl 10-11-2021_13-04-08).pdf, 487122	✓
	10/11/2021	Project Review Comments	Proj Review Comments Initial, 21-1153P(compl 10/11/21 13:04)	MarkJ	Project Review Comments Report - 21-1153 (compl 10-11-2021_13-04-03).pdf, 487121	✓
	10/11/2021	Project Review Comments	Proj Review Comments LE, 21-1153P(compl 10/11/21 13:03)	MarkJ	Project Review Comments Report - 21-1153 (compl 10-11-2021_13-03-59).pdf, 487120	✓
	07/22/2021	Application Review Report	Grant Manager Comments, 21-1153P(compl 07/22/21 14:58)	AlissaF	Grant Manager Comments Report - 21-1153 (compl 07-22-2021_14-58-46).pdf, 481719	✓

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File Type	Attach Date	Attachment Type	Title	Person	File Name, Number Associations	Shared
	06/28/2021	Project Application Report	Project Application Report, 21-1153P (sub 06/28/21 09:20:43)	AlexL	Project Application Report - 21-1153 (submitted 06-28-2021_09-20-43).pdf, 479423	✓
	06/14/2021	Cost Estimate	UPDATED-SAL-CostEstimate_Skookum Edfro Phase 3 Design 061121	KelleyT	SAL-CostEstimate_Skookum Edfro Phase 3 Design Scaled Back 061121.xlsx, 476550	✓
	06/01/2021	Application Review Report	Grant Manager Comments, 21-1153P(rtnd 06/01/21 11:15)	AlissaF	Grant Manager Comments Report - 21-1153 (rtnd 06-01-2021_11-15-29).pdf, 473941	✓
	05/07/2021	Visuals	Skookum Edfro Phase 3 Design Virtual Site Visit 050621.pdf	KelleyT	Skookum Edfro Phase 3 Design Virtual Site Visit 050621.pdf, 472195	✓
	04/23/2021	Project Application Report	Project Application Report, 21-1153P (sub 04/23/21 08:29:06)	AlexL	Project Application Report - 21-1153 (submitted 04-23-2021_08-29-06).pdf, 470552	✓
	04/22/2021	Landowner acknowledgement form	pfeiffer-hoyt signed acknowledment form.pdf	AlexL	pfeiffer-hoyt signed acknowledment form.pdf, 470537	
	04/22/2021	Visuals	Skookum Edfro P3 SRFB FY21 Figures.pdf	KelleyT	Skookum Edfro P3 SRFB FY21 Figures.pdf, 470536	✓
	04/22/2021	Visuals	SaxonBridge_RoadPrism.JPG	AlexL	IMG_6159.jpg, 470526	✓
	04/19/2021	Landowner acknowledgement form	Landowner Acknowledgment_Miller.pdf	AlexL	Landowner Acknowledgment_Miller.pdf, 469766	
	02/24/2021	Project Review Comments	Proj Review Comments Final, 20-1151P(compl 02/24/21 16:27)	ScottC	Project Review Comments Report - 20-1151 (compl 02-24-2021_16-27-32).pdf, 464417	✓
	02/24/2021	Project Review Comments	Proj Review Comments Initial, 20-1151P(compl 02/24/21 16:27)	ScottC	Project Review Comments Report - 20-1151 (compl 02-24-2021_16-27-27).pdf, 464416	✓
	02/24/2021	Project Review Comments	Proj Review Comments LE, 20-1151P(compl 02/24/21 16:27)	ScottC	Project Review Comments Report - 20-1151 (compl 02-24-2021_16-27-22).pdf, 464415	✓
	12/08/2020	Cultural Resources: Formal Consultation	2020 SRFB DAHP Consulation	BrentH	2020 SRFB DAHP Consulation.pdf, 456576	✓
	07/14/2020	Project Review Comments	Project Review Comments Report, 20-1151P(accepted 07/14/20 0	AlissaF	Project Review Comments Report - 20-1151 (accepted 07-14-2020_09-38-24).pdf, 438260	✓
	06/09/2020	Visuals	Geomorphic conditions left floodplain.jpg	AlexL	Skookum 3 Geomorph_Left_Floodplain.jpg, 433445	✓
	06/09/2020	Visuals	Relative Water Surface Project Reach.jpg	AlexL	Skookum Edfro Phase 3 RWSE.jpg, 433430	✓
	05/21/2020	Landowner acknowledgement form	SAL-LandownerAckForm Whatcom PW.PDF	AlexL	SAL-LandownerAckForm Whatcom PW.pdf, 426910	
	05/21/2020	Landowner acknowledgement form	RCO-AppendixF-signed-20200520 Heidi Nelson.pdf	AlexL	RCO-AppendixF-signed-20200520 Heidi Nelson.pdf, 426909	
	05/14/2020	Landowner acknowledgement form	RCO-AppendixF-signed-20200514 DNR Uplands.pdf	AlexL	RCO-AppendixF-signed-20200514 DNR Uplands.pdf, 425718	
	04/16/2020	Photo	Upstream Saxon Bridge.JPG	AlexL	Upstrm Saxon Bridge.jpg, 422038	✓
	04/16/2020	Photo	RB riprap_LB floodplain_Rapid upstrm at start of riprap 1.JP	AlexL	RB riprap_LB floodplain_Rapid upstrm at start of riprap 1.jpg, 422037	✓
	04/16/2020	RCO Fiscal Data Collection Sheet	FiscalDataCollectionSheet_Lummi2019.pd	AlexL	FiscalDataCollectionSheet_Lummi201… 422035	
	04/16/2020	Map: Planning Area	Figure 1 EdfroP3VicinityMap.pdf	AlexL	Figure 1 EdfroP3VicinityMap.pdf, 421953	✓
	04/16/2020	Landowner acknowledgement form	Signed LA WLT.pdf	AlexL	Signed LA WLT.pdf, 421952	
	04/16/2020	Landowner acknowledgement form	RCO-AppendixF-signed-20200403 DNR.pdf	AlexL	RCO-AppendixF-signed-20200403 DNR.pdf, 421951	
	04/03/2020	Applicant Resolution/Authorizations	FakeAuthorizingResolutionForm	AlissaF	FakeAuthorizingResolutionForm.docx, 420115	✓

Application Status

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Application Due Date: null

Status Name	Status Date	Submitted By	Submission Notes
Application Complete	07/22/2021	Alissa Ferrell	
Application Resubmitted	06/28/2021	Alex Levell	Updated the budget, deleted the original. Uploaded sponsor response to Review Comments. Adjusted some text in objectives for clarity. Used the new version of the APE map, deleted the original.
Application Returned	06/01/2021	Alissa Ferrell	
Application Submitted	04/23/2021	Alex Levell	
Preapplication	03/08/2021		

I certify that to the best of my knowledge, the information in this application is true and correct. Further, all application requirements due on the application due date have been fully completed to the best of my ability. I understand that if this application is found to be incomplete, it will be rejected by RCO. I understand that I may be required to submit additional documents before evaluation or approval of this project and I agree to provide them. (Alex Levell, 06/28/2021)

Date of last change: 10/11/2021