# Biological Assessment Report

*North Fork Road Emergency Bank Repair*
*[NWP-2021-1136]*

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**February 2022**

Whatcom County Public Works
322 North Commercial St, Suite 301
Bellingham, WA 98225

# Biological Assessment Report

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# EXECUTIVE SUMMARY

A series of three high water events in the Nooksack River in mid to late November 2021 caused severe bank erosion of a 30 ft high river bank that removed a 100-foot section of North Fork Road in Whatcom County, WA. To prevent further bank erosion and enable re-construction of the roadway, Whatcom County Public Works constructed a rock toe at the base of the eroding bank, re-sloped the bank to a stable angle, place topsoil and erosion matting, and plant the bank with native trees and shrubs. Thirty-five LWD pieces were imported and incorporated in the rock toe. Also, three trees removed from the bank during construction were re-located to the upstream end of the repair to help re-direct flow and provide additional fish habitat.

The project was designed to avoid and minimize impacts to listed species and habitats. The footprint of the proposed revetment was minimized to the maximum extent possible, and impact minimization measures employed during the project further minimize project effects.

This project includes work below the ordinary high-water mark of the North Fork Nooksack, a water of the U.S., and requires a federal permit from the US Army Corps of Engineers. Therefore, the project has a federal nexus to the 1973 Endangered Species Act, as amended.

This Biological Assessment evaluated species presence in the action area based on a combination of previously documented reports, on-site observations, and habitat availability. The federally-listed species in the action area include bull trout, Chinook salmon, and steelhead trout. Direct and indirect impacts from construction were minimized by employing conservation measures and Best Management Practices so that impacts were discountable or insignificant. Therefore, construction related impacts may affect but will not adversely affect bull trout, steelhead trout, Chinook salmon; Chinook, and steelhead critical habitat; and will not adversely affect EFH for the Pacific salmon fishery. The project will have no interdependent, interrelated effects.

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# INTRODUCTION

A series of three high water events in the Nooksack River in mid to late November 2021 caused severe bank erosion of a 30 ft high river bank that removed a 100-foot section of North Fork Road in Whatcom County, WA. To prevent further bank erosion and enable re-construction of the roadway, Whatcom County Public Works constructed a rock toe at the base of the eroding bank, re-sloped the bank to a stable angle, and plan to place topsoil and erosion matting, and plant the bank with native trees and shrubs. Thirty-five LWD pieces were imported and incorporated in the rock toe. Also, three trees removed from the bank during construction were re-located to the upstream end of the repair to help re-direct flow and provide additional fish habitat.

The project was designed to avoid and minimize impacts to listed species and habitats. The footprint of the proposed revetment was minimized to the maximum extent possible, and impact minimization measures employed during the project to further mitigate project effects.

The purpose of this project is to halt bank erosion and repair a portion of North Fork Road that is the sole-access to an isolated community. This project includes work below the ordinary high-water mark (OHWM) of the North Fork Nooksack River, a water of the U.S., and requires a federal permit from the US Army Corps of Engineers. Therefore, the project has a federal nexus to the 1973 Endangered Species Act, as amended. This biological assessment has been prepared to address federally-listed species and critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries) (Appendix B).

A coordination meeting with WDFW, the Army Corps occurred on November 30th, 2021. A follow-up meeting with representatives from WDFW occurred while construction was underway on December 6, 2021 to discuss project impacts and potential mitigation opportunities.

# PROJECT DESCRIPTION

## Project Setting

The North Fork Road emergency bank stabilization project is located in a broad valley formed by the North Fork Nooksack River (Water Resource Inventory Area #01-0120) (Hydrologic Unit Code 1711000405). The project is located approximately four miles east of the town of Deming in Whatcom County, Washington (T39N; R5E; Section 22) (Figure 1). The NF Nooksack forms an approximately 1,200-foot-wide floodplain with numerous braids and mid-channel gravel bars as it flows through an un-confined valley between Sumas Mountain to the West and Slide Mountain (figure 1). Land use on the valley bottom is chiefly agricultural and rural residential houses, with forestry dominating the surrounding foothills.

The project is located at the center of the geomorphic reach which extends from the Mosquito Lake Road Bridge at river mile (RM) 41 upstream to the beginning of a short, confined reach at RM 43.2 (Figure 1). Near the downstream end of the reach Bell Creek enters from the right bank, and in the middle of the reach Kenny Creek enters from the left bank, just south of the project area. The reach is a broad, heavily braided alluvial floodplain with several side channels and a few vegetated Islands. The reach is bounded on land by SR 542 to the west and the North Fork Road to the east (figure 1). In the project area, the NF Nooksack channel has occupied the western half of the active floodplain since 2005 with a small side channel occupying the left bank margin of the floodplain. This changed during the November 2021 floods when a major channel braid shifted to occupy this side channel, and eroded the high bank in the project area.

The eastern margin of the floodplain is armored with rock immediately south of the project where a portion of the high bank was lost in a similar flood event in the 1990s. Since implementation of the emergency action, the majority of the river flow remains directed at the high bank in the project area.

## Project Area Description

The North Fork Road emergency repair project is located on the east bank of the Nooksack River at RM 42, in the 5900 Block of North Fork Road, approximately 1.8 miles from the SR-542 intersection with Mosquito Lake Road, Deming, WA, Whatcom County (Section 32; Township 39 N; Range 5 E, W.M.) (Figure 1). The project area is defined by the immediate impact area surrounding the North Fork Road bank repair (Figure 2). The center of the project is located at 48.853447 N Latitude and -122.146038 W. Longitude. The average elevation is approximately 330 feet above sea level. Topographically, the project area is a relatively flat, elevated river terrace along the eastern river bank. The project area is approximately 0.9 acres in size, approximately 350 feet long, and varies in width from approximately 150 ft. at the widest point to 40 ft. at the narrowest point. This work area includes all proposed access routes, staging areas for equipment and material stockpiles, and proposed work areas within the river channel and along the river banks.

The North Fork is the central feature within the project area. Land use adjacent to the river is agricultural pasture and rural residential farmsteads. The river flows through a braided channel in the project reach, one 100-foot-wide braid of which flows along the bank in the project area. The channel is characterized by large gravel bars and small woody debris accumulations, with a substrate dominated by medium sized gravel and cobble. The river bank downstream of the project area is armored with rip-rap to protect the North Fork Road roadway from flood scour. The riparian buffer up and downstream of the project area is approximately 60 to 80 feet wide, and is composed of Sitka spruce, Douglas fir, big leaf maple, and red alder trees and scattered native understory shrubs (Figure 3).

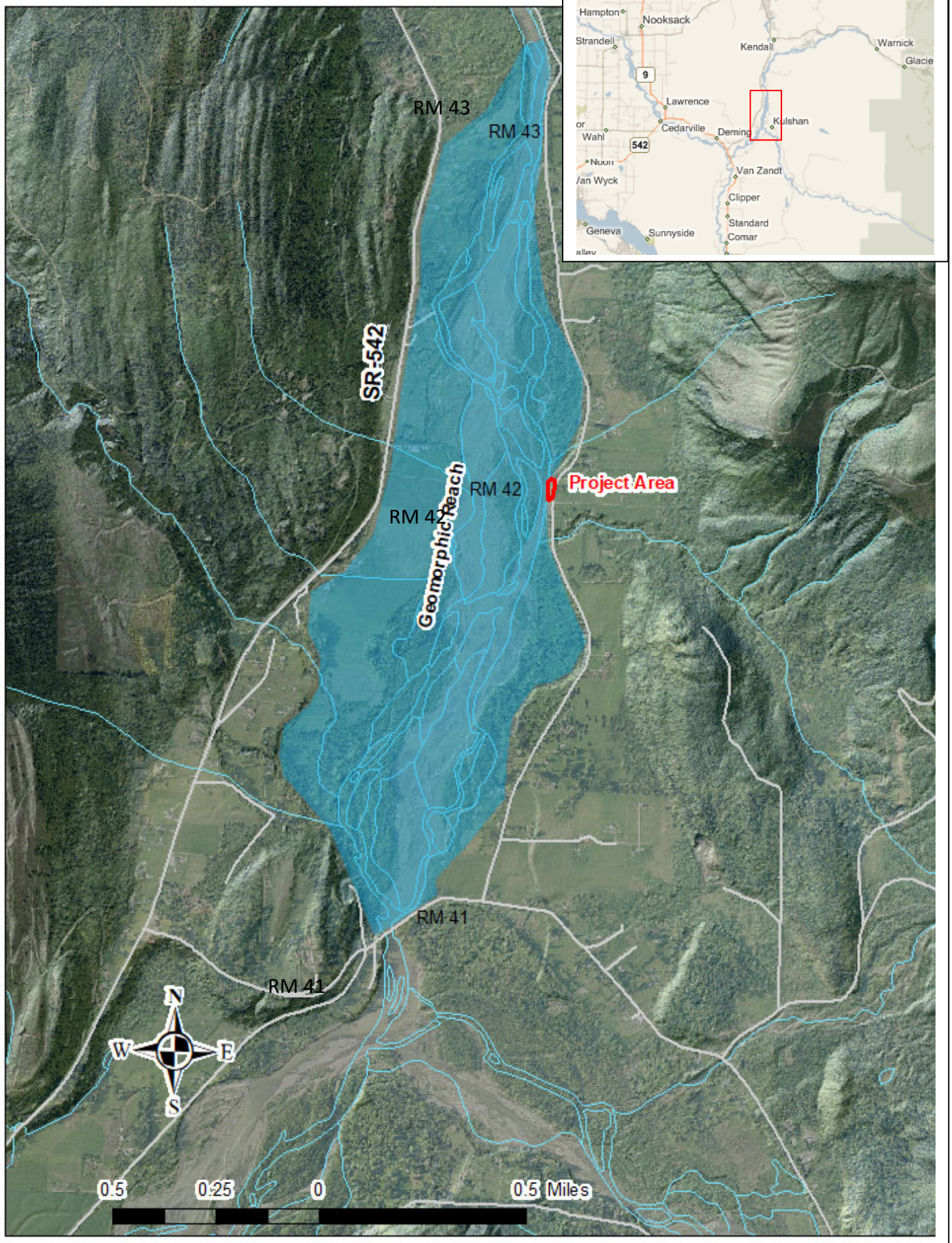


**Figure 1. Vicinity and River Reach**

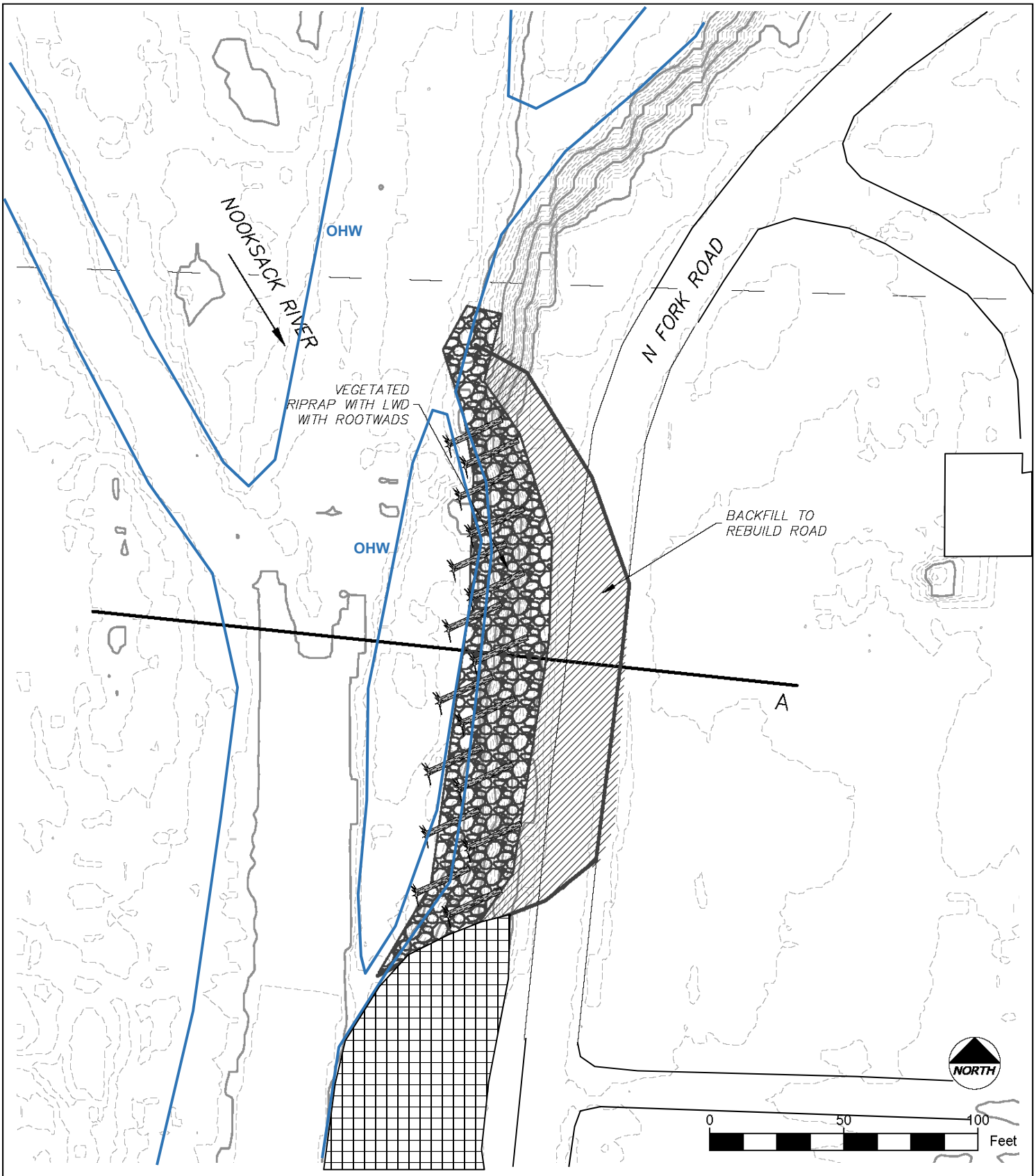


**Figure 2. Project Area**

**Figure 3. Riparian Buffer**

Repair work started 11/6/2021 with installation of erosion and sediment control BMPs and construction fencing, and construction of a traffic bypass through the yard of the adjacent residence (Figure 4). Next, the eroded bank was laid back to a stable angle, and a temporary access ramp was constructed down to the waterline of the river. From the access ramp, a 40-foot-wide (max) X 270-foot-long X 10-foot-thick rock toe (7.4 CY / LF) made of 6' diameter heavy loose rip rap was constructed below the OHWM (defined by the perennial vegetation line and shelving on an undisturbed portion of the project area) that was slowly expanded waterward to the final design toe location (Figure 5).

Thirty-five large logs with root wads were placed with an excavator in two layers with the root wads extending past the rock face into the river. The lower layer was placed below the water line as far as possible, and the upper layer staggered with the lower layer such that two logs were placed every 15 feet of bank length. During the process of setting the rock and logs in the river, the excavator remained on an elevated terrace composed of rip rap.

The Contractor was monitoring the turbidity visually as he proceeded. The intermittent nature of rock and log placement kept the turbidity well within water quality standards at the point of compliance 300 feet downriver. Three undermined trees (two cedar, one spruce) that were on an eroding vertical bank at the northernmost part of the project were removed with an excavator with root wads intact and placed in the river at the upstream end of the project for additional habitat.

**Figure 417. Traffic Bypass**

**Figure 5. Rock Bench with LWD**

**Figure 6. Completed slope**

Once the toe rock bench and habitat logs were finished, the slope was re-built in lifts with an excavator and vibratory roller at a 1. 25H:1V slope angle using stockpiled native soil and imported gravel from a local commercial pit. Part way up the slope, while the rip rap was still within reach, one foot of sandy native soils was placed over the exposed rip rap above the OHW line and tamped into the rock voids. The remainder of the slope was constructed in compacted lifts of bank run gravel to the elevation of the roadway as shown on the design plans (Figure 6) (Appendix A).

The damaged section of North Fork Road in the project area was reconstructed using compacted gravel base and crushed rock top course using excavators, bulldozers, dump trucks and vibratory rollers. The temporary traffic bypass was removed and the disturbed areas restored to pre-existing conditions. Finally, the reconstructed road section will be paved and striped, and restored areas of the temporary bypass road ill be seeded with pasture grasses when the weather conditions were conducive to grass growth.

Following road reconstruction, a one-foot thick lift of topsoil was placed over the reconstructed slope, covered with erosion control matting, and planted with native trees and shrubs as shown in the planting plan (Appendix F).

## Project Timing

The project was constructed between December 6, 2021 and March, 2022 with in-water work occurring between December 6 and December 10, 2021, and plant installation in mid-February, 2022.

## Agency Coordination

A coordination meeting with WDFW, the Army Corps occurred on November 30th, 2021. A follow-up meeting with representatives from WDFW occurred while construction was underway on December 6, 2021 to discuss project impacts and potential mitigation opportunities.

### *Vegetation Impacts and Re-Vegetation Plan*

Three mature cedar trees and one large Sitka spruce tree were removed from the northern tip of the project area to facilitate construction, and placed in the river for habitat features. This included removing a 300 Square foot area at the top of bank supporting sword fern (*Polystichum munitum*), salmonberry (*Rubus spectabilis*), snowberry (*Symphorocarpus albus*), and Himalayan blackberry (*Rubus armeniacus*) shrubs.

Following completion of bank re-shaping, riparian buffer areas between the river and the North Fork Road were, stabilized with erosion control fabric and planted with a mixture of Douglas Fir (*Pseudotsuga menziesii*), Sitka spruce (*Picea sitchensis*) on 12-foot centers, and snowberry (*Symphoricarpos alba*), black twinberry (*Lonicera involucrate*), and Pacific ninebark (*Physocarpus capitatus*) on four-foot centers according to the planting plan (Appendix XX).

### *Stormwater Treatment*

No new impervious surface was created so no stormwater treatment was required or installed.

## *Erosion Control Plan*

Standard erosion and sediment control BMPs listed in the 2020 WSDOT Highway Runoff Manual were used to minimize construction related impacts to water quality. BMPs remained in place until disturbed areas are stabilized with coir cloth. Construction crews were trained in Temporary Erosion and Sediment Control (TESC) measures. The contractor had a Certified Erosion and Sediment Control Lead (CESCL), and Whatcom County had a trained construction inspector on-site to monitor the contractor and site conditions to ensure that all work is performed to State standards.

## *Spill Prevention Plan*

Spill kits were required on vehicles on site, refueling took place well away from the water and fuel was contained in truck mounted tanks, and construction was monitored by a Whatcom County construction inspector that is trained in spill response.

## *Conservation Measures*

The following conservation measures were provided to minimize impacts to the project area and associated habitat.

## *Best Management Practices (BMPs)*

The following is a list of BMPs employed on site during and after the construction.

**Permanent Cover:**

- Preserving Vegetation – Clearing limits were clearly marked and disturbance kept to a minimum.
- Permanent Seeding and Planting – all areas disturbed by construction activities were either covered with coir cloth and planted with native trees and shrubs, or seeded with an erosion control mix.

**Sediment Retention:**

- Earthwork Timing – All earth work was suspended during periods of heavy rainfall, and major earth moving activities were delayed until dry weather was forecast.

## *Additional Conservation Measures*

- Minimized the construction footprint to avoid creation of a habitat conducive to undesirable species.
- Project oversight by qualified biologist.
- Minimized work below the OHW line.
- Maintained WSDOE water quality standards during construction (WAC 173-201A-200 (1) (e) (i) (C)).
- Restored disturbed areas with native plants.
- Picked up all unnecessary sediment cloth, stakes, markers, flagging and litter and food waste from the work area and dispose off-site.
- Implemented erosion prevention and sediment control BMPs.

# ACTION AREA

The action area is based on the reasonable extent of construction related disturbance resulting from the revetment construction, and includes both terrestrial and aquatic zones of impact. An on-site traffic detour route through an adjacent pasture was employed, so detour traffic impacts are not included in this assessment.

## *Terrestrial Zone of Impact*

Noise impacts define the size of the action area since the areal extent of construction related noise that exceeds ambient noise levels covers the largest area of potential project impacts. Project-related terrestrial noise was calculated following the noise assessment protocol in the WSDOT *Biological Assessment Preparation for Transportation Projects* (WSDOT, 2020). The maximum noise estimate for construction activities is 83 dBA at 50 feet for two hydraulic excavators and dump trucks. Baseline noise in the project area is 45 dBA based on population density and river noise (Appendix C). Project-related noise is expected to extend 1,657 feet (0.31 miles) over land before it attenuates to the ambient background sound level (Figure 7) (Appendix C).

### Aquatic Zone of Impact

Turbidity impacts resulting from the placement of rock and habitat logs are the farthest-reaching aquatic impact in the river and determine the extent of the aquatic zone of impact in the NF Nooksack (Figure 7). Project-related turbidity did not exceed the DOE water quality standard for turbidity within the mixing zone that extends downstream. The point of compliance for streams with discharge greater than 100 cfs at the time of construction is 300 feet (WAC 173-201A-200 (1) (e) (i) I).

# SPECIES AND HABITAT INFORMATION

## *Species and Critical Habitat Addressed in the BA*

The USFWS and NMFS species lists identify species and critical habitat potentially present throughout Whatcom County and Puget Sound, respectively. The current listings were obtained from the USFWS and NMFS web sites and are provided in Appendix B (NMFS 2022; USFWS 2022).

A Whatcom County biologist conducted field investigations on January 10, 2022, to determine the status of federally listed species and critical habitats that potentially occur within the project action area. Additional species use and habitat information was obtained from the WDFW Priority Habitats and Species (PHS) dataset, (WDFW 2017) Salmon Status Inventory (SaSI), the WRIA 1 Salmonid Recovery Plan (WC 2005), and the draft Bull Trout Recovery Plan (WC 2004). Local fish biologists Joel Ingram and Tasha Geiger of WDFW and Ned Currence of

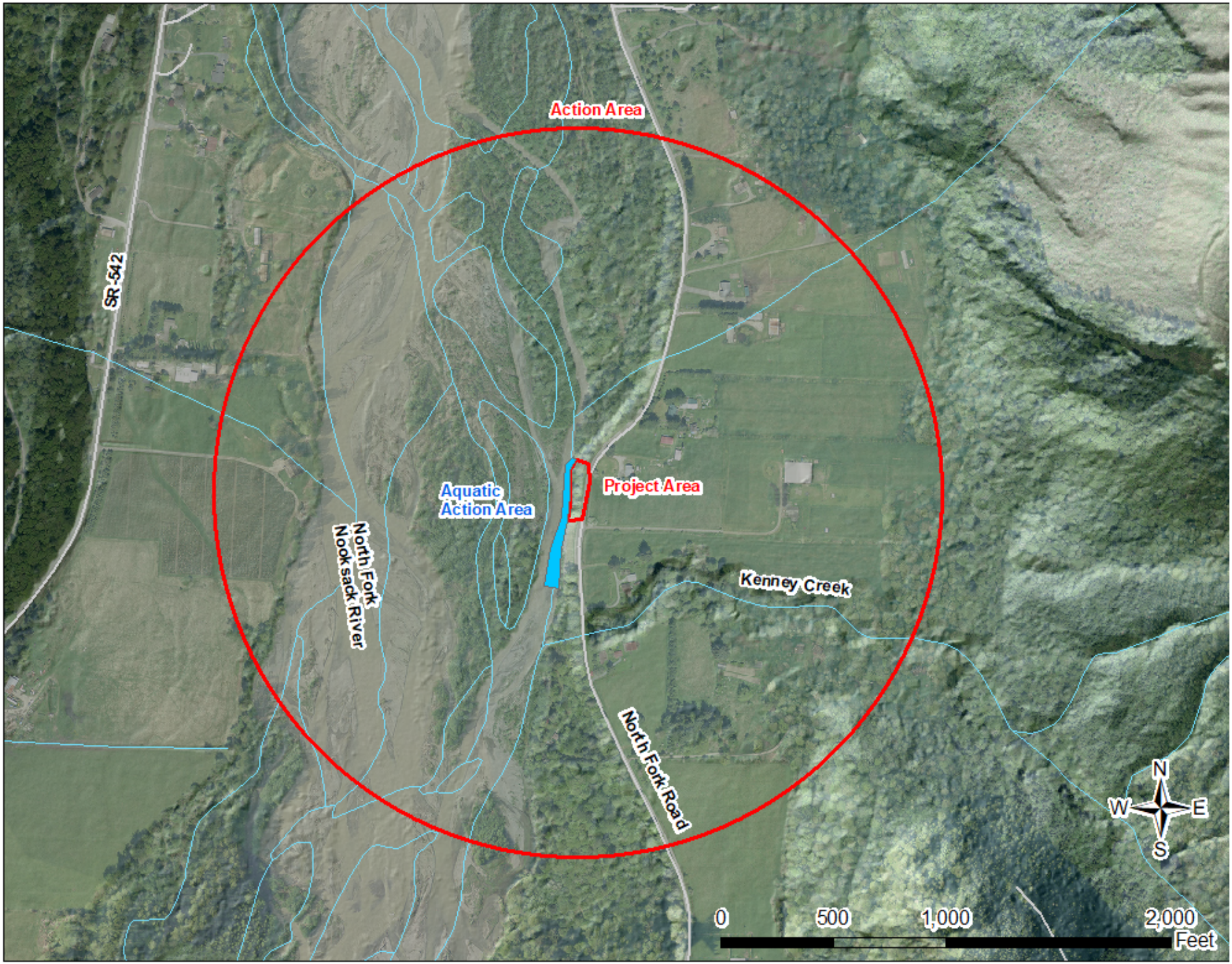


**Figure 7. North Fork Road Emergency Bank Stabilization Action Area Map**

the Nooksack Tribe were also consulted. Site specific information indicates that three listed species and three critical habitats potentially occur in the project action area (Table 1).

**Table 1 ESA-listed Species and Critical Habitat Potentially Present in the Project Action Area**

| Species | Federal Status | Critical Habitat | Jurisdiction |
|---|---|---|---|
| Coastal/Puget Sound Bull Trout DPS (*Salvelinus confluentus)* | Threatened | Not Present | USFWS |
| Puget Sound Chinook Salmon ESU (*Oncorhynchus tshawytscha*) | Threatened | Designated | NMFS |
| Puget Sound Steelhead DPS (*Oncorhynchus mykiss*) | Threatened | Designated | NMFS |

Based on field visits, literature review, and consultation with area biologists, no documented occurrences of and no suitable nesting, foraging, or breeding habitat for the other listed species in Whatcom County occur within the action area (Table 2). Because they are not considered present in the action area, the proposed project will not affect these species or critical habitats. Thus, they will not be discussed further in this report.

The list of rare plants and high-quality ecosystems from the Washington State Department of Natural Resources Natural Heritage database was also reviewed (WDNR 2021). The database did not list any rare plants or high-quality ecosystems in the project vicinity.

**Table 2 ESA-listed Species and Critical Habitat Not Addressed in the BA**

| Common Name | Scientific Name | Agency/Federal Status | Critical Habitat | Rationale for Not Addressing |
|---|---|---|---|---|
| Canada lynx | *Lynx canadensis* | USFWS/ Threatened | Not Designated | Canada lynx prefer mixed forest-coniferous forest-high tundra habitat. The action area does not coincide with either the current or historic range. |
| Gray wolf | *Canis lupus* | USFWS/ Endangered | Not Designated | Gray wolf habitat is generally open tundra and forest with human disturbance. The action area does not coincide with either the current or historic range. |
| Grizzly bear | *Ursus arctos* | USFWS/ Threatened | Not Designated | The home range for grizzlies is large forested areas in or near mountains. The action area does not coincide with either the current or historic range. |
| Northern spotted owl | *Srix occidentalis caurina* | USFWS/ Threatened | Designated | Spotted owls require mature coniferous forests for nesting and foraging. There is no suitable habitat, critical habitat, or documented occurrence in the action area. The nearest documented spotted owl occurrence is from 1993 and is over 2.5 miles south of the project area. |
| Marbled Murrelet | *Brachyramphus marmoratus* | USFWS/ Threatened | Designated | Marbled murrelets require mature coniferous forests for nesting between April and September. Work occurred in January/March. There is no suitable habitat, documented occurrence, or designated critical habitat in the action area, and no suitable nest trees were disturbed. |
| Streaked Horned Lark | *Eremophila alpestris strigata* | USFWS/ Threatened | Designated | No documented occurrence, suitable habitat, or critical habitat is present in the action area. |
| Spotted Frog | *Rana pretiosa* | USFWS/ Threatened | Not Designated | No documented occurrence, suitable habitat, or proposed critical habitat is present in the action area. |
| Yellow Billed Chuckoo | *Coccyzus americanus* | USFWS/ Threatened | Not Designated | No documented occurrence or suitable habitat is present in the action area. |

## *Presence of Federally Listed and Proposed Species in the Project Action Area*

Federally listed species that are known to be present or that might be associated with the action area include bull trout, Chinook salmon, and steelhead trout. The following section provides information on these species to determine their presence or absence in the aquatic

zone of the action area during construction. The listed fish stocks identified in the North Fork Nooksack River are provided in Table 3. Additional life history information for these species is provided in Appendix D.

**Table 3 ESA-listed Fish Stocks in the North Fork Nooksack River[1]**

| Species | Stock Name | Run Time | Origin | Production | Spawning Season |
|---|---|---|---|---|---|
| Bull Trout | Canyon Creek | Unspecified | Native | Natural/Wild | Unknown |
| | Lower Nooksack | Unspecified | Native | Natural/Wild | Sep–mid-Nov |
| Chinook | North Fork/Middle Fork | Spring | Native | Composite | Aug–late Sep |
| | Samish/Mainstem | Fall | Non-native | Composite | Early Sep–mid-Nov |
| Steelhead | Mainstem/North Fork | Winter | Native | Natural/Wild | Early Mar–early Jul |
| | North Fork/Middle Fork | Winter | Native | Natural/Wild | Early Mar–mid-Jun |

[1] SaSI (WDFW 2002 and 2004)

## Coastal/Puget Sound DPS Bull Trout

USFWS listed the Coastal/Puget Sound bull trout DPS as threatened on November 1, 1999 (FR 1999a). The DPS includes all watersheds within the Puget Sound basin and the marine nearshore areas of Puget Sound. Dolly Varden is a proposed species based on similarity of appearance (FR 2001). Although species listed under the Similarity of Appearance provisions receive some of the protections of the ESA, consultation requirements under Section 7 do not apply. Therefore, this BA does not evaluate potential impacts to Dolly Varden.

The North Fork Nooksack River has been identified as a core area that supports five known bull trout populations that spawn in the upper North Fork and its tributaries (USFWS 2004). WDFW has delineated two discrete bull trout stocks in the North Fork Nooksack basin: Lower Nooksack and Canyon Creek (WDFW 2004). All bull trout stocks in the Nooksack basin are of native origin and are maintained by wild production. The stock status for both populations is unknown. Bull trout in the Nooksack express amphidromous, fluvial, and possibly resident life history forms that potentially commingle in spawning areas.

Lower Nooksack bull trout are known to spawn and rear in the North Fork Nooksack River upstream of the project from approximately RM 50 to RM 65, as well as in several tributaries (WDFW 2004). Bull trout habitat below RM 50 is foraging and migratory (Ned Currence, 2011, personal communication). The second discrete bull trout stock in this system spawns in Canyon Creek, a major tributary to the North Fork Nooksack at RM 55. Limited data is available for this population.

Lower Nooksack bull trout spawn from September through mid-November (WDFW 2004). After spawning, resident bull trout remain nearby and fluvial bull trout move throughout the river until the next spawning season. Amphidromous bull trout migrate downstream to overwinter in the lower mainstem and then enter the estuary in early spring to forage for several months. Fry emerge from the gravel in late April to May and remain in their natal streams for two to three years. Depending on life history form, juveniles rear in rivers, lakes, or salt water. Amphidromous adult bull trout reenter the Nooksack River in early June and migrate to spawning grounds. Amphidromous sub-adults spend spring and most of summer in marine areas and reenter freshwater in late summer or early fall where they remain in the lower river to forage.

The bull trout life history timing record for the North Fork Nooksack River is provided in Table 4. The project coincided with the adult migration period. Habitat for bull trout in the action area includes adult migratory and foraging, and possibly subadult rearing.

### Puget Sound ESU Chinook Salmon

NMFS listed the Puget Sound Chinook ESU as threatened effective March 24, 1999 (FR 1999b), with reaffirmation effective June 28, 2005 (FR 2005a). The ESU encompasses all naturally spawned populations of Chinook salmon from rivers and streams flowing into Puget Sound, the Strait of Juan de Fuca, Hood Canal, and the Strait of Georgia, as well as numerous hatchery programs.

The North Fork Nooksack River supports one spring-run and one fall-run Chinook salmon race, named to reflect the timing of river entry by adults and their primary spawning locations (WDFW 2002). The spring stock, North Fork/Middle Fork Nooksack Chinook, is independent, native in origin, and maintained by composite production with supplementation from the Kendall Creek hatchery at approximately RM 46. The fall stock, Samish/Mainstem Nooksack Chinook, is non-native and has composite production thought to be derived from the Green River hatchery. The fall Chinook stock is not considered an independent population nor is it the target of WRIA 1 recovery efforts (Ned currents, personal communication, 2018). The native Chinook salmon population is considered critically low while the non-native stock status is unknown.

Spring run Chinook enter the Nooksack River and migrate to spawning grounds in the North Fork Nooksack River and tributaries from mid-March to mid-September. Spawning occurs in August and September, primarily above RM 45 (Tasha Geiger, personal communication, 2011), but with some scattered spawning in the backchannel areas upstream of the project (Hyatt, 2007). Fry emerge between February and May and most migrate downstream to freshwater or estuarine rearing areas by July. Juvenile Chinook rear year-round in estuaries, coastal areas, and freshwater streams.

The spring Chinook life history timing record for the North Fork Nooksack River is provided in Table 4. The bank repair project coincided with the incubation period. However, the three back-to-back floods that occurred prior to bank repair work likely scoured any eggs in the vicinity of the project. Habitat for spring Chinook in the action area includes adult migratory and possibly juvenile rearing.

Fall run Chinook are distributed throughout much of the Nooksack River basin, but spawn at lower elevations than the spring run. Fall Chinook begin river entry in late summer and spawn in the mainstem, associated tributaries, and all three forks between early September and mid-November (WDFW 2002). WDFW does not conduct spawning surveys for fall Chinook as they are a non-native hatchery stock planted as a terminal fishery for the tribe (Tasha Geiger, personal communication, 2011). While side channels in the action area provide good spawning habitat during years when they carry water (Hyatt 2007), the three back to back floods that occurred prior to bank repair work, and the shift of the river thalwag into the left bank likely scoured any eggs in the vicinity of the project. The life history record for fall Chinook in the North Fork Nooksack River is not available. Habitat for fall Chinook in the aquatic action area includes adult migratory, and possibly juvenile rearing.

### Puget Sound DPS Steelhead

NMFS listed the Puget Sound Steelhead DPS as threatened on May 11, 2007, with an effective date of June 11, 2007 (FR 2007). The DPS includes all naturally spawned anadromous winter-run and summer-run populations of steelhead in rivers and streams of the Puget Sound basin. The resident form of *O. mykiss* is not included in the listing.

The North Fork Nooksack River supports one steelhead stock referred to as the Mainstem /North Fork (WDFW 2002). This is a winter run that is native in origin and maintained by natural production. The stock status is unknown. The Mainstem /North Fork winter run is ocean-maturing. Steelhead remain at sea from one to three years and return to the Nooksack River in December near sexual maturity. Spawning occurs from early March through early July in the mainstem Nooksack, North Fork Nooksack, and several tributaries (WDFW 2002). Juveniles remain in the Nooksack system for up to three years and out-migrate primarily in April and May (Anchor 2003).

WDFW steelhead spawning surveys have identified redds in side channels upstream of the project, with peak counts occurring between the first and second week of May each year (Tasha Geiger, personal communication, 2011).

The winter steelhead life history timing record for the North Fork Nooksack River is provided in Table 4. The project in-water work in mid-December did not coincide with any steelhead life history periods other than juvenile rearing. Habitat for steelhead in the aquatic action area includes adult migratory, and possibly juvenile rearing.

**Table 4 North Fork Nooksack Fish Life History Timing– 2007 RM 36.6-65.0[1]**

| Species | Life Stage | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| In-water Work Window | | | | | | | | | | | | | |
| Bull Trout | Adult Migration | | | | | | | | | | | | |
| | Spawning | | | | | | | | | | | | |
| | Incubation | | | | | | | | | | | | |
| | Juvenile Outmigration | | | | | | | | | | | | |
| Spring Chinook | Adult Migration | | | | | | | | | | | | |
| | Spawning | | | | | | | | | X | | | |
| | Incubation | | | | | | | | | | | | |
| | Juvenile Outmigration | | | | | | | | | | | | |
| Winter Steelhead | Adult Migration | | | | | | | | | | | | |
| | Spawning | | | | | | | | | | | | |
| | Incubation | | | | | | | | | | | | |
| | Juvenile Outmigration | | | | | | | | | | | | |

[1] Obtained from Jeff Kamps, WDFW Biologist.

## *Presence of Federally Designated Critical Habitat in the Project Action Area*

Federally designated critical habitat that occurs in the project action area includes the Puget Sound Chinook salmon ESU, and the Puget Sound Steelhead DPS. The project action area is not included as Coastal/Puget Sound bull trout DPS or marbled murrelet critical habitat (FR 1996) and does not contain any proposed critical habitat.

### Chinook Salmon

Designated critical habitat for the Puget Sound Chinook ESU became effective on January 2, 2006 (FR 2005c). Critical habitat includes all marine, estuarine, and river reaches accessible to Chinook salmon in Puget Sound that contains suitable spawning, rearing, foraging, and over-wintering habitat to support essential existing Chinook local populations, and migration corridors free of obstruction. Critical habitat for the Puget Sound ESU of Chinook salmon has been designated in the North Fork Nooksack River. The lower North Fork Nooksack provides migratory, rearing, and limited spawning habitat. There is some suitable spawning and rearing habitat in the action area.

NMFS has defined specific PCEs as the known physical and biological features within occupied areas that are essential to the conservation of the species (FR 2004b). PCEs for Chinook salmon are:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
2. Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility, water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams, and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
3. Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.
4. Estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.
5. Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.
6. Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

PCE #1, #2 and #3 are present in the project action area.

## Steelhead Trout

Designated critical habitat for the Puget Sound steelhead DPS became effective on February 24, 2016 (FR 2016). Critical habitat includes all marine, estuarine, and river reaches accessible to steelhead trout in Puget Sound that contains suitable spawning, rearing, foraging, and over-wintering habitat to support essential existing steelhead local populations, and migration corridors free of obstruction. Critical habitat for the Puget Sound steelhead has been designated in the North Fork Nooksack River. The lower North Fork Nooksack provides migratory, rearing, and limited spawning habitat, and there is some suitable spawning and rearing habitat in the action area.

NMFS has defined specific PCEs as the known physical and biological features within occupied areas that are essential to the conservation of the species (FR 2016). PCEs for steelhead trout are:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
2. Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility, water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams, and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
3. Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.
4. Estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.
5. Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.
6. Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

PCE #1, #2 and #3 are present in the project action area.

# ENVIRONMENTAL SETTING

The North Fork Nooksack River is roughly 40 miles long and drains approximately 287 square miles extending from glaciers and snowfields on Mount Baker to the confluence with the Middle Fork at RM 40.5, and the south fork at RM 36.5. The river continues from this point to Bellingham Bay as the mainstem Nooksack River (Williams et al. 1975). A natural water fall at RM 65 is the upstream extent for anadromous salmonids (Smith 2002). Due to glacial melt, the North Fork is typically turbid and has high spring flows and moderate summer flows (WC 2006). Average annual precipitation ranges from 60 inches to 130 inches depending on elevation. Precipitation occurs as rainfall and snow, mostly between October and March (WC 2006). Rain on snow events are common and can trigger debris torrents in tributary watersheds (Smith 2002). Land uses in the watershed include forestry, recreation, urban, rural residential, and agriculture.

Geology in the basin includes predominantly sedimentary bedrock mantled by glacial deposits, alluvial fans, and colluvium from landslides. Terrain in the basin is steep and relief is high with elevations ranging from 240 feet to over 10,000 feet. Recently deposited river alluvium from

the N F Nooksack forms a 900-foot-wide braided river valley between the constriction at the Mosquito Lake Road bridge and upstream where the channel becomes confined to a single thread near RM 41 (Dragovich et al. 1997) (Figure 1). The channel instability that characterizes this reach is emblematic of an oversupply of sediment, and the lack of large diameter logs needed to key stable wood jams and establish an anastomosing channel form typical of more mature forest systems.

## *Habitat Conditions in the Basin (Freshwater Aquatic Species)*

The North Fork Nooksack River is used by bull trout, Chinook salmon, and steelhead as migratory, foraging, spawning, and rearing habitat (Smith 2002). Habitat has been limited and impaired by the removal of large wood from the system, the increase in fine sediment from natural and human-caused landslides, and channel constriction from bank armoring (WC 2006). All fish stocks in the Nooksack basin have declined from historic levels due primarily to habitat loss and degradation (Hyatt and Rabang 2003).

An evaluation of baseline environmental conditions for the project area was conducted following *Making Endangered Species Act Determinations of Effect for Individual of Grouped Actions at the Watershed Scale* (NMFS 1996) and *A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale* (USFWS 1998). This combined evaluation assesses several baseline indicators to determine whether a proposed project would restore, maintain or degrade existing baseline conditions. The results of this evaluation are summarized in Table 5 and detailed in Appendix E. Information regarding baseline habitat was obtained from the WRIA 1 Salmonid Recovery Plan (WC 2005), the Limiting Factors Report for WRIA 1 (Smith 2002), and the Whatcom County Shoreline Master Program Update (WC 2006).

**Table 5 NOAA Fisheries and USFWS Pathways and Indicators Matrix**

| Diagnostics/Pathways Indicators | Environmental Baseline | | | Effects of the Action(s) | | |
|---|---|---|---|---|---|---|
| | Properly Functioning | At Risk | Not Propr. Functioning | Restore | Maintain | Degrade |
| **Subpopulation Characteristics** | | | | | | |
| Subpopulation Size | | ✓ | | | ✓ | |
| Growth and Survival | | ✓ | | | ✓ | |
| Life History Diversity/Isolation | | ✓ | | | ✓ | |
| Persistence/Genetic Integrity | | ✓ | | | ✓ | |
| **Water Quality:** | | | | | | |
| Temperature | | ✓ | | | ✓ | |
| Sediment | | ✓ | | | ✓ | ✓ (temp) |
| Chem. Contam./Nut. | ✓ | | | | ✓ | |
| **Habitat Access:** | | | | | | |
| Physical Barriers | ✓ | | | | ✓ | |

| Diagnostics/Pathways Indicators | Environmental Baseline | | | Effects of the Action(s) | | |
|---|---|---|---|---|---|---|
| | Properly Functioning | At Risk | Not Propr. Functioning | Restore | Maintain | Degrade |
| | | | | | | |
| **Habitat Elements:** | | | | | | |
| Substrate | | ✓ | | | ✓ | |
| Large Woody Debris | | | ✓ | | ✓ | |
| Pool Frequency | | | ✓ | | ✓ | |
| Pool Quality | | ✓ | | | ✓ | |
| Off-channel Habitat | | ✓ | | | ✓ | |
| Refugia | | ✓ | | | ✓ | |
| **Channel Cond. & Dyn:** | | | | | | |
| Water/Depth Ratio | ✓ | | | | ✓ | |
| Streambank Condition | | ✓ | | | ✓ | |
| Floodplain Connectivity | | ✓ | | | ✓ | |
| **Flow/Hydrology:** | | | | | | |
| Peak/Base Flow | | ✓ | | | ✓ | |
| Drainage Network Increase | | ✓ | | | ✓ | |
| **Watershed Conditions:** | | | | | | |
| Road Dens. and Loc. | | | ✓ | | ✓ | |
| Disturbance History | | ✓ | | | ✓ | |
| Riparian Reserves | | ✓ | | | ✓ | |
| Disturbance Regime | | ✓ | | | ✓ | |
| **Species and Habitat** | | | | | | |
| Integration | | ✓ | | | ✓ | |

# EFFECTS OF THE ACTION

The project has the potential to directly and indirectly impact listed species and designated critical habitat. The effects analysis assumes that all impact minimization measures identified herein have been incorporated into the construction process.

## *Direct Effects*

### Listed Species

Potential direct effects on listed species and critical habitat may result from placing rock and LWD pieces in the river without fish isolation and temporarily elevated turbidity from in-water work.

### Fish impacts

Listed fish species that may have been present in the project area during in-water work could have been directly impacted by placing rock and LWD pieces in the water without excluding fish

from the work area first. Fish exclusion was not undertaken because coffer dam placement and complete fish exclusion in deep, swift water is nearly impossible to do adequately, and would have caused as much or more turbidity and fish impact as the work itself.

Direct impacts to fish were insignificant for the following reasons:

1. The actual rock and LWD placement work were intermittent and short duration in a high flow thalwag area where fish do not naturally congregate and were not observed,
2. Substrate in the work area was primarily coarse sand and no spawning gravel was disturbed,
3. No eggs were present in the project area due to recent flood erosion.

### Water Quality Impacts

Short-term impacts to water quality resulted from an increase in turbidity during installation of the rock toe and the installation and repositioning of habitat logs and existing LWD during in-water construction. However, turbidity spikes attenuated rapidly in the turbulence and were not discernable at the point of compliance 300 feet downstream of the work area, and were temporary and short term in nature. Since adult bull trout and steelhead, and juvenile Chinook, and steelhead could have been present in the work area at some time during in-water work, a few of these individuals could have been exposed to elevated turbidity levels.

### Designated Critical Habitat

## *Chinook Salmon and Steelhead Trout*

Since the PCEs for Chinook and steelhead are identical, project impacts to these PCEs will be discussed jointly. Three of the six PCEs for Chinook salmon and steelhead critical habitat are present in the project action area.

PCE-1 Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.

The project resulted in the loss of 7,000 square feet of river bed covered by the rock toe. This river substrate is sand and sandy gravel and is not suitable spawning habitat. Also, this substrate was recently exposed by bank failure during a high-water event, is located in the river thalwag, and was actively eroding and unstable. Therefore, the quality of the substrate was low and presence of eggs unlikely.

Elevated turbidity during in-water work temporarily affected the water quality element of this PCE, but turbidity levels were not visible at the point of compliance 300 feet downstream, and returned to background levels shortly after completing in-water work. Thus, water quality degradation did not impair spawning in the action area.

Since the impact area was small and of low-quality unsuitable substrate, and turbidity impacts were minimal, impacts to this PCE are considered discountable.

PCE-2 Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility, water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams, and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

Elevated turbidity during in-water work temporarily affected the water quality element of this PCE, but turbidity levels were not visible at the point of compliance 300 feet downstream, and returned to background levels rapidly after completing in-water work. Thus, water quality degradation did not impair rearing in the action area significantly. Also, 35 fir logs were imported and incorporated into the rock toe for habitat enhancement, so no loss of LWD occurred as a result of the project. Therefore, impacts to this PCE are considered discountable.

PCE-3 Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

The project is located on the margin of a wide floodplain, and will have no impact on migratory corridors, and will not produce any permanent impediments to migratory movement. However, migration could have been impacted by short-term elevated turbidity during installation of the rock toe and habitat logs. Also, 35 fir logs were imported and incorporated into the rock toe for habitat enhancement, so no loss of LWD occurred as a result of the project. Since increased turbidity levels were not visible at the point of compliance 300 feet downstream, and no loss of natural cover occurred, impacts are considered insignificant.

## *Indirect Effects*

Construction of this project will not change the current land use zoning in the project vicinity. Development possibilities will remain the same before and after the construction of the proposed project, and the project will not result in any new vehicle access routes or affect the current rate of urbanization in the project vicinity.

### Permanent Stream Impacts

Approximately 7,000 Square Feet of river bed was directly impacted by rock toe construction. This rock toe has potential indirect impacts on listed species and habitat by arresting lateral

channel migration and thereby reducing channel complexity, sediment, and debris source recruitment, and limiting the development of floodplain refugia,

Indirect effects from the project are insignificant and discountable for the following reasons:

1. The pre-project bank geometry was simple: a 30 ft. high vertical cut bank and one long scour-pool where the thalwag impinged on the bank. By re-shaping the bank, adding LWD roughness elements, planting with native vegetation, there was no net loss of cover habitat resulted from the project.

2. The re-shaped bank was planted with native trees and shrubs that will mature and provide long term riparian function that was originally lacking.

3. Since the project area was a vertical cut bank, no flood refuge was present in the project area. Creation of a vegetated slope and LWD roughened toe will provide some flood refuge where none was present before.

4. Active erosion of the vertical cut bank provided woody debris and sediment recruitment to the river. The sediment was composed of coarse sand, and minor gravel. Loss of this low-quality sediment source will not have a significant effect in a 900-foot-wide braided channel.

5. No off-channel rearing habitat was present in the project area before the project, and no off-channel rearing habitat was created as part of the project design.

6. The project design has permanently interrupted the natural channel migration process. However, the project is located at the southern extent of historic channel migration and flanked downstream by a rock revetment, so the extent of channel migration at this location would have been limited in scope during a timeframe equivalent to the life of this project. For these reasons, lost channel migration and associated habitat creation is considered discountable.

## *Effects from Interrelated and Interdependent Actions*

There are no interrelated or interdependent actions or activities anticipated as a result of this project.

# CONCLUSIONS

Based on field work, project timing, evaluation of the proposed design, review of the pertinent literature, and interviews with local fish biologists, we conclude that, with the project design and the impact minimization measures given above, the proposed project will have the following effects:

## *Bull Trout*

The proposed project "**may affect"** Coastal/Puget Sound Bull Trout DPS because:

- The project required in-water work.
- At the time of in-water work, adult and sub adult bull trout could have been in the action area.

The project **"is not likely to adversely affect"** bull trout because:

- No fish handling was undertaken,
- Turbidity levels were within state water quality standard at the point of compliance.
- No adult or juvenile fish were observed,
- In-water work was at the margin of swift water and was intermittent and short duration so direct effects are discountable,
- Prey species density was low in the river at the time of construction, and foraging activity was unlikely,

## *Chinook Salmon*

The proposed project "**may affect"** the Puget Sound ESU Chinook salmon because:

- The project required in-water work.
- At the time of in-water work, juvenile Chinook could be incubating and emerging from the gravel and rearing in the action area.

The project "**is not likely to adversely affect"** Chinook salmon because:

- No fish handling was undertaken,
- Turbidity levels were within state water quality standard at the point of compliance.
- No adult or juvenile fish were observed,
- In-water work was at the margin of swift water and was intermittent and short duration so direct effects are discountable.

### *Steelhead*

The proposed project "**may affect"** the Puget Sound steelhead trout DPS because:

- The project required in-water work.
- At the time of in-water work, adult and juvenile steelhead could be present in the action area.

The project "**is not likely to adversely affect"** Chinook salmon because:

- No fish handling was undertaken,
- Turbidity levels were within state water quality standard at the point of compliance.
- No adult or juvenile fish were observed,
- In-water work was at the margin of swift water and was intermittent and short duration so direct effects are discountable.

### *Chinook Salmon Critical Habitat*

The proposed project "**may affect"** designated critical habitat for Chinook salmon:

- Designated critical habitat exists within the project action area.
- The following PCEs for critical habitat are present in the project action area: freshwater spawning and rearing sites and freshwater migration corridor.
- The project resulted in a small area of permanent in-channel habitat alteration.

The project "**is not likely to adversely affect"** designated Chinook salmon critical habitat because:

- Riparian impacts will have an insignificant effect on PCEs,
- The in-water project footprint in swift water with a sandy substrate will have an insignificant effect on prey species and habitat function,
- Water quality impacts on PCEs were insignificant as they are short-term and minor.
- The addition of 35 LWD pieces to the revetment face and dense planting of native shrubs and trees improves riparian conditions over existing conditions.

### *Steelhead Trout Critical Habitat*

The proposed project "**may affect"** designated critical habitat for steelhead trout:

- Designated critical habitat exists within the project action area.
- The following PCEs for critical habitat are present in the project action area: freshwater spawning and rearing sites and freshwater migration corridor.

- The project resulted in a small area of permanent in-channel habitat alteration.

The project "**is not likely to adversely affect"** designated steelhead trout critical habitat because:

- Riparian impacts will have an insignificant effect on PCEs,
- The in-water project footprint in swift water with a sandy substrate will have an insignificant effect on prey species and habitat function,
- Water quality impacts on PCEs were insignificant as they are short-term and minor.
- The addition of 35 LWD pieces to the revetment face and dense planting of native shrubs and trees improves riparian conditions over existing conditions.

It is our understanding that this Biological Assessment satisfies the Whatcom County Flood Control Zone District's and Whatcom County Public Work's responsibilities under Section 7(c) of the Endangered Species Act at this time. We will continue to remain aware of any change in status of these species and will be prepared to reevaluate potential project impacts if necessary.

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## *Personal Communication Contact Information*

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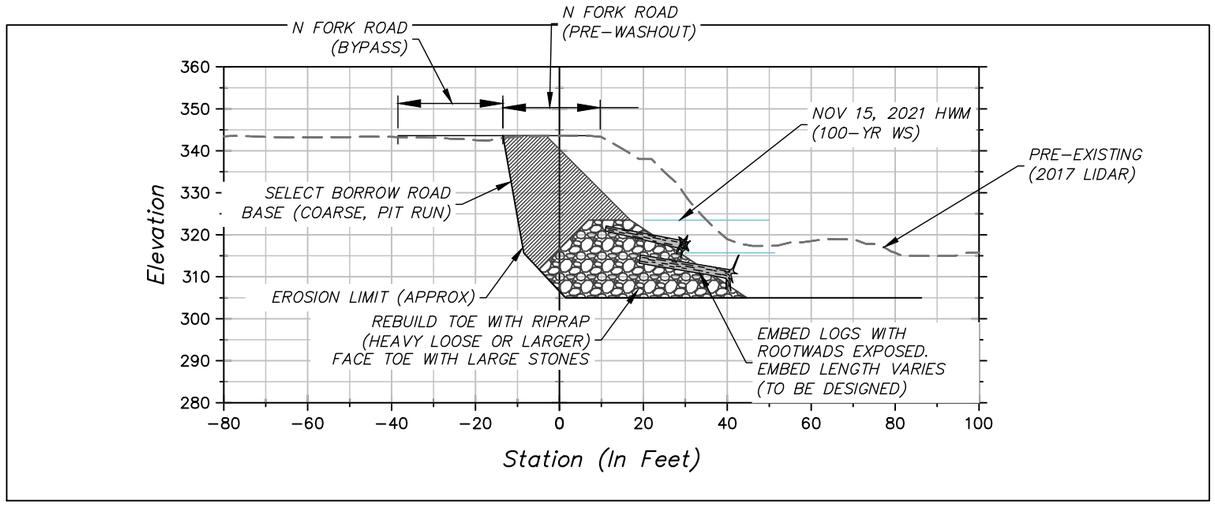
Tasha Geiger, WDFW Nooksack River Stock Assessment, Fish Biologist

# APPENDIX A. Design Plans

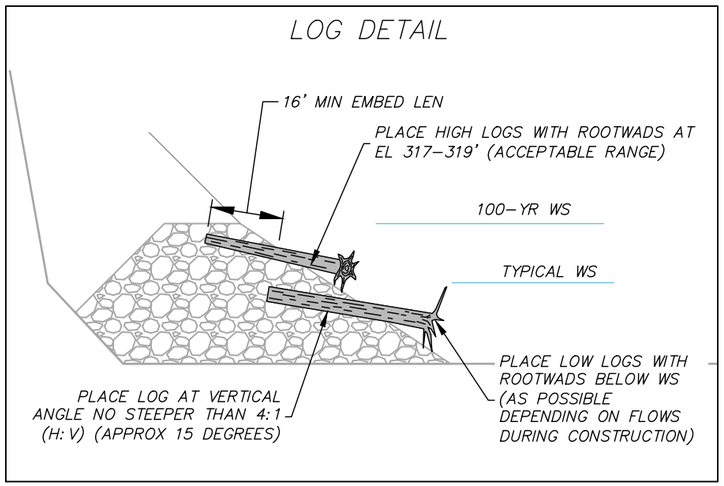
## SECTION A – EMERGENCY ROAD AND SCOUR COUNTERMEASURE DESIGN VIEWING DOWNSTREAM



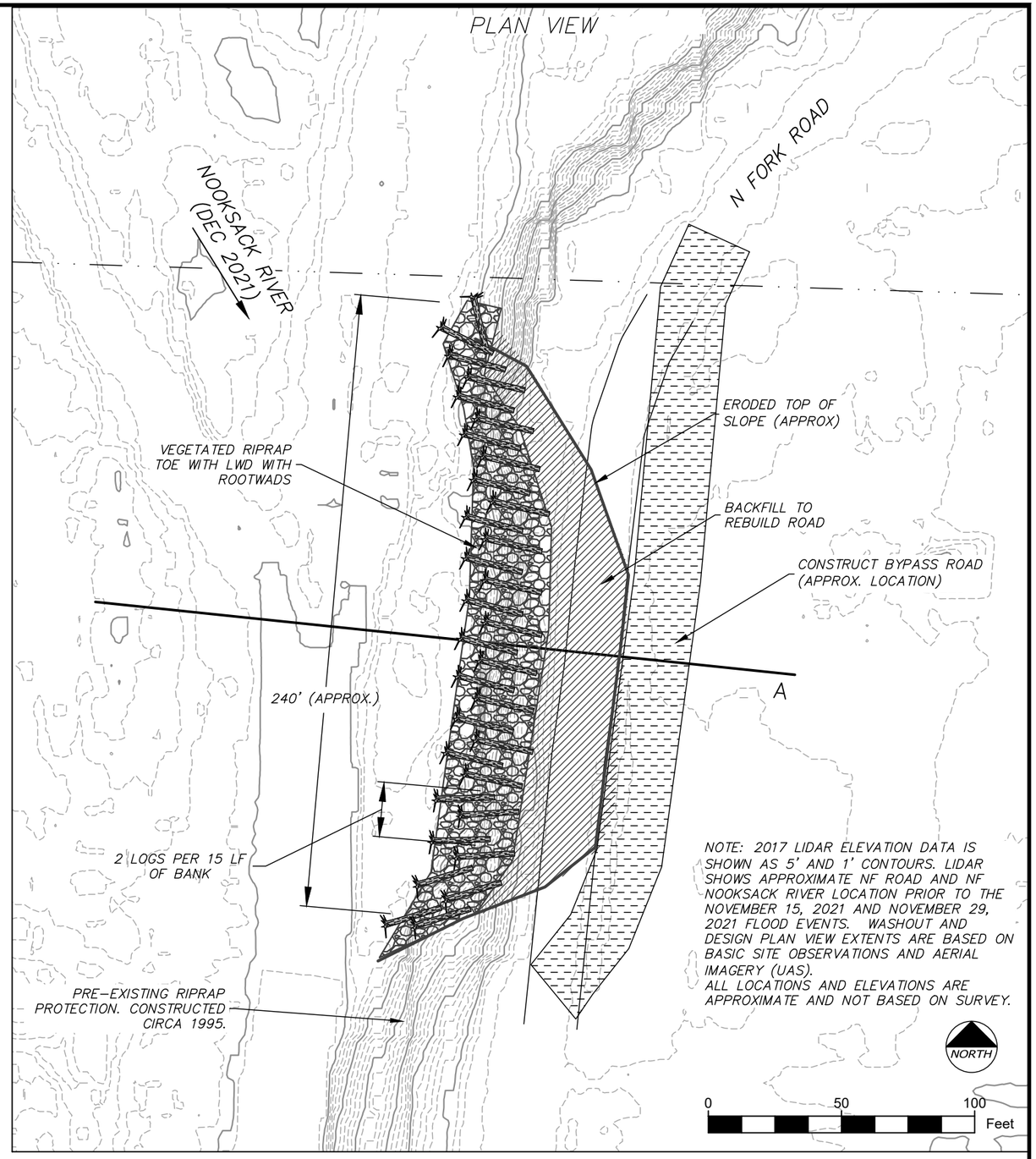

## NOTES

1. RIPRAP SHALL BE PLACED NO STEEPER THAN 1.5 TO 1 (H:V). PLACE LARGE STONES (6–MAN) AT TOE OF SLOPE AND GRADE REMAINING RIPRAP WITH HEAVY LOOSE.
2. BACKFILL UPPER SLOPE AT 1:1 (H:V) FOR INTERIM. GEOTECHNICAL INPUT ON STABLE SLOPE NEEDED FOR LONGTERM SOLUTION (OR ASSUME 2:1).
3. LOGS:
   - 3.1. COUNT: 30–35 LOGS
   - 3.2. SIZE: 25' STEM LENGTH, 18–28" DBH, 5–8' DIA. ROOTWAD INTACT.
   - 3.3. TYPE: DOUGLAS FIR OR OTHER LOCALLY SOURCED CONIFERS (NON–HEMLOCK UNLESS APPROVED).
   - 3.4. PLACEMENT: LOGS SHALL BE EMBEDDED IN THE RIPRAP WITH ROOTWAD EXPOSED TO FLOW. LOGS SHALL BE PLACED AT DIFFERENT ELEVATIONS AS DIRECTED. LOGS TO BE ANGLED +/– 30 DEGREES FROM PERPENDICULAR TO THE BANK FACE. LOGS SHALL BE PLACED IN A MANNER THAT MEETS THE MINIMUM COVER DEPTH AND MINIMUM EMBEDMENT LENGTH.
   - 3.5. PLACEMENT FREQUENCY: BASED ON 6' AVERAGE ROOTWAD SIZE, PLACE 2 LOG PER 15 LF OF BANK. ADJACENT LOGS SHALL BE PLACED AT ALTERNATE LOW AND HIGH ELEVATIONS AS DIRECTED.

## LOG DETAIL




## PLAN VIEW




## CONCEPT FOR EMERGENCY CONSTRUCTION

| No. | SHEET REVISION | DATE | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

| PLAN SET ISSUE | DATE |
|---|---|
| | |
| | |
| | |
| | |

| DESIGN | DRAWN | CHECK |
|---|---|---|
| PJF | SWU | PJF |

DRAWING SCALE:
HORZ. DATUM: NAD 83 / 1991
VERT. DATUM: NAVD88

CONTRACT DATE:
PROJECT No: XXXXX
ROAD/BRIDGE No:
DRAWING FILE:

PUBLIC WORKS DIRECTOR: JON HUTCHINGS
COUNTY ENGINEER: JAMES P. KARCHER, P.E.
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PROJECT: N FORK RD SHOULDER EVALUATION
N FORK NOOKSACK RIVER

TITLE: PLAN AND SECTION - EMERGENCY REPAIR

SHEET: 1
OF:

# Appendix B. NMFS and USFWS Species Lists

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
Phone: (360) 753-9440 Fax: (360) 753-9405
http://www.fws.gov/wafwo/

In Reply Refer To: February 14, 2022
Project Code: 2022-0007188
Project Name: North Fork Road bank repair

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)

(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

**Migratory Birds**: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

# Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

**Washington Fish And Wildlife Office**
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
(360) 753-9440

# Project Summary

Project Code: 2022-0007188
Event Code: None
Project Name: North Fork Road bank repair
Project Type: Flooding
Project Description: repair eroded river bank
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@48.853491500000004,-122.14598954850746,14z


Counties: Whatcom County, Washington

# Endangered Species Act Species

There is a total of 6 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

## Birds

| NAME | STATUS |
|---|---|
| Marbled Murrelet *Brachyramphus marmoratus*<br>Population: U.S.A. (CA, OR, WA)<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/4467 | Threatened |
| Streaked Horned Lark *Eremophila alpestris strigata*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/7268 | Threatened |
| Yellow-billed Cuckoo *Coccyzus americanus*<br>Population: Western U.S. DPS<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/3911 | Threatened |

## Fishes

| NAME | STATUS |
| --- | --- |
| Bull Trout *Salvelinus confluentus*<br>Population: U.S.A., conterminous, lower 48 states<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/8212 | Threatened |
| Dolly Varden *Salvelinus malma*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/1008 | Proposed Similarity of Appearance (Threatened) |

## Insects

| NAME | STATUS |
| --- | --- |
| Monarch Butterfly *Danaus plexippus*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/9743 | Candidate |

## Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

# ESA Section 7 Consultations on the West Coast

NOAA Fisheries assists federal agencies to ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat.

---

NOAA Fisheries helps federal agencies comply with the requirements of the Endangered Species Act whose purpose is to conserve ecosystems upon which endangered and threatened species depend.

Under Section 7(a)(1) of the Endangered Species Act (ESA), federal agencies are directed to implement programs for the conservation of threatened and endangered species. In the West Coast Region (WCR), we assist federal agencies with the development of conservation programs for marine and anadromous species under NOAA Fisheries' jurisdiction throughout California, Oregon, Washington, and Idaho. We also work with federal agencies on training and opportunities to implement proactive conservation actions that will benefit ESA-listed species and their habitats.

Under ESA Section 7(a)(2), federal agencies must consult with NOAA Fisheries when any project or action they take may affect an ESA-listed marine or anadromous species or designated critical habitat.

## How do Endangered Species Act consultations work?

Federal agencies must determine whether their actions may affect ESA-listed species. If an agency determines its actions may affect threatened or endangered marine species, the agency is required to consult with NOAA Fisheries. Some consultations are called "informal" and could involve conference calls, email exchanges, and site visits. Others are called "formal" and result in biological opinions. The time needed to conduct an ESA consultation varies depending on the complexity of the proposed action.

**Informal consultations** are conducted on actions that are not likely to adversely affect ESA-listed species or designated critical habitat. These consultations generally must be completed within 60

### Highly Migratory Species

**Lyle Enriquez**
(562) 980-4025
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### Coastal Pelagic Species

**Josh Lindsay**
(562) 980-4034
josh.lindsay@noaa.gov

### Groundfish

**Keeley Kent**
(206) 526-4655
keeley.kent@noaa.gov

## Geographic Area

# Puget Sound (north)

Contact: owco.section7info@noaa.gov

**ESA-listed species that may be found in the area**

- Bocaccio (Puget Sound/Georgia Basin DPS)
- Rockfish, yelloweye (Puget Sound/Georgia Basin DPS)
- Sturgeon, green (Southern DPS)
- Salmon, Chinook (Puget Sound ESU)
- Steelhead (Puget Sound DPS)
- Whale, killer (Southern Resident DPS)


# Puget Sound (central and south)

Contact: owco.section7info@noaa.gov

**ESA species that may be found in the area**

# Appendix C. Noise Assessment

# Noise Impact Assessment

The noise impact assessment for this slope stabilization project was conducted in accordance with WSDOT's Biological Assessment preparation guidance (WSDOT 2020). The project site is located on North Fork Road in a rural area in Whatcom County, Washington.

## *Terrestrial Noise*

The community baseline noise level in the project vicinity is based on population density and river noise, and is estimated at 45 dBA (FTA 2006). The three loudest pieces of construction equipment include an excavator (81 dBA), and dump truck (76 dBA) and a pickup truck (75 dBA). Accounting for the additive effect of multiple pieces of equipment operating at once, the construction noise level will be 83 dBA at 50 feet from the source. As shown in Table 1, construction noise levels attenuate by 7.5 dBA per doubling distance over a soft site (over land) (USDOT 1995).

**Table 1. Noise Attenuation – Soft Site**

| Distance from Roadway (ft) | Construction Noise (-7.5 dBA) | Environmental Baseline |
|---|---|---|
| 50 | 83 | 45 |
| 100 | 75.5 | 45 |
| 200 | 68 | 45 |
| 400 | 60.5 | 45 |
| 800 | 53 | 45 |
| 1600 | 45.5 | 45 |
| 3200 | 38 | 45 |
| 6400 | 30.5 | 45 |
| 12800 | 23 | 45 |
| 25600 | 15.5 | 45 |

Based on the noise analysis, construction noise for this project would be indistinguishable from baseline noise within 1,657 feet (0.31 miles) from the project site.

## *References*

Davidson, M. 2004. Transmission loss. Pages lecture structure obtained from website in IOM. Studies, editor. University of Plymouth, Drake Circus, Plymouth, Devon, UK.

Federal Transit Administration (FTA). 2006. *Transit Noise and Vibration Impact Assessment Guidance*. FTA-VA-90-1003-06 May.

Washington State Department of Transportation (WSDOT). 2020. *Biological Assessment Preparation for Transportation Projects. Advanced Training Manual*. May 2011.

# Appendix D. Biology of Listed Species

**Biology of Listed Species**

**Bull Trout (*Salvelinus confluentus*)**

Sources: USFWS 2004a; USFWS 2004b; USFWS 1999

Bull trout are members of the char subgroup of the Salmonidae family that exhibit four life histories strategies: resident, migratory fluvial, migratory adfluvial, and migratory amphidromous. The amphidromous form is unique to the coastal-Puget Sound DPS. Resident and migratory forms can produce offspring of either form. Resident populations complete their life cycles in or near the tributaries where they spawn and rear. Migratory populations spawn in small headwater streams where juveniles rear from one to four years, then migrate to rivers (fluvial form), lakes (adfluvial form), or salt water (amphidromous form) to rear as subadults or live as adults. Amphidromous subadult bull trout use the marine environment to forage, typically from late spring to early fall, then return to freshwater in the fall to overwinter. They continue this cycle until reaching sexual maturity between the ages of 4 and 7. Bull trout are iteroparous and spawning occurs in the upper portions of watersheds between August and November as water temperature decreases. Bull trout life expectancy is 12 years.

Bull trout have more specific habitat requirements than most other salmonids, including colder water, cleanest substrate, complex habitats, and connectivity with migratory pathways. These features influence their distribution and abundance. Bull trout are generally found in streams colder than 59 °F (15 °C) and prefer to spawn in low gradient streams with clean loose gravel near springs or other sources of cold groundwater. Spawning is triggered when temperatures drop below 48 °F (9 °C) in the fall. Optimal water temperature for other life stages are 35-39 °F (2-4 °C) for egg incubation and 46-50 °F (8-10 °C) for juvenile rearing. Eggs incubate over the winter and fry emerge in the spring. All life stages require complex freshwater habitat containing riffles, cover, pools, undercut banks, woody debris, stable banks, and natural stream flows. Bull trout are opportunistic feeders and require diverse food resources. Fry feed on loose salmon eggs, salmon fry and smolts, and other small fish. Juveniles eat aquatic and terrestrial insects as well as small schooling fish and juvenile salmonids. In marine waters, bull trout feed largely on small fish.

**Chinook Salmon (*Oncorhynchus tshawytscha*)**

Sources: NMFS 1998; NMFS 2004; NMFS 2007a; Hyatt and Rabang 2003

Chinook salmon are the largest and least abundant Pacific salmon. In North America, they are found in larger river systems and coastal drainages from California to Alaska. Chinook exhibit two life history patterns: ocean-type and stream-type.

Ocean-types outmigrate as fry, subyearling juveniles, or yearling juveniles, rear in estuaries, and a follow a coastal migration. They also have five freshwater return times: spring, summer, fall, late fall, and winter. Stream-types outmigrate as yearlings, have offshore migrations, and typically return to freshwater in spring or summer.

Adult Chinook return to natal streams to spawn after an average of four years at sea and migrate upstream at varying rates as they acclimate to freshwater conditions. Chinook typically spawn in streams with gradients less than 2%, velocities between 30 cm/s and 110 cm/s, depths greater than 24 cm, and gravel-cobble substrates up to 110 mm. Female Chinook dig redds in fast moving water with clean coarse gravel and lay on average 2,000 to 5,500 eggs, which are simultaneously fertilized by males. The adults die soon after spawning. Eggs incubate for three to five months depending on water temperature then alevins remain in the gravel for another few weeks. Juveniles rear from three months to two years in freshwater then migrate as smolts to estuaries.

Ocean-type Chinook tend to utilize estuaries and coastal areas more extensively for juvenile rearing. Stream-type juveniles are much more dependent on freshwater stream ecosystems because of their extended residence in these areas. During their estuarine residence, Chinook fry utilize low salinity areas along marshes during high tide and tidal channels and creeks during low tide. As a Chinook grows and increases its salinity tolerance, it will utilize more of the estuary. Estuarine rearing areas must have a variety of cover and foraging options to accommodate the different life history types. Optimal rearing habitat includes areas that have slow-moving water, deep pools, undercut banks, woody debris, riparian cover, and a diverse prey base. Fry require smaller prey, such as detritivores, small invertebrate larvae, and worms. Juveniles consume these organisms plus small fish, insects, and larger invertebrate larvae. It is thought that once juveniles outgrow their prey, they move offshore to begin their ocean phase.

**Steelhead Trout (*Oncorhynchus mykiss*)**

Sources: NMFS 2007b; Smith 2002; NOAA Fisheries 2010

Steelhead trout are a salmonid species that is iteroparous and has both anadromous (steelhead) and resident (rainbow trout) forms. Steelhead are found in the Pacific Ocean from the east coast of Russia to the west coast of North America. Anadromous forms typically spend one to four years in freshwater before smolting and can spend up to three years in the ocean before returning to freshwater to spawn. Both anadromous and resident forms can yield offspring of the opposite form. Steelhead are iteroparous.

West coast steelhead have seasonal spawning migrations referred to as "runs" that are named to reflect the season in which they occur: winter, spring, summer, or fall. Steelhead express two reproductive types named in part to reflect sexual maturity at the time of river entry. Summer ("stream-maturing") steelhead enter freshwater in a sexually-immature condition and spawn the following spring after reaching sexual maturity. Winter ("ocean-maturing") steelhead enter freshwater near sexual mature and spawn within a few months. In systems with both types, the summer run generally spawns farther upstream than the winter run.

Steelhead spawn in well-oxygenated fast flowing streams with gravel substrate. Females dig redds in which to deposit eggs that are then fertilized by males. Eggs hatch in three to four weeks. Steelhead tolerate a range of temperatures, but prefer dissolved oxygen levels above 7 parts per million. Juveniles feed primarily on zooplankton. Adults eat a variety of prey, including insects, mollusks, and small fish.

**References**


Hyatt, Tim and Angel Rabang. 2003. *Nooksack Chinook Spawning and Incubation Assessment*. Nooksack Tribe Natural Resources. December 31, 2003.

NOAA Fisheries. 2010. Steelhead Trout. Accessed from <http://www.nmfs.noaa.gov/pr/species/fish/steelheadtrout.htm>.

National Marine Fisheries Service (NMFS). 2007a. *Puget Sound Salmon Recovery Plan. Volume I. Recovery Plan*. Shared Strategy Development Committee.

--------2007b. *Endangered and Threatened Species: Final Listing Determination for Puget Sound Steelhead.* Final Rule. May 11. Federal Register 72(91):26722-26735.

--------2004. *Endangered and Threatened Species: Proposed Listing Determinations for 27 ESUs of West Coast Salmonids*. Proposed Rule. June 14. Federal Register 69(113): 33102-33179.

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Smith, C.J. 2002. *Salmon and Steelhead Habitat Limiting Factors in WRIA 1, The Nooksack Basin*. Washington State Conservation Commission. Lacey, Washington.

U.S. Fish and Wildlife Services. 2006. *Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Marbled Murrelet.* Proposed Rule. September 12. Federal Register 71(176): 53838-53886.

--------2004a. *Endangered and Threatened Wildlife and Plants; Proposed Designation of Critical Habitat for the Jarbidge River, Coastal-Puget Sound, and St Mary-Belly River Populations of Bull Trout.* June 24. Federal Register 69(122): 35768-35857.

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--------1999. *Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for Bull Trout in the Coterminous United States*. Final Rule. November 1. Federal Register 64(210): 58910-58933.

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Washington State Department of Transportation (WSDOT). 2020. *Biological Assessment Preparation for Transportation Projects. Advanced Training Manual*. February 2011.

# Appendix E. Matrix of Pathways and Indicators

**Matrix of Pathways and Indicators**

The following analysis assesses the baseline indicators for the North Fork Nooksack River and determines if the proposed project would restore, maintain or degrade the existing baseline conditions at the reach and/or watershed levels using the protocols developed by NOAA Fisheries (1996) and USFWS (1998).

**Sub-population Characteristics (bull trout)**

Sub-population Size

The North Fork Nooksack River supports five of the ten bull trout subpopulations identified in the Nooksack core area (USFWS 2004). The estimated adult abundance in the core area is less than 1000 (USFWS 2004), the population trend is unknown, and there is no long-term monitoring data available (WDFW 2004). Based on existing stock data and documented habitat degradation, this parameter is judged as *functioning at risk.*

The project may temporarily impact bull trout during in-water work as a result of minor turbidity, but not significantly enough to impact the sub-population size. The project will *maintain* the baseline condition for this indicator.

Growth and Survival

Habitat in the North Fork Nooksack River has been significantly impacted and altered since Euro-American settlement. Logging and road building have removed wood from the system and have caused landslides. Agricultural practices, development, wetland draining, and streambank armoring have reduced floodplain connectivity, riparian vegetation, off-channel refugia, and water quality. The effect of these activities has been a degradation or elimination of spawning, rearing, foraging, and migration habitat. Given these impacts to water quality, flow regimes, and riparian areas, this parameter is judged as *functioning at risk*.

The project includes in-water work that may temporarily impact bull trout in the immediate vicinity of the project. However, installation of LWD, and riparian restoration will compensate for any minor unavoidable impacts, and the project will not impact the growth and survival of the existing population. Therefore, the project will *maintain* the baseline condition for this indicator.

Life History Diversity and Isolation

The North Fork Nooksack River supports anadromous and fluvial forms of migratory bull trout and possibly resident forms that can commingle in spawning areas (USFWS

2004). Resident bull trout remain in or near their natal stream whereas migratory bull trout travel to the mainstem or to marine waters to rear as subadults or live as adults. As repeat spawners, migratory bull trout travel both up and downstream throughout their lives. Based on the estimated number of bull trout in the core area and the degree of habitat degradation in the North Fork Nooksack River, this parameter is judged as *functioning at risk*.

The project will not create a migration barrier or other feature that would affect the life history, diversity, and isolation of bull trout. Therefore, the project will *maintain* the baseline condition for this indicator.

Persistence and Genetic Integrity

Connectivity between the five subpopulations in the North Fork Nooksack River exists, but habitat is fragmented. Genetic integrity of bull trout in the watershed is good because hatchery bull trout have not been released in the system (Ned Currence, personal communication, 2020). However, non-native brook trout are well established in the Nooksack core area and can threaten bull trout populations through hybridization and competition (USWFS 2004). Given the level of habitat fragmentation in the North Fork Nooksack River watershed and the presence of competitive species, this parameter is judged as *functioning at risk.*

The project will not impact connectivity, further fragment habitat, or introduce competitive species to the system. Therefore, the project will *maintain* this baseline condition for this indicator.

**Water Quality**

Temperature

Temperature in the North Fork Nooksack River rates from good in the upper reaches to poor in the lower reaches (Smith 2002). USGS data as reported in Smith (2002) show that the percentage of samples exceeding 16° C in July and August were 39% at RM 41.1 and 59% at RM 37.2. In addition, numerous tributaries are classified by the Department of Ecology as impaired or of concern for temperature (Ecology 2021). Ecology operated a stream gage at the project location from 2003 through 2010 (Ecology 2010a). The average temperature during the in-water work window was 13° C. Available temperature information indicates that the baseline is considered *functioning at risk* in the lower North Fork Nooksack River.

The proposed project is expected to *maintain* the baseline condition for this indicator because it does not impact shading, groundwater spring discharge, or otherwise alter temperature.

Sediment and Turbidity

The North Fork Nooksack River is naturally turbid due to glacial runoff. Sedimentation has been increased by timber harvesting and road building activities that have destabilized slopes causing landslides (Smith 2002). Stream instability and fine sediment have impacted stream productivity (WDFW 2002). Fine sediment in the North Fork Nooksack River is rated as fair (Smith 2002). Based on available information, sediment and turbidity is *functioning at risk*.

The project may temporarily increase the environmental baseline for sediment in the action area during in-water work; however, sediment disturbance will be minimized by sediment and erosion control BMPs, and overall reduction in bank erosion and mobilization of fine-grained deposits. Thus, any minor sediment disturbance during in-water work will be insignificant to listed fish species. The project will *maintain* the baseline condition for this indicator.

Chemical Contamination and Nutrients

The North Fork Nooksack River contains limited sources of chemical contamination and nutrients originating primarily from road runoff and residential onsite septic systems (WC 2006). Ecology lists numerous tributaries as impaired or of concern for temperature, but not for chemical contaminants or nutrients (Ecology 2021). Available water quality data indicate that the baseline for this indicator is *properly functioning*.

The project does not introduce chemical contamination or nutrients to the river; thus, will *maintain* the baseline condition for this indicator.

**Habitat Access**

Physical Barriers

There are no manmade fish passage barriers on the North Fork Nooksack, thus this parameter is considered *properly functioning*.

The project does not create any fish passage barriers and will therefore *maintain* the baseline condition for this indicator.

**Habitat Elements**

Substrate

Delivery of coarse and fine sediment in the North Fork Nooksack River comes from steep slopes in the upper watershed, and the high landslide potential and low slope

stability in the middle and lower watersheds (WC 2006). The lower watershed also has a high road density which contributes to sediment input (Smith 2002). This information suggests that there is a moderate level of embeddedness due to sediment inputs. Therefore, this parameter is *functioning at risk.*

The river bed in the project vicinity consists of coarse sand, gravel, and cobbles with silt deposits. The project will remove an eroding bank composed of sand and gravel from the system. This small reduction in sediment input in a broad braided reach of the river is not expected to significantly influence substrate quality in the project area.

Therefore, this project is expected to *maintain* the baseline condition for this indicator.

Large Woody Debris (LWD)

Extensive forest cover remains in the watershed, but due to past logging most of the stands are small to medium sized coniferous and deciduous trees. Consequently, large wood is scarce (WC 2006). Large woody debris recruitment potential is low in the lower reaches of the North Fork Nooksack River and higher in the upper reaches (Coe 2001). A study by the Nooksack Tribe (2007) determined that there is a low distribution of LWD in the North Fork Nooksack River. Therefore, LWD is *not properly functioning*.

All of the potential recruitment trees between the river and the roadway was incorporated into the project as in-water habitat elements, so no loss of LWD occurred as a result of the project. Also, 35 pieces of LWD were added to the bank protection as roughness and habitat elements. Thus, this project will *maintain* the baseline condition for this indicator.

Pool Frequency and Quality

Limited information is available regarding pool frequency and quality in the North Fork Nooksack River watershed (Smith 2002). WDFW (2002) reports that pool depth has decreased due to land use practices that have caused slope instability and landslides. This increased sedimentation has likely resulted in pools filling in, thereby decreasing pool frequency and quality. Hyatt (2007) reports a low number of pools in the lower North Fork Nooksack River likely due to the lack of in-channel large wood that induces scour. Therefore, pool frequency is considered *not properly functioning* and pool quality is considered *functioning at risk*.

The project will create approximately 270 linear feet of hardened bank roughened with 35 LWD pieces on the outside of a meander bend. This may accelerate scour pool formation in the area immediately adjacent to the levee. However, since the scale of the project is small, the project will *maintain* the baseline condition this indicator.

Off Channel Habitat

Off-channel habitat has been reduced due to logging and development in the floodplain (Hyatt 2007). Much of the large wood has been removed from the system, which has limited the formation of channel islands and side channels, while bank hardening has limited channel migration and off-channel habitat development in certain areas (Smith 2002). Therefore, off channel habitat in the North Fork Nooksack River is considered *functioning at risk.*

The project design has permanently interrupted the natural channel migration process. However, the project is located at the eastern extent of historic channel migration and flanked downstream by extensive rock revetments, so the extent of channel migration at this location would have been limited in scope during a timeframe equivalent to the life of this project. For these reasons, lost channel migration and associated habitat creation is considered discountable. Thus, the project does not further impact off-channel habitat and will *maintain* the baseline condition for this indicator.

Refugia

The North Fork Nooksack River is used for foraging, migrating, rearing, and spawning by bull trout, Chinook salmon, and steelhead trout. Habitat has been impacted by logging and development resulting in reduced LWD, pools, riparian vegetation, and connection to off-channel areas. Adequate refugia remains in the watershed, but has been fragmented. Therefore, refugia is considered *functioning at risk.*

The project design has permanently interrupted the natural channel migration process. However, the project is located at the eastern extent of historic channel migration and flanked downstream by extensive rock revetments, so the extent of channel migration at this location would have been limited in scope during a timeframe equivalent to the life of this project. For these reasons, lost channel migration and associated habitat creation is considered discountable. Therefore, the project does not further impact refugia and will *maintain* the baseline condition for this indicator.

**Channel Condition and Dynamics**

Width/Depth Ratio

Limited information is available regarding width to depth ratios in the North Fork Nooksack River. The channel widens in a downstream direction, and the lower reaches are low gradient, wide, and heavily braided (Hyatt 2007). It is assumed that this parameter is *properly functioning*.

The project at the edge of the historic channel migration zone, and at the margin of a 1,200 ft. wide braided channel. The rip rap levee will arrest lateral migration of the channel but will not significantly affect overall width to depth ratios in the adjacent channels. Therefore, the project does not further impact the width to depth ratio and will *maintain* the baseline condition for this indicator.

Streambank Condition

The streambank of the North Fork Nooksack River has been impacted by past and present land use practices. Logging has reduced riparian vegetation and increased slope instability. Bank armoring has limited channel migration and has caused increased velocity, and loss of floodplain connectivity. River instability and moderate to high levels of fine sediment are widespread (WDFW 2002). Therefore, river bank condition is considered *not properly functioning.*

The project armored the toe of an eroding cut bank, re-sloped the bank to a stable angle, re-established a native riparian buffer, and placed a large volume of LWD along the river bank. The riparian restoration and LDW placement adequately compensated for the rock toe armoring. Therefore, the project does not further impact the river bank and will *maintain* the baseline condition for this indicator.

Floodplain Connectivity

Over the past century, much of the North Fork Nooksack River floodplain has been cleared for timber, and ditched and drained for development (Hyatt and Rabang 2003). Sections of the river channel have been dredged and diked, and bank armoring has occurred where the river flows in close proximity to roads and development (Smith 2002). These actions have reduced channel migration, reduced overbank flow, and reduced riparian quality. Therefore, floodplain connectivity is considered *functioning at risk*.

The project armored the toe of a 30 ft high eroding cut bank that effectively isolated the project site from the river. Re-sloping the bank to a stable angle, re-establishing a native riparian buffer, and placing a large volume of LWD along the streambank adequately compensates for the rock toe armoring. Therefore, the project does not further impact the river bank and will *maintain* the baseline condition for this indicator.

## Hydrology

### Peak/Base Flows

The glacially fed North Fork Nooksack River typically has high spring flows, moderate summer flows, and low winter flows (Smith 2002). Land conversion in the lower reaches has replaced mature coniferous forests with development, agriculture, and deciduous forests. This has impacted hydrology in the basin. Due to low flow concerns, the North Fork Nooksack River is closed to further water allocations part of the year (Smith 2002). Floods have also become more intense and more frequent over the past two decades (Hyatt 2007) and peak flows have also increased (WDFW 2002). Due to these factors, peak and base flows are considered *functioning at risk*.

The proposed project does not add impervious surfaces, divert water, or otherwise alter flow. Therefore, the project will *maintain* the baseline condition for this indicator.

### Drainage Network Increase

The drainage network in the North Fork Nooksack River basin has been moderately increased by roads and other impervious surfaces created by development. Therefore, this indicator is considered *functioning at risk*.

The project will *maintain* the baseline condition for this indicator as it does not expand an existing road or create a new road.

## Watershed Conditions

### Road Density / Location

Road density in the North Fork Nooksack River basin is 3.1 $mi/mi^2$, which is considered high (Smith 2002). Therefore, this parameter is judged as *not properly functioning*.

The project does not add or subtract road length and therefore will *maintain* the baseline condition for this indicator.

### Disturbance History

The North Fork Nooksack River basin has been disturbed by logging, agriculture, river channel manipulation, and development. Logging in particular has occurred on steep, unstable slopes. Habitat in areas where these activities have occurred has been impacted. Therefore, this parameter is considered *functioning at risk*.

The project repairs and stabilizes an eroding bank and does not further affect unstable or sensitive areas; therefore, will *maintain* the baseline condition for this indicator.

Riparian Reserves

Logging in parts of the floodplain has removed large wood and converted vegetation from a mature coniferous forest to a mix of hardwood forest and non-forest. Riparian reserves, LWD recruitment potential, and shading are rated high in the upper North Fork Nooksack watershed and poor in the lower North Fork Nooksack watershed (Smith 2001; Coe 2001). For these reasons, riparian reserves are considered *functioning at risk*.

All of the potential recruitment trees between the river and the roadway, was incorporated into the project as in-water habitat elements, so no loss of LWD occurred as a result of the project. Thus, this project *maintains* the baseline condition for this indicator.

Disturbance Regime (bull trout)

Logging in the North Fork Nooksack basin has decreased slope stability and increased landslides and sedimentation which have impacted habitat (Smith 2001). Debris torrents triggered by rain on snow events have been identified as a major problem for fish productivity in the basin (WDFW 2002). Flood frequency and intensity have also increased since the 1980s (Hyatt 2007). For these reasons, the disturbance regime is considered *functioning at risk*.

The project does not alter flooding, scour events, or debris torrents; hence, will *maintain* the baseline condition for this indicator

**Species and Habitat (bull trout)**

Integration of Species and Habitat Conditions

The North Fork Nooksack River provides habitat for bull trout. Habitat quality has been negatively impacted since Euro-American settlement due to development and associated land use practices, land conversions, and channel modifications. These actions have also resulted in habitat fragmentation. There is currently no trend data for bull trout in this system. Based on the disturbance history and habitat quality, this indicator is considered *functioning at risk*.

The project design has permanently interrupted the natural channel migration process. However, the project is located at the eastern extent of historic channel migration and flanked downstream by extensive rock revetments, so the extent of channel migration at this location would have been limited in scope during a

timeframe equivalent to the life of this project. For these reasons, lost channel migration and associated habitat creation is considered discountable. Therefore, the project does not further impact integration of species and habitat, and will *maintain* the baseline condition for this indicator.

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# Appendix F. Planting Plan

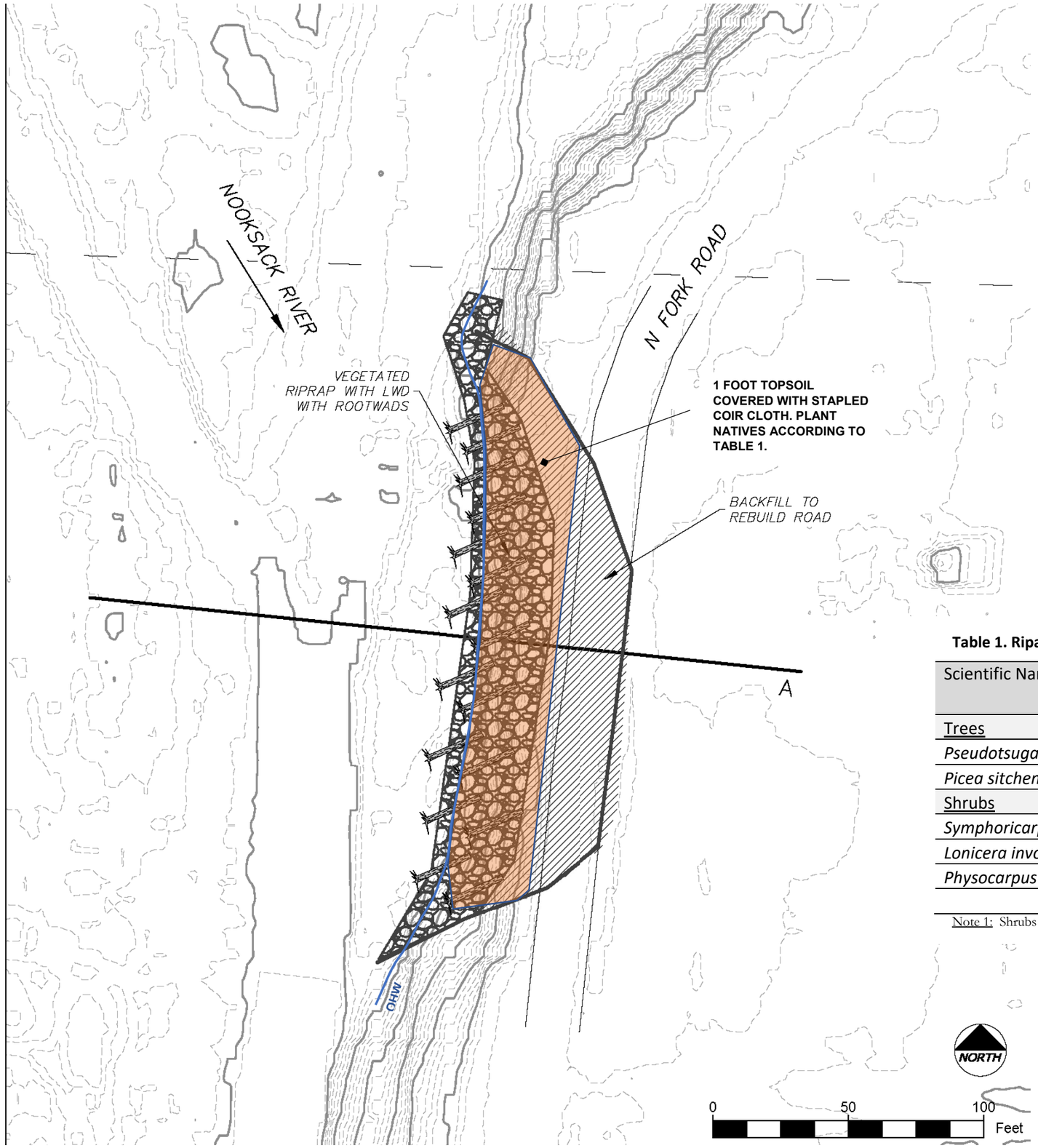
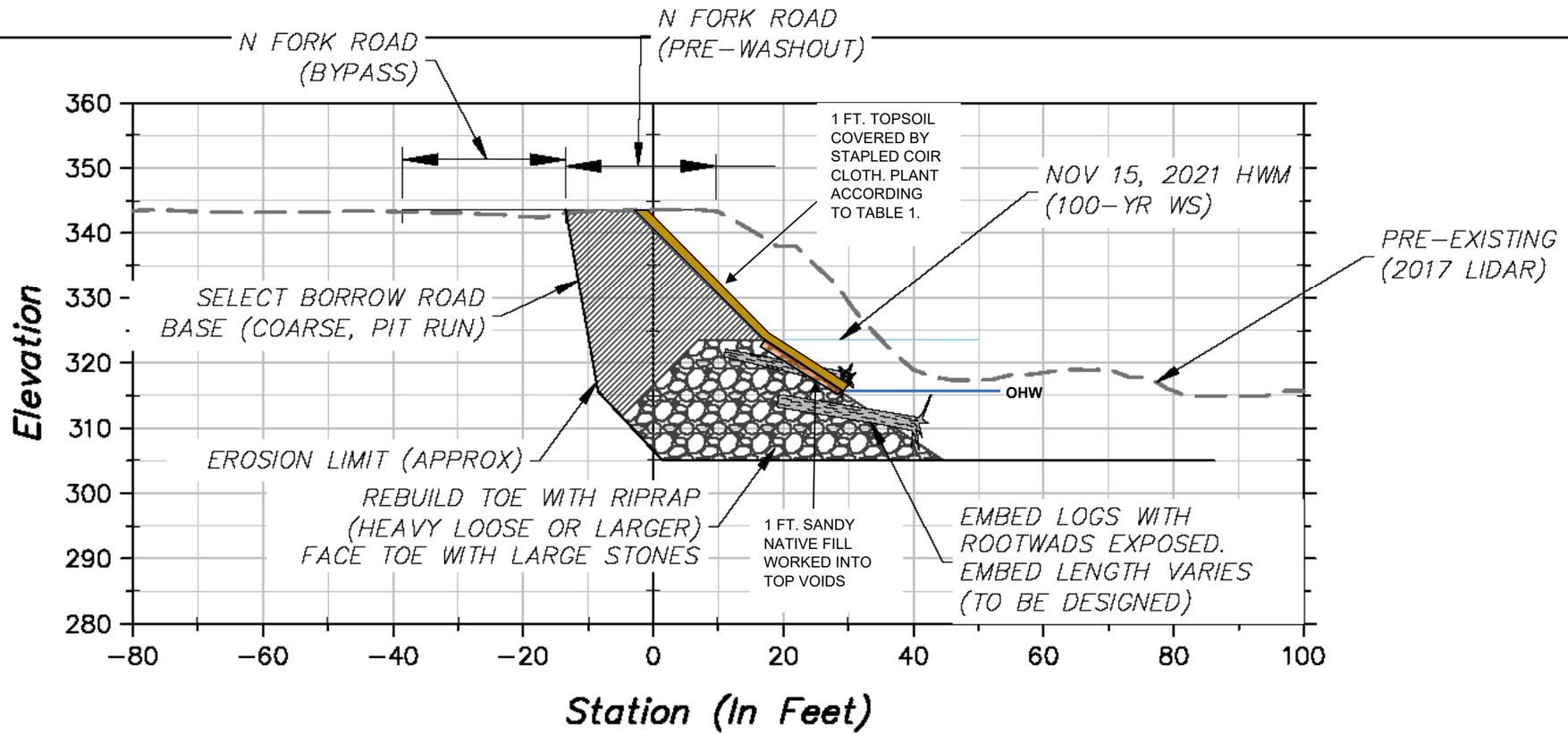



**Table 1. Riparian Buffer Plant Materials.**

| Scientific Name | Common Name | Planting Density | Number of Plants (Approx. 0.45 Acre) | Size of Plants |
|---|---|---|---|---|
| Trees | | | | |
| *Pseudotsuga menziesii* | Douglas Fir | 12’ O.C. | 100 | Plugs |
| *Picea sitchensis* | Sitka Spruce | 12’ O.C. | 50 | Plugs |
| Shrubs | | | | |
| *Symphoricarpos alba* | Snowberry | 4’ O.C. | 450 | 18” BR |
| *Lonicera involucrata* | Black Twinberry | 4’ O.C. | 350 | 18” BR |
| *Physocarpus capitatus* | Pacific Ninebark | 4’ O.C. | 450 | 18” BR |
| | | | **1,400** | **TOTAL** |

Note 1: Shrubs are to be planted in clumps of 20 on 4-foot centers

# SECTION A – EMERGENCY ROAD AND SCOUR COUNTERMEASURE DESIGN
## VIEWING DOWNSTREAM



# APPENDIX G. ESSENTIAL FISH HABITAT ASSESSMENT

**Magnuson Stevens Fishery Conservation and Management Act**

Action Agency: Whatcom County

Project Name: North Fork Road Emergency Bank Repair

**Essential Fish Habitat Background**

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires federal agencies to consult with NOAA Fisheries on activities that may adversely affect essential fish habitat (EFH). The objective of this EFH assessment is to determine whether or not the proposed action(s) "may adversely affect" designated EFH for relevant commercially, federally-managed fisheries species within the proposed action area. It also describes conservation measures proposed to avoid, minimize, or otherwise offset potential adverse effects to designated EFH resulting from the proposed action.

**Description of the Proposed Action**

A series of three high water events in the Nooksack River in mid to late November 2021 caused severe bank erosion of a 30 ft high river bank that removed a 100-foot section of North Fork Road in Whatcom County, WA. To prevent further bank erosion and enable re-construction of the roadway, Whatcom County Public Works constructed a rock toe at the base of the eroding bank, re-sloped the bank to a stable angle, and planted the bank with native trees and shrubs. Thirty-five LWD pieces were imported and incorporated in the rock toe. Also, three trees removed from the bank during construction were re-located to the upstream end of the repair to help re-direct flow and provide additional fish habitat. Additional project information is provided in the "Introduction" section of the BA.

The Nooksack River is EFH for the Pacific Salmon management unit, which includes coho salmon (*Oncorhynchus kisutch*), Chinook salmon (*O. tshawytscha*), and Puget Sound pink salmon (*O. gorbusha*). Coho salmon, Chinook salmon and pink salmon use the North Fork Nooksack River for adult migration, spawning, juvenile rearing, and juvenile outmigration.

**Potential Adverse Effects of Proposed Project**

**Adverse Effects on Essential Fish Habitat for Salmonids**

Rock and LWD placement caused temporary, short term increases in turbidity. Turbidity spikes attenuated rapidly in the turbulence and were not discernable at the point of compliance 300 feet downstream of the work area, and is therefore considered discountable. With the slope re-sloping and native riparian plantings, impacts to the riparian buffer are insignificant. The small in- water project footprint occurs in low quality habitat on the margin of a 1,200-foot-wide braided channel, and will have an insignificant effect on prey species and habitat function. Additional impact analysis is provided in the Effects section of the BA.

**Adverse Effects on Essential Fish Habitat for Ground Fishes**

The project area is not included in the groundfish as it is not located in the marine environment. Therefore, the project will have no adverse effect on the groundfish EFH.

**Adverse Effects on Essential Fish Habitat for Coastal Pelagic Species**

The project area is not included in the coastal pelagic EFH as it is not located in the marine environment. Therefore, the project will have no adverse effect on the coastal pelagic species EFH.

**Essential Fish Habitat Conservation Measures**

Conservation measures have been incorporated into the project to avoid and minimize adverse effects on EFH. These include project design, project timing, erosion and sediment control BMPs, riparian planting, and LWD placement. Additional information regarding conservation measures is provided in the "Impact Avoidance and Minimization Measures" section of the BA.

**Conclusions**

The Nooksack River is EFH for the Pacific salmon fishery. Proposed conservation measures will minimize impacts to listed species and EFH to levels that are insignificant or discountable. Therefore, the project **will not adversely affect** EFH for the Pacific salmon fishery, and will have **no adverse effect** on the EFH for groundfish and coastal pelagics.