

Washington State Department of Transportation
Natural Systems Design, Inc.

Skagit CED O'Brian Reach Feasibility Study

Scope of Work Summary

July 13, 2022

PROJECT BACKGROUND

State Route 20 near milepost 101 (upstream of the Dolotimber structures) has experienced frequent inundation and erosion from small and medium-sized floods along the Skagit River. This site is located at the downstream end of the O'Brian Reach of the Skagit River (River Miles 72-75). A solid scientific investigation into fluvial processes that influence inundation and erosion, and directly affect highway infrastructure, aquatic habitat, and adjacent landowners will help WSDOT consider options for protecting SR 20 while also protecting aquatic habitat and adjacent landowners.

To develop a creative solution for protecting highway infrastructure that is more resilient to climate change and friendly to fish habitat, WSDOT solicited a grant from the Salmon Recovery Funding Board (SRFB) to conduct a study that will examine existing channel hydraulics and sediment transport in the river, and how they affect habitat, SR 20, and private land. The study will also look at how future changes to the river associated with the warming climate and river management could change those effects. This will provide a valuable assessment of existing and future hazards to landowners and resource managers. Our intent is to determine if there are actions that would improve fish habitat, reduce erosion and repairs at SR20, and benefit adjacent landowners.

The project focus is a feasibility assessment. Current topography within the study reach reveals large meanders within the valley bottom that are no longer engaged with the river during small and medium sized floods. Historic maps from the late 1800s and early 1900s show the river occupied some of these meanders and had significantly more channel length than the present river. The assessment will not only focus on historic changes and future projections, but whether better floodplain engagement in the O'Brian Reach could have beneficial effects to SR 20 and habitat while not adversely impacting private land.

Because a proposed construction project would be off highway right-of-way and would require partnering with other stakeholders to implement, WSDOT needs to engage potential partners very early in the project development process. Therefore, we included a substantial outreach component in our proposal, as we are committed to regular communications, not only to keep stakeholders and landowners informed throughout the analysis, but to incorporate their feedback, comments, and concerns.

During the latter part of the project, we will look at scenarios of how natural changes in the river or restorative actions would affect or influence SR 20, aquatic habitat, and adjacent landowners. If these changes elevate risk to infrastructure, the study will be invaluable to future projects focused on developing possible solutions. This proposed feasibility assessment lays a foundation for future planning and will make recommendations that have been thoroughly vetted with key stakeholders and the community.

FEASIBILITY STUDY GOALS

The NSD Team will conduct a feasibility study that investigates fluvial processes, examining historic changes and estimating future changes if no actions are taken. We will then assess whether actions, such as improving the river's connectivity to side channels and abandoned meanders within a 3.7-mile study reach of the Skagit River floodplain, would have beneficial effects to SR 20 and habitat while not adversely impacting private landowners. The study will engage stakeholders and present conceptual alternatives to select a concept that would be designed and constructed at a later phase. The goal of the project is to improve and restore habitats for native salmonids by reconnecting relic Skagit River side channels during small to medium sized floods and evaluate potential resulting hydraulic effects on SR 20. Please see the attached PRISM Fact Sheet for Project 20-1350 for information on this study, and the LECC supplement for more information on the goals of the stakeholder outreach.

The assessment will be overseen by Dr. Tim Abbe, a licensed engineering geologist in Washington State with expertise in geomorphology, channel migration zone delineation, and the influence of wood in large river systems. Other areas of expertise will include hydrology and hydraulic modeling, river restoration design, fish habitat quantification, and stakeholder outreach.

The study will:

- Describe the current geomorphology, hydrology, and aquatic and riparian habitat in the O'Brian Reach.
- Investigate existing fluvial processes that influence inundation and erosion of existing floodplain flow paths and the main channel, and their effects on aquatic habitat, highway infrastructure, and private development.
- Summarize geomorphic and hydrologic historic changes to the Skagit River within the O'Brian Reach.
- Discuss how these changes have influenced floodplain connectivity and geomorphic processes such as bank erosion and flooding.
- Assess historic trends in channel migration and predict future changes under the current hydrologic and sediment regime of the river.
- Develop several project alternatives that enhance floodplain processes.
- Identify floodplain reconnection opportunities that maintain side channel inlet connectivity.
- Identify structural alternatives that will re-engage side channel inlets and floodplain processes during small and medium sized floods.
- Quantify the extent and quality of fish habitat gain.
- Risk analysis that evaluates the effects of the alternatives on shear stress, flow velocities, channel migration and potential avulsion to State Route 20, other infrastructure, surrounding properties, and adjacent restoration work.

In collaboration with stakeholders, identify a preferred concept that maximizes the diversity and extent of floodplain habitats, reduces flood and erosion risk to SR 20, and maintains or reduces risk to other infrastructure and adjacent landowners. The concept should also be resilient to changes in the river associated with a warming climate.

SCOPE OF WORK

Task 1: Project Management, Meetings, Technical Support and Stakeholder Coordination

- Kick off meetings
- Technical preparation for stakeholder meetings
- Project management and administration

Task 2: Stakeholder Outreach

- Develop stakeholder engagement plan
- Implement plan (as budget allows) – early engagement, stakeholder meetings and workshops, point of contact

Task 3: Hydrology and Hydraulic Modeling

- 2D hydraulic model
- Hydrology from the ACOE Skagit GI, USGS gages

Task 4: Habitat Quantification by Alternative

- Model habitat quality under the one-year, 90% September, and 50% June exceedance flows
- Evaluation of level of connectivity vs. flow
- Habitat suitability curve application and mapping of habitat suitability index output for four species and life stage combinations

Task 5: Bank Migration Characterization/Geomorphologic Assessment

- Characterization of bank migration processes in the project reach
- Map Historic Channel Occupation Zone and determine rates of lateral retreat
- Characterize mechanisms of erosion flow levels for sediment mobilization, and potential avulsion hazards
- Develop empirical bank erosion model for evaluating alternatives

Task 6: Risk Assessment

- Identify easement or acquisition requirements for each alternative
- Evaluation of effects of no-action and restoration alternatives on flooding, channel migration, avulsions affecting property, State Route 20, utilities and other infrastructure and adjacent project efforts.

Task 7: Conceptual Design Development and Refinement

- Develop and analyze at least two action alternatives that do not pose unacceptable risks
- Identify major work actions
- Develop concept images
- Summarize how features support improvements to limiting factors for salmon and steelhead
- Compare attributes of alternatives to existing conditions
- Concept level (order of magnitude) cost estimates

DRAFT SCHEDULE (SUBJECT TO CHANGE BASED ON PROJECT NEEDS)

2022

January – Data Review Summary/Existing Data, potential slides for outreach

February – Target for VEDA to be contracted with WSDOT

March – Draft Outreach Plan Submittal

April – SEP finalized- coordination with WSDOT internal staff

May – Initial emails and letter development

June – Access permission work, Field work at O’Brian Reach

July – Review of field information/concepts

August – LIDAR expected, 2nd field visit (partial Team)

September – Model development

October– Model QA/QC, Prep for workshop 1 – Existing Conditions Assessment

Early November - Existing Condition Model presentation/outreach

2023

January - Alternatives Development – ongoing, using input from November Meeting

February– Alternatives Modeling

March– WSDOT – initial review of modeling results,

April- revisions by NSD as needed

May – Preparation for Workshop 2

June - Workshop 2 – Presentation and discussion of Alternatives

July- Incorporate feedback and revise

August – Incorporate feedback and revise

September – Draft Report Development, Draft Concept Design

October– Revisions to Report

November – Final Report with recommended alternative, final conceptual design

December– Contract ends

Study Contact:

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Skagit CED O'Brian Reach Feasibility Study

Study Area Figures

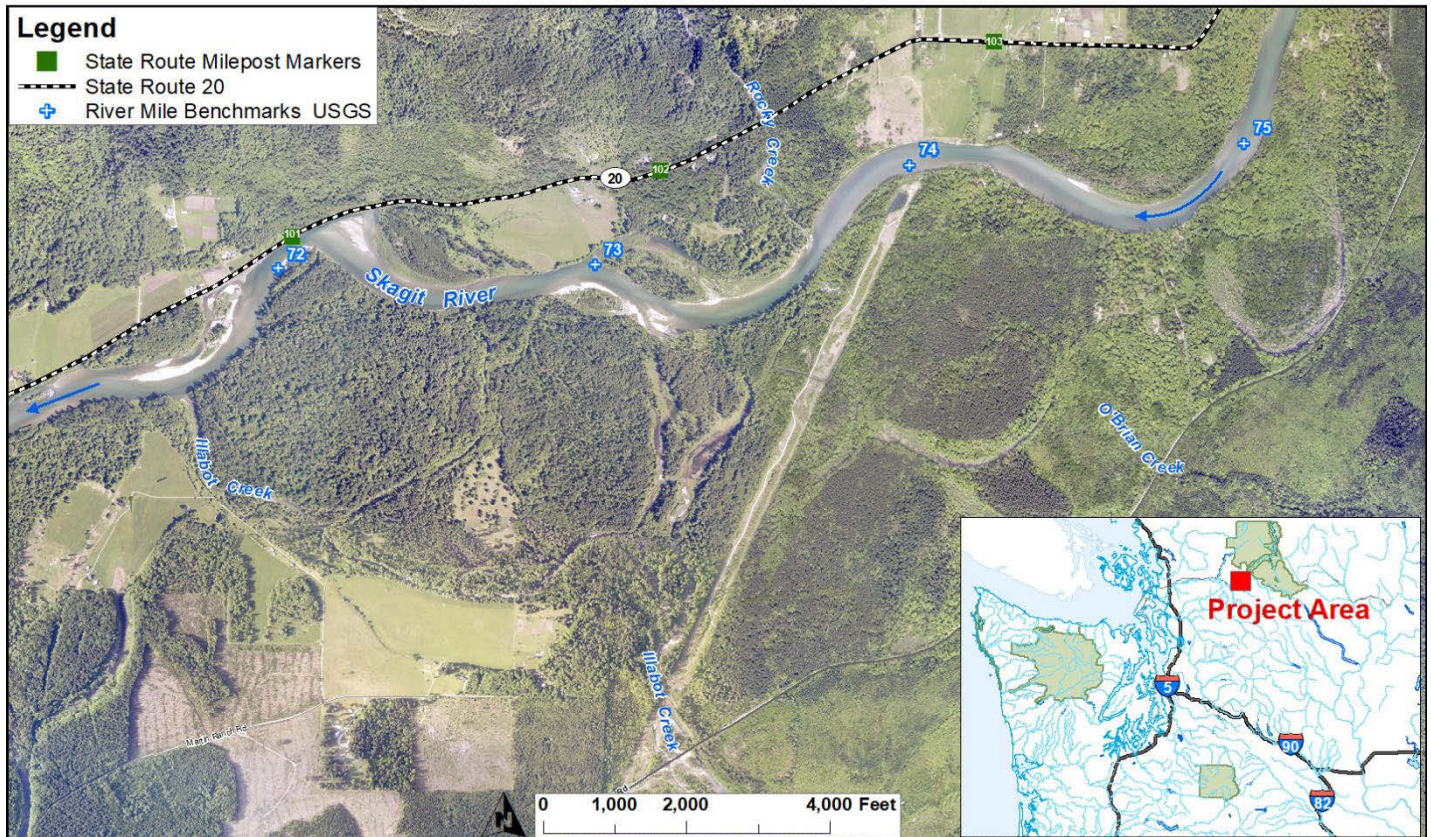


Figure 1. Skagit River O'Brian Reach Feasibility study vicinity and study reach.

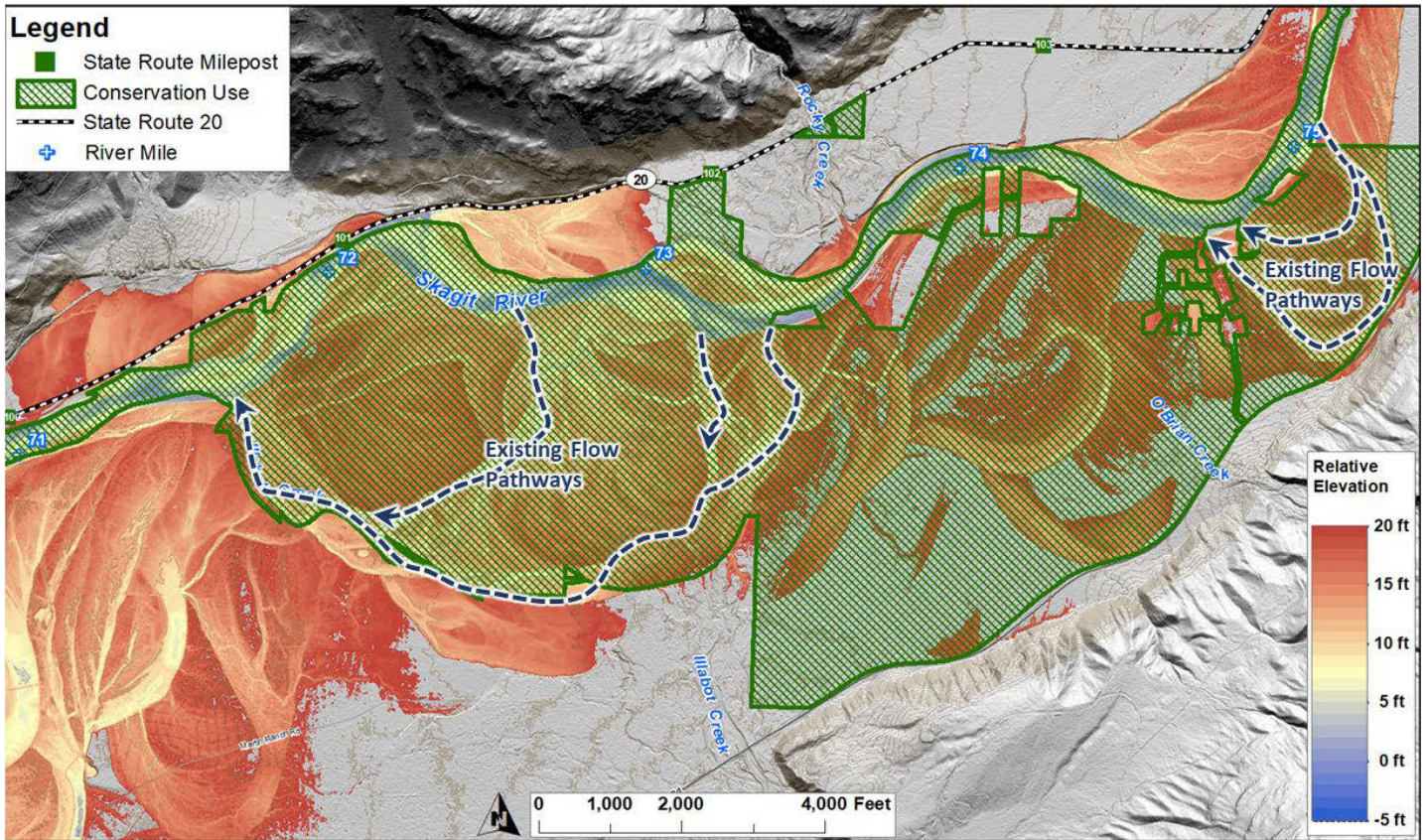


Figure 2. Land Currently in Conservation Use in the Study Reach.

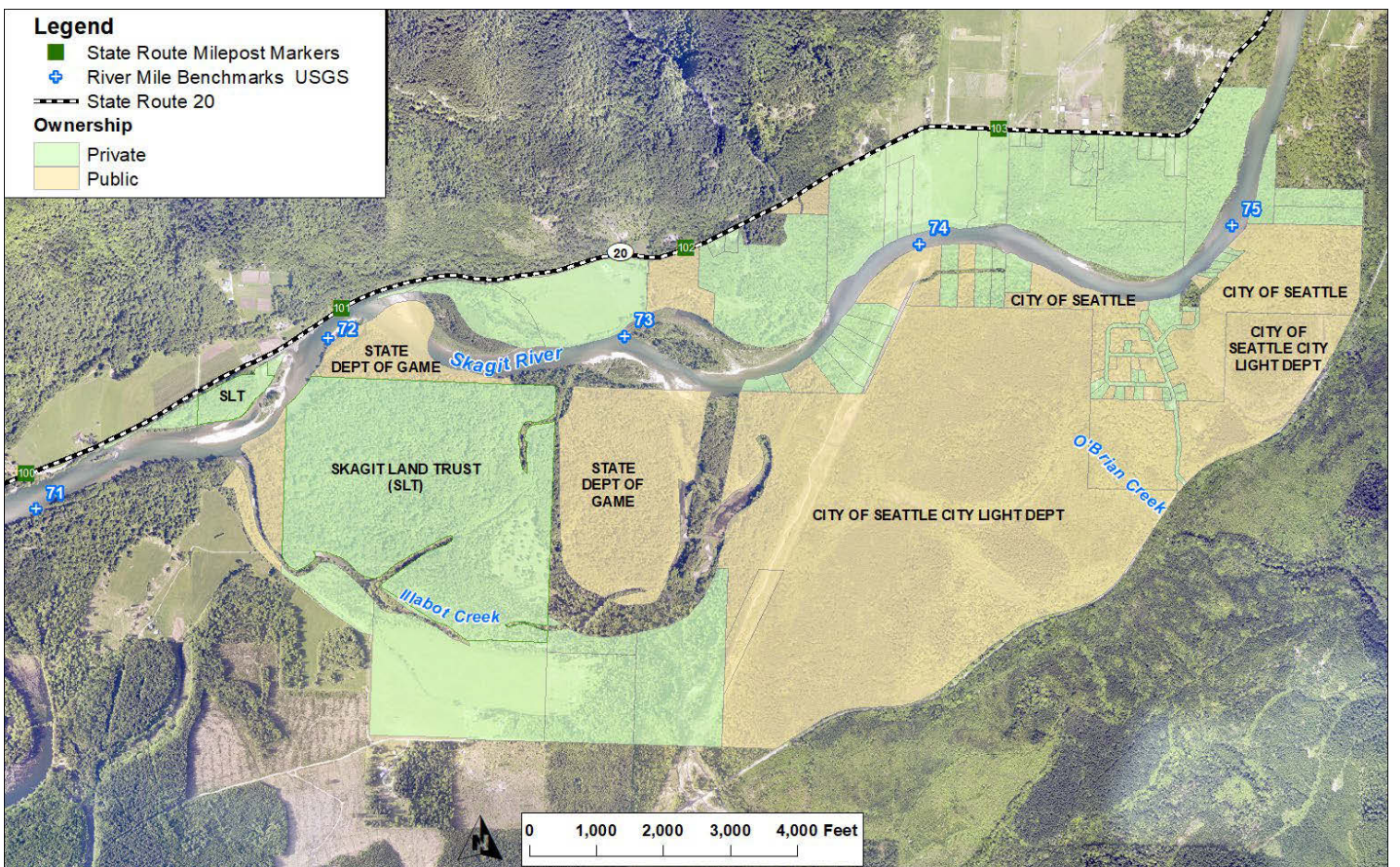


Figure 3. Major Landowners in the Study Reach.