Draft Environmental Assessment

Nooksack River – Bertrand Creek Levee System
Rehabilitation of Flood Control Works
Whatcom County, Washington

US Army Corps
of Engineers®
Seattle District

July 2006

Nooksack River- Bertrand Creek Levee System
Rehabilitation of Flood Control Works
Final Environmental Assessment
July 2006

Responsible Agency: The responsible agency for rehabilitation of flood control works is the U.S. Army Corps of Engineers, Seattle District.

Abstract:

This Environmental Assessment (EA) evaluates the environmental effects of the repair and setback replacement of the Bertrand Creek levees. Bertrand Creek is a tributary of the Nooksack River. The creek empties into the Nooksack River at River Mile 12.5 near Ferndale, Whatcom County, Washington. The levees protect 1,790 acres of residences, agricultural land and associated public infrastructure, such as roads.

The Nooksack River and Bertrand Creek rose above the zero damage flood stage during 24-26 November 2004, resulting in damage of approximately 2700 lineal feet to both the right bank and the left bank of the levee system. Whatcom County Public Works Department requested assistance under the U.S. Army Corps of Engineers, Seattle District (Corps) PL84-99 program in implementing a repair project at this location. The Corps determined that the levee was in need of permanent repair in order to provide the necessary level of flood protection for the neighboring residences, agricultural land, and associated public infrastructure. The Corps plans to relocate approximately 4800 feet of the damaged portions of the levees and set them back. The proposed project will not constitute a major federal action significantly affecting the quality of the human environment.

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1. INTRODUCTION

This Environmental Assessment (EA) evaluates the environmental effects of the proposed removal and setback replacement of portions of the right and left bank of the Bertrand Creek Levee system. Bertrand Creek is a tributary of the Nooksack River which empties into the Nooksack River at River Mile 12.5 near Ferndale, Whatcom County, Washington. The area is within the historic floodplain of the Nooksack River, and contains several small farms, single-family residences, and over 1,700 acres of agricultural land. The Nooksack River and Bertrand Creek rose above the zero damage flood stage in November 2004, resulting in severe damage of approximately 3000 linear feet of total damage to both the right and left banks of the levee. Subsequently, Whatcom County Public Works Department requested assistance under the Corps PL84-99 program in implementing a repair project at this location. Because the damage occurred in the same location as damage from an earlier event in 2003 that was repaired by the Corps, the proposed project consists of removing the damaged remnants of the levee and constructing new segments in a different alignment. This will not only be a benefit to flood protection and maintenance costs but will also increase riparian and aquatic habitat in the area and allow Bertrand Creek to perform more as a natural stream system

1.1 Location and Setting

The approximately 10,000 lineal feet of levees are located along both the left and right banks of at approximate river mile 1 of Bertrand Creek. Bertrand Creek is a tributary of the Nooksack River near Ferndale, located in Section 34, Township 40 North, Range 2 East, in Whatcom County, Washington. A location map can be found in Figure 1.

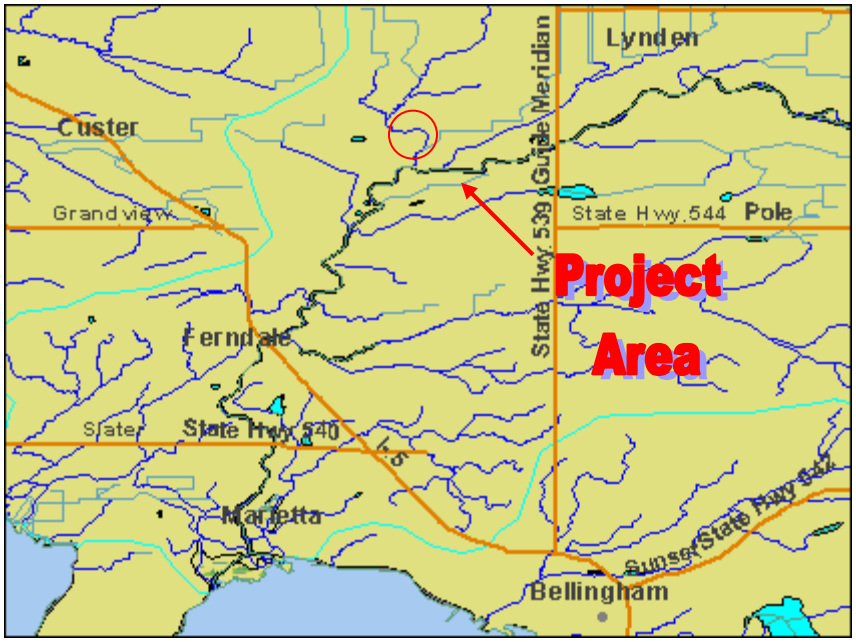

Figure 1. Project Location

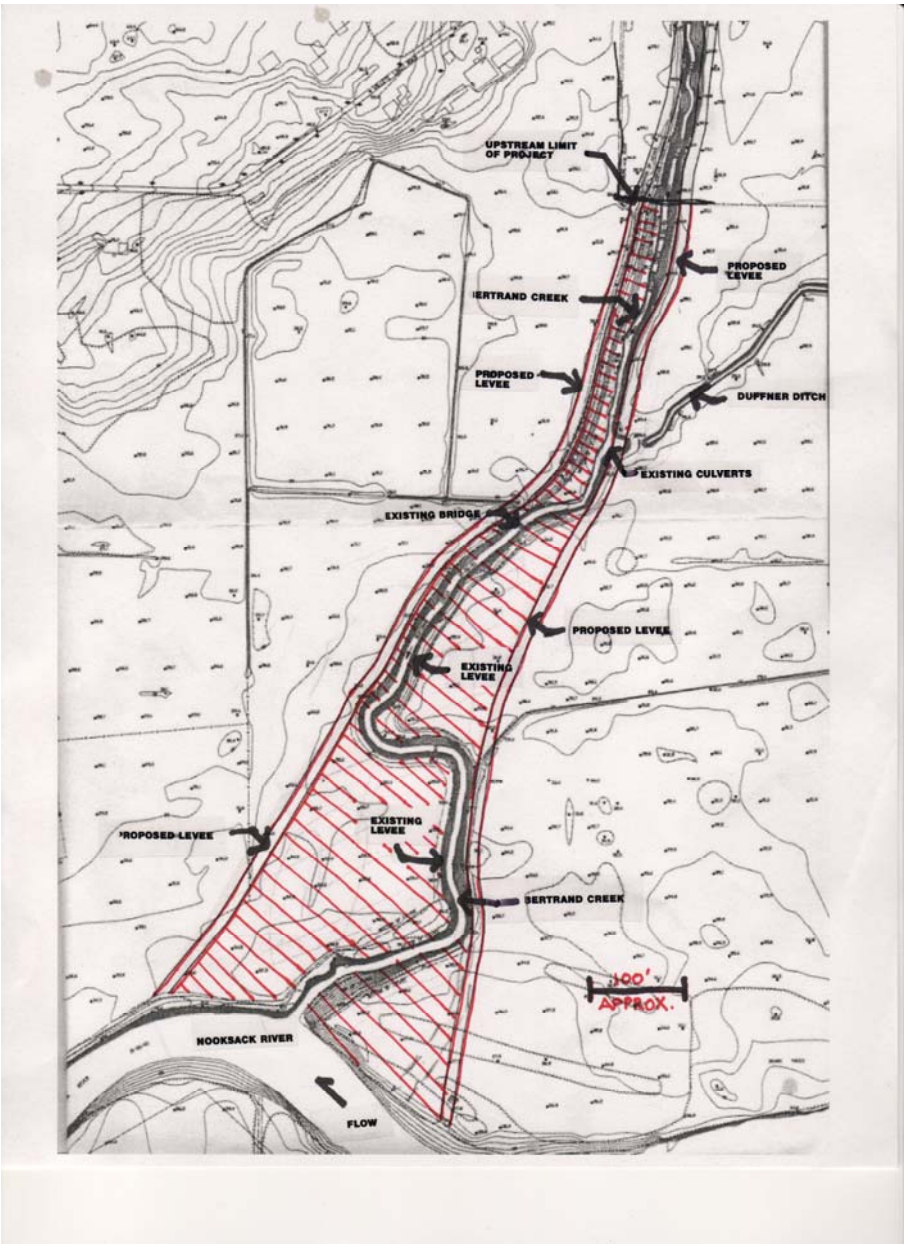

Figure 2. Project Layout

1.2 Background

The Bertrand Creek levee system was originally constructed in the early 1900's by local farmers to protect crops, roads, and structures. Over the years, separate segments became interconnected to form a contiguous levee segment stretching over 5000 feet. The estimated completion of a contiguous segment is prior to 1936 when the Corps performed levee upgrades using Works Progress Administration (WPA) funding. After the WPA upgrades, Corps involvement has been limited to flood fights and levee rehabilitation. The levee system is operated and maintained by Whatcom County. Annual maintenance includes the removal of blackberries and thinning or removal of trees that would jeopardize levee integrity.

During an October 2003 flood event the levees sustained significant damage by erosion resulting in damage to five separate areas (two on the left bank and three on the right bank). Four of the damaged areas experienced severe erosion resulting in the levee top nearly at grade with the existing ground, and vertical riverward slopes. The other damaged area experienced a catastrophic right bank breach. The damaged areas were subsequently repaired by the Corps.

The Nooksack River stream gage near Ferndale (nearest stream gage to site) experienced a 12-year recurrence interval flood event on November 26, 2004. This levee suffered significant damage, with breaches in multiple locations on the right bank, totaling 1500 feet in length. The main break was at the exact same location as repairs done the previous year. This suggests that the current alignment of the levee is problematic. There were also several locations where the levee was severely scoured on the riverward slope, or where the driving surface and back slope were scoured from overtopping. This is an area that appears to be designed for overtopping during high events. The left bank was also damaged by overtopping and scour over approximately 1,300 lineal feet of its length of 5,200 feet.

Left Bank Levee

The existing left bank levee is approximately 4,800 feet in length (see Appendix B). The levee is constructed of earthen materials with riverward slopes of 2H:1V and landward slopes of approximately 3H:1V. The top width is 10-12 feet. There are two flap gates connecting Duffner ditch through the levee, and a light use, agricultural bridge crossing the creek. The levee is vegetated with grass and weeds on the landward side, and armor rock is on the riverward face. Alder and cottonwood trees along with shrubs such as snowberry, Nootka rose, and blackberry grow on the riverward bench. The County performs annual maintenance including the removal of blackberries, knotweed and thinning or removal of trees that would jeopardize levee integrity. The levee protects agricultural and residential property. In an undamaged condition, the levee provides protection from a 5-year exceedance event.

Figure 3. Bertrand Creek left bank levee damage

Right Bank Levee

The existing right bank levee is approximately 5,200 feet in length (see Appendix B). The levee is constructed of earthen materials with riverward slopes of 2H:1V and landward slopes of approximately 3H:1V. The top width is 10-12 feet. There is a light use agricultural bridge crossing the creek. The levee prism is vegetated with grass and weeds on the landward side, and armor rock is on the face. The riverward benches are vegetated with alder and cottonwood trees and shrubs such as snowberry, Nootka rose, and blackberries. There are three culverts with flap gates along this stretch of levee. The County performs annual maintenance including the removal of blackberries and thinning or removal of trees that would jeopardize levee integrity. The levee protects agricultural and residential property. In the undamaged condition, the levee provides protection from the 5-year exceedance event.

Figure 4. Right bank flood damage to Bertrand Creek Levee

1.3 Project Purpose and Need

The purpose of the flood control project is to repair the damaged Bertrand Creek levees to restore and maintain adequate and reliable flood control for the residences, agricultural land and public infrastructure that has historically been protected by the Bertrand Creek Levee system. Environmentally this project provides the opportunity to restore riparian, stream bank habitat and increase flood plain connectivity while still improving the quality of flood control.

1.4 Authority

The Bertrand Creek Levee System Rehabilitation is authorized by Public Law 84-99 (33 USCA 701n). Corps rehabilitation and restoration work under this authority is limited to flood control works damaged or destroyed by flood. The rehabilitated structure is normally designed to provide the same degree of protection as the original structure. This project has an emergency

status as stated under the PL 84-99 regulations. If the levee is not repaired by the next flood season, an imminent threat of loss of private and/or public property exists. (see Appendix A)

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1.5 Action Area

The action area includes both banks of Bertrand Creek from the confluence with the Nooksack up to river mile 1.0 upstream of the confluence. Staging will be accomplished at the work site, and access will be obtained using existing levee access roads from existing paved roads. (see Appendix B)

2. DESCRIPTION OF THE ALTERNATIVES

2.1 Preferred Alternative

The preferred alternative consists of setting back the levees on both the right and left banks for approximately 4,800 feet. An existing agricultural bridge will also be removed along with the rerouting of the small, fertilizer pipeline that is attached. This bridge is being removed because with the new setback levee system, the bridge would become a choke point and not allow Bertrand Creek to meander and allow flood plain connectivity. Since the 6" fertilizer pipe is connected to the bridge to be removed the pipe will be directionally drilled under Bertrand Creek. This will prevent the fertilizer pipe from being damaged and releasing fertilizer into the creek system. Also, since the real estate designation is changing for the property, access for maintenance or future removal would be very difficult and would disturb newly created habitat. The pipe will be routed under Bertrand Creek below the scour depth. No excavation will take place in Bertrand Creek for the new pipe. The bridge is being removed at Whatcom County's expense and they will provide a disposal location. The preferred alternative is not the least costly alternative; however Whatcom County saw this as an opportunity to provide beneficial habitat back into the Bertrand Creek system and chose this as their preferred plan. The sponsor has agreed to pay the high additional costs created by setting portions of the levees back instead of repairing them at the current damaged locations. Refer to Appendix C for detailed drawings of the proposed levees that show a gentler back slope and are constructed about the ordinary high water line.

<u>Right Bank Levee</u>

On the right bank, a new levee will be built behind the existing levee alignment along the downstream reach. The riverward slope will be armored and the existing levee removed. In places where the levee will not be set back, the riverward and back slopes will be repaired to match the pre-flood condition. Scour damage to the levee top will be repaired by replacing the lost material, including 20" minus riprap, and re-grading. The riverward slope will be pulled back to 4:1, then a 3-foot thick blanket of class III riprap will be placed for armor rock. The armor rock will catch at the river bottom. No buried toe will be constructed along the portions of levee directly adjacent to the channel. Newly constructed levee segments that are further away from the channel will be constructed with a trenched armor toe that will not effect wetlands or provide any negative effects on Bertrand Creek. The setback portions of the levee will also have a 4:1 front and back slope and 40% clay and 60% class III riprap core, depending on availability (see Appendix B). The new levee section will be approximately 80 feet wide. The project will be rebuilt to the same level of protection as the pre-flood condition.

Left Bank Levee

On the left bank, a new levee will be built behind the old levee. The old levee will be removed and the riverward slope will be armored. In places where the levee will not be set back, the riverward and back slopes will be repaired to match the pre-flood condition. Scour damage to the levee top will be repaired by replacing the lost material. The riverward slope will be pulled back to 4:1, then a 1'-foot thick blanket of quarry spalls will be placed for slope protection. Newly constructed levee segments that are further away from the channel will be constructed with a trenched armor toe (see Appendix B). This trenched toe will not affect any wetlands and will not provide any adverse effects to Bertrand Creek. The new levee prism will have a 40% clay and 60% class III riprap core, depending on availability. The new levee section will be approximately 80 feet wide. The project will be rebuilt to the same level of protection as the pre-flood condition.

Approximately 95,000 cubic yards of material from the existing levees will be reused in the new structures. An additional 30,000 cubic yards of quarry spalls, 5,000 cubic yards of gravel and 15,000 cubic yards of riprap will also be used. The work will be performed using two hydraulic excavators, two large bulldozers, two tractor pulled double gang scrapers, and dump trucks. An existing 6" fertilizer pipe will be relocated from the existing bridge to beneath the creek. Trenches will be dug on either side of the creek and a directional drill will be used to lay the pipe. The pipe will then be buried and the trenches filled. Two culverts that are currently impassable for fish at Duffner Ditch will be replaced because the footprint of the levee has increased and the existing plans are to reuse the existing flap gates. Coordination is currently underway to possibly replace existing culverts with culverts that would be passable for fish at low flows. All work on the culverts will occur in the existing project boundaries. At this time, Washington Department of Fish and Wildlife has proposed to pay for new, more fish friendly flap gates but the installation of the gates will take place separately and after the completion of the Corps portion of the project.

2.2 Non-Selected Alternatives

2.2.1 No Federal Action

The No-Action alternative would leave the levees in their currently damaged condition with no further action to repair the damage. This alternative was quickly discarded because of the high potential of additional flood damages to the surrounding area. In addition, the damaged levees increase the potential for further introduction of sediments to the already heavily silted creek system.

2.2.2 Repair to Pre-Flood Condition

The Repair to Pre-Flood Condition alternative would repair the erosion and return the levee to its pre-flood condition. This plan consists of pulling the riverward slope back to 2H:1V, reshaping the top and landward slope, armoring the riverward slope and leaving the agricultural bridge and the fertilizer pipe attached to it in place. This plan provides the lowest-cost solution and least amount of environmental benefits. In addition, the construction of a new levee will reduce the chance of failure during high water events and will prevent the need for further construction in the area.

2.2.3 Non-Structural Alternative

The Non-Structural alternative would be to buy-out the existing farmland and provide for any necessary relocation. This alternative was discarded because the local sponsor is unable to afford the purchase and the local land owners do not wish to sell their property.

3. AFFECTED ENVIRONMENT

3.1 General

Near the project area the Nooksack River is a confined, single channel, low gradient system. The river provides spawning and rearing for all salmon species utilizing the upper main stem Nooksack. These species include Chinook (*Oncorchynchus tshawytscha*), Coho (*O. kisutch*), chum (*O. keta*), pink (*O. gorbuscha*), perhaps sockeye (*O. nerka*), steelhead (*O. mykiss*) and large numbers of Coho (*O. kisutch*). Juvenile rearing could occur through the reach. Much of the riparian zone adjacent to the levees along this section of the Nooksack is well developed with medium age cottonwoods, and alders. The riparian vegetation serves as habitat for a variety of raptors, woodpeckers, passerines and aquatic mammals.

The following threatened species are expected to be found near the project area in the Nooksack River and Bertrand Creek:

Puget Sound Chinook salmon (two essential stocks)
Puget Sound/ Coastal Bull trout
Bald Eagle

In the project area Bertrand Creek is a confined, single channel, low gradient system. The creek may provide spawning and rearing for all salmon species utilizing the upper main stem Nooksack. The species that have been documented utilizing Bertrand Creek include Fall Chinook (*Oncorchynchus tshawytscha*), Coho (*O. kisutch*), chum (*O. keta*), sockeye (*O. nerka*), and steelhead (*O. mykiss*). It is also anticipated that marbled murrelet could transit the area going to nesting areas in the upper watershed, or feeding areas in Puget Sound.

3.2 Hydrology, Soils and Topography

Flood frequency curves were developed using the published drainage area (40 sq. miles) for the historic United States Geological Service (USGS). Bertrand creek stream gage and USGS regional regression equations (WA Zone 2). The historic gage has only one high flow data point and is not suitable for gage analysis. Because portions of the watershed are in Canada, topography and rainfall data are limited to that published for the US. The drainage area for the historic gage does not include the tributary area of Lynden. It is felt that this area is less than 10% of the total catchments area--if it is greater, the discharge estimates would be affected accordingly. If the upper watershed topography is influenced by orographic precipitation, then the mean annual precipitation would be higher than that used for the hydraulic analysis for this project (45”/year). As a result the analysis would underestimate discharge. The calculated discharges for the 2, 10, 25, 50 and 100-year flood events on Bertrand Creek are 722, 1258, 1534, 1788, 1999 cubic feet per second respectively.

Topography of the project site is generally flat river floodplain, changing to a gently rolling landscape away from the river. The on-site soils are Mt. Vernon fine sandy loam, which is a very deep, moderately well drained soil found on river terraces and flood plains. Included in this unit are small areas of Briscot, Puyallup, Eliza, and Oridia soils; Shalcar soils in depressions, Riverwash, and Mt. Vernon Soils that have slopes greater than 2 percent. Of these soils, Briscot, Eliza, Oridia, Shalcar, and Riverwash soils are listed as hydric soils. Average precipitation is about 45 inches; average temperature is 50 degrees F. This soil usually has a seasonally high water table, and is at risk for flooding.

3.3 Vegetation

The project site is located in a coastal upland agricultural area. Vegetation at and near the vicinity of the project site is limited to that which occurs near the river. These include:

- Cottonwood (*Populus spp.)*
- Red-osier Dogwood (*Cornus sericea*),
- Nootka Rose (*Rosa nutkana*),
- Snowberry (*Symphoricarpos albus*),
- Red Alder (*Alnus rubra*),
- Japanese Knotweed (*Polygonum cuspidatum*)
- Himalayan Blackberry (*Rubus discolor*),
- Evergreen Blackberry (*Rubus laciniatus*),
- Douglas Fir (*Pseudotsuga menziesii*)
- Willow (*Salix spp.*) and

Vegetation specific to the project site is primarily Japanese Knotweed, Himalayan blackberry, grasses, willows, cottonwood and alder.

3.4 Fish and Wildlife

The Nooksack River supports several species of salmon and trout. Trout species occasionally present include bull trout, Dolly Varden, rainbow and cutthroat trout. The salmon species are Chinook (*Oncorchynchus tshawytscha*), Coho (*O. kisutch*), chum (*O. keta*), pink (*O. gorbuscha*), and perhaps sockeye (*O. nerka*).

The species that have been documented utilizing Bertrand Creek include Fall Chinook (*Oncorchynchus tshawytscha*), Coho (*O. kisutch*), chum (*O. keta*), sockeye (*O. nerka*), and steelhead (*O. mykiss*).

The agricultural area surrounding the project site along Bertrand Creek and the Nooksack River is frequented by a variety of wildlife species. Mammals include raccoon (*Procyon lotor*), Douglas squirrel (*Tamiasciurus douglasi*), little brown myotis (*Myotis lucifugus*), mink (*Carnivora mustelidae)* and Columbia black-tailed deer (*Odocoileus hemionus*). Bird species could include bald eagles (*Haliaeetus leucocephalus*), transiting marbled murrelets (*Brachyramphus marmoratus*), and chestnut-backed chickadee (*Parus rufescens*).

3.5 Threatened and Endangered Species

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to

federally listed and proposed threatened or endangered species. Four species listed as either threatened or endangered are potentially found in the area of the project, and are listed in Table 3-1.

Table 3-1. Endangered Species in the Project Vicinity

Scientific Name	Common Name	Status
Haliaeetus leucocephalus	Bald Eagle	Threatened
Oncorhynchus tshawytscha	Puget Sound Chinook Salmon	Threatened
Salvelinus confluentus	Puget Sound Coastal Bull Trout	Threatened
Brachyramphus marmoratus marmoratus	Marbled murrelets	Threatened

Information on known occurrences of candidate and threatened species in the project vicinity, and the impacts of the proposed projects on these species are addressed in Appendix F.

Bald eagle is listed as threatened in Washington State pursuant to the Endangered Species Act and can be found in coastal areas. Feeding areas and perches are not known to be in the project area.

Marbled murrelet is listed as threatened and is found in coastal old-growth forest areas of Washington. Marbled murrelets do not nest or feed in the project area. The project site lacks old-growth forest and does not contain suitable marbled murrelet habitat.

Bull trout and Dolly Varden have been found to co-exist in streams in this region. Because these two species are closely related and have similar biological characteristics, the WDFW manages bull trout and Dolly Varden in the Nooksack together as "native char." Bull trout and Dolly Varden are very difficult to distinguish based on physical features and share similar life history traits and habitat requirements. Dolly Varden were not listed as a threatened species in the Coastal/Puget Sound Distinct Population segment when the USFWS listed bull trout was listed in November 1999. However, the USFWS indicated on January 9, 2001 that Dolly Varden are being considered for listing as threatened due to their similarity of appearance to bull trout.

Bull trout was designated on June 10, 1998, as threatened in the contiguous U.S.A. (lower 48 states). Anadromous and resident bull trout spawn in the upper forks of the Nooksack River. Although bull trout have not been documented as utilizing Bertrand Creek it is possible that bull trout could use Bertrand Creek for juvenile rearing and larger bull trout could transit through the project area to upstream salmon spawning areas to feed. Existing habitat suitability for char along this length of shoreline is low during summer months as the water temperatures are likely quite high.

Puget Sound Chinook Salmon, an anadromous fish run in the Nooksack River area, is listed as threatened under the ESA. Chinook salmon in the Nooksack Basin are considered part of the Puget Sound Chinook salmon Evolutionarily Significant Unit (ESU) that was listed as threatened in March 1999. Three Chinook stocks have been identified in the Nooksack River basin: the North Fork spring-run, the South Fork spring-run and the Samish/Mainstem fall-run. The two spring-runs are distinct wild stocks of native origin while the Samish/Mainstem fall-run is a non-native introduced hatchery stock from the Green River.

Spring-run Chinook generally enter the Nooksack River between late March and early August, migrate rapidly upstream to the forks and hold there until July through early August, and spawn generally from August through October (Williams et al. 1975). Fall-run Chinook enter the river beginning in mid July and migrate upriver to the spawning grounds or hatchery of origin through the end of September, and generally spawn from mid September through mid November (Williams et al. 1975). Juvenile salmonid smolts and Chinook fry migrate downstream in the Nooksack River and likely through the project reach from mid March through mid July (Williams et al. 1975).

Only fall-run-Chinook are known to inhabit Bertrand Creek (Smith 2002). The Nooksack Salmon Enhancement Association has been conducting spawning surveys on Bertrand Creek for at least two years. The survey reach includes River Miles 7.5-9.7 (project locations approximately River Mile 0.25-1.0). In 2002, 0 Chinook and 0 redds were identified and in 2003, 9 Chinook and 7 redds were identified in Bertrand Creek. In the project area Bertrand Creek is backwater area during high and low flows. Water velocities are extremely low as evidenced by the lack of gravel substrate and the presence of fines, thus the immediate project area does not provide adequate water velocities for Chinook spawning. Aquatic vegetation is virtually non-existent and the entire channel in the project area is covered with a layer of fine sediment. Visual and olfactory observations of the large quantities of manure spread on the surrounding fields and comparisons with sediment in the channel suggest that the channel substrate (silt) also partially comprises manure. Department of Ecology Investigations indicate that wastewater or manure is likely contributing to poor water quality in Bertrand Creek (Dickes 1992). Although no gravels or sand substrate appear to be present in the project area, and water quality is at times poor, the existing riparian vegetation, and occasional small woody debris may provide rearing, feeding, and predator avoidance habitat in the project reach.

Coho salmon within the Puget Sound/Strait of Georgia ESU are presently classified as a "candidate" for ESA listing. Candidate species are species that may be proposed or are under review for possible listing as a threatened or endangered species in the future. In its ESA status review, the Biological Review Team stated that although many coho populations within this ESU are abundant and apparently stable, there are a number of factors (high harvest rates, habitat degradation, and hatchery production) that may lead to substantial risks to whatever native production remains. The Biological Review Team stated that if the population continues to decline, this ESU is likely to become endangered in the foreseeable future.

Coho salmon of the Nooksack are dominant Puget Sound contributors to U.S. and Canadian sport and commercial fisheries. Nooksack River coho salmon are harvested in pre-terminal fisheries, Bellingham Bay terminal fisheries, and Lummi, Nooksack tribal river net fisheries, and river sport fisheries. The fish have been managed as a hatchery management unit under the Puget Sound Management Plan for nearly 27 years. Run size each year is large enough to provide both a harvestable surplus and a sufficient hatchery escapement. Between 1989 and 1999 the estimated total number of Nooksack coho salmon returning to Puget Sound has ranged from 43,300 to 244,600 with escapement estimates ranging from 7,950 to 99,000.

Three naturally spawning stocks of coho salmon were tentatively identified by WDFW (1992) in the Samish/Nooksack Basin region. These are the Nooksack, Samish, and North Puget Sound Tributary stocks. Stock separation was primarily based on geographic distribution. Life history

timing or morphological differences between the groups of fish do not exist or have not been observed. Within the Nooksack basin, it is uncertain whether a naturally spawning Nooksack coho population exists that is sufficiently distinct from the hatchery population to be considered a native stock. In the Nooksack River basin, natural escapement has been estimated to range from 500 to 5,500 since 1966. The highest escapement in this period (1987) corresponds to the second highest hatchery release to the system (6.2 million in 1985). Some biologists believe the native Nooksack coho stock is extinct, while others argue that there is high likelihood that a segment of the naturally spawning population retains sufficient genetic distinction to warrant its classification as a native stock. The NMFS has deferred any decisions on this ESU while additional information is gathered.

The Nooksack River coho stocks are typical of the Puget Sound/Strait of Georgia ESU with regard to their life history. Following emergence, the majority of stream-rearing juveniles spend eighteen months in fresh water before migrating downstream to saltwater as river flows increase with annual spring snowmelt and runoff. Following eighteen months in salt water, adult coho return to the Nooksack River and migrate upstream from August through early January. Spawning occurs in the upper mainstem and the accessible portions of the Forks from mid-November through January.

Coho habitat and life history functions in the project area include adult and juvenile migration and juvenile rearing (Whatcom County 1994). It is highly unlikely that coho spawning occurs in the project area. Adults migrate in the Nooksack River and likely through the project reach from mid July though mid November (Williams et al. 1975). Juveniles migrate downstream through the reach from mid April through mid August (Williams et al. 1975).

The Nooksack Salmon Enhancement Association has been conducting spawning surveys on Bertrand Creek for at least two years. The survey reach includes River Miles 7.5-9.7 (project locations approximately River Mile (0.25-1.0). In 2002, 88.0 coho and 6.0 redds were identified and in 2003, 78.0 coho and 20.0 redds were identified in Bertrand Creek. In the project area Bertrand Creek water velocities are extremely low, thus the immediate project area does not provide adequate water velocities for coho spawning. Aquatic vegetation is virtually non-existent and the entire channel in the project area is covered with a layer of fine sediment. Visual and olfactory observations of the large quantities of manure spread on the surrounding fields and comparisons with sediment in the channel suggest that the channel substrate (silt) is also partially comprised of manure. Department of Ecology investigations indicate that wastewater or manure is likely contributing to poor water quality in Bertrand Creek (Dickes 1992). Although no gravels or sand substrate appear to be present in the project area, and water quality is at times poor, the existing riparian vegetation, and occasional small woody debris may provide rearing, feeding, and predator avoidance habitat in the project reach.

3.6 Cultural Resources

Swanton (1952:430) places the stretch of the river containing the project area within the traditional territory of the Nooksack Tribe, who belonged to the coastal division of the Salishan linguistic family. Ruby and Brown (1992:152-153) provide information that the name Nooksack was originally the name of one of the tribe's villages and that it is also a corruption of one of the tribe's bands. During the middle of the nineteenth century the tribe was settled in three main

villages between Everson and Deming (Ruby and Brown 1992:153). Russo (1981:Figure 1) shows the village site of "Siiḱwewmex" near the major bend in the river downstream of the Bertrand Creek project area. Russo describes the village as a Nooksack longhouse and fishing site and permanent camping ground, but the location is not precisely marked on his map. A map compiled by Hollenbeck (1987:45, Map 2) shows the settlement of "Who-wa-pulam" as located at the confluence of Bertrand and Fish Trap Creeks near the north end of the project area. Supplemental, specific information pertaining to Indian settlement/camping sites in this area was recently supplied by the Nooksack Tribe. The 1873 General Land Office map for T. 40 N., R. 2 E., W.M., does not show any homesteads, roads or other evidence of settler claims or activity within the entire township. (see Appendix D)

3.7 Water Quality

Warm water temperatures are a problem in the main stem Nooksack River. Water temperatures in the Nooksack River near North Cedarville (RM 30.9) were in the "poor" category (warmer than 16 C) for 54% of the samples in 1996 and 1997 (data from USGS 2001). Conditions worsen downstream near Everson (RM 23.2) where 65% of the samples are warmer than 16 degrees Celsius and the peak temperature was 19.0 degrees Celsius. Near the mouth (RM 3.4), 60% of the samples were warmer than 16 C in July and August of 1996 and 1997 (data from USGS 2001). Shade levels were remarkably poor with no main stem reaches achieving more than 40% of target shade levels, and most reaches had percent canopy cover in the 0 to 20% range (Coe 2001). Other causes include the surrounding agriculture, residential and urban land use and the increased sedimentation from upstream sources. All of these water quality problems pose serious impacts to salmonids and result in a "poor" water quality rating for the main stem Nooksack River.

Washington State Department of Ecology (DOE) has reported that the water quality in Bertrand Creek itself is poor. Water quality criteria were exceeded for bacteria and dissolved oxygen (D.O.), and potentially toxic ammonia concentrations were present when sampled in the spring of 2002.

3.8 Air Quality and Noise

Air quality in the Nooksack Basin is generally good. However, urban areas experience moderately degraded air quality during certain times of the year. Motor vehicles are the largest source of air pollutants in Whatcom County, although wood-burning stoves also contribute. Particulates, sulfur dioxide, ozone, and carbon monoxide are the pollutants of concern. High concentrations of these pollutants generally occur during the dry, late summer months when minimal wind conditions persist for long periods of time or during mid-winter thermal inversions.

The project area is rural-agricultural and typical existing noises consist of those generated by farm animals, machinery, trucks, automobiles, aircraft and other internal combustion engines

3.9 Utilities and Public Services

The levee provides protections for agricultural land, residential properties, and associated public infrastructure.

3.10 Land Use

Land use in the project area is primarily rural residential and agricultural.

3.11 Recreation

Recreational uses of Bertrand Creek at the project site are seasonal and moderate and exist primarily for the private landowner.

3.12 Hazardous, Toxic, and Radioactive Waste

There are no known sites at the project locations that have any hazardous, toxic, or radioactive waste.

3.13 Aesthetics

Along Bertrand Creek the local landscape provides scenery of agriculture and small, rural farms. With increasing development in the area, examples of this type of land use are becoming rarer.

4. EFFECTS OF THE ALTERNATIVES

4.1 General

4.1.1 Proposed Alternative

There will be minor, short-term impacts from construction of the set back levees. Long term impacts however include a restored flood protection system and the reestablishment of important habitat along lower Bertrand Creek. Over the life of the project, the chance of future flood fights and repairs will decrease because of improved levee design better suited for the hydrology of this system. No work will be performed below the Ordinary High Water Mark (OHWM), with the exception of replacing two 48" culverts at Duffner Ditch where construction will occur in the existing footprint. The culvert replacement will take place during the established fish window of July 1-August 30 to minimize any potential adverse impacts. Currently these culverts are impassable to fish. Replacement flapgates may be installed at a later time by Whatcom County that are passable for fish in the system. Due to the timing of construction (July 24 – September 30) and the design of the levees, no long-term adverse impacts to the environment are anticipated. Any disturbance to fish and wildlife would be temporary and occur only during construction. Over the long term, a significant positive impact is anticipated due to the increase in available flood plain and shoreline as a result of setting the levee segments back from the creek. The removal of the existing agriculture bridge and the directional drilling of the new fertilizer line will not require any in water work. All work for these actions will either be above the OHHW mark or below scour depth of Bertrand Creek.

4.1.2 No-Action Alternative

The No-Action alternative would leave the site in as-is condition and there would be continued flood damage in the form of bank erosion and damage to a loss of surrounding farm lands.

4.1.3 Repair to Pre-Flood Condition Alternative

The Repair to Pre-Flood Condition Alternative would require in-water work and would have short term construction impacts, primarily increased turbidity, and noise and machinery activity.

4.2 Hydrology, Soils and Topography

4.2.1 Proposed Alternative

The current hydrology, soils and topography will change over time in a beneficial manner in the area that the levee is set back do to the increase in availability of new flood plain for Bertrand Creek to meander. The natural stream processes including meandering, and introduction of organic material will begin to take affect almost immediately on the reaches of Bertrand Creek where the levee has been set back. Fewer disturbances from flood fight activities and required levee maintenance will allow for a permanent establishment of a riparian corridor and the natural introduction of large woody debris from newly formed native stands of vegetation.

4.2.2 No-Action Alternative

The No-Action alternative would leave the site in as-is condition and there would be continued erosion and sediment deposition added to the Bertrand Creek system.

4.2.3 Return to Pre-Flood Condition Alternative

The Return to Pre-Flood Condition Alternative would have temporary impacts on the hydrology, soils and topography as work progressed. The hydrology, soils and topography would be essentially unchanged from the pre-flood condition at the completion of the project. Some areas, such as access roads and the repaired levee sections would possibly have more compacted soils.

4.3 Vegetation

4.3.1 Proposed Alternative

The vegetation currently onsite consists primarily of grasses and willows that was installed as part of the 2004 repairs. The proposed project would remove the existing vegetation for construction of new setback levee sections. Disturbed areas will be hydroseeded with a native seed mix and native plantings are being installed under the CREP program.

4.3.2 No-Action Alternative

The No-Action alternative would result in the project site continuing to be populated with Japanese knotweed and Himalayan blackberry. Some native vegetation including a few alder trees exist at the site and would continue to grow.

4.3.3 Return to Pre-Flood Condition Alternative

This alternative would result in removal of existing vegetation on both the riverward and back slopes on both levees. Vegetation removed would consist primarily of grasses, Japanese knotweed and Himalayan blackberry, but may also include alder, snowberry, Nootka rose, red-osier dogwood, and willows. The repaired sections would be planted with native willow species at appropriate elevations and then the area would be hydroseeded with a native seed mix.

4.4 Fish and Wildlife

4.4.1 Proposed Alternative

Effects to fish and wildlife would be temporary and occur only during construction. With the increased flood plain and the availability of land for channel migration a more diverse creek system should develop.

4.4.2 No-Action Alternative

Increased sediment levels further degrading the creek bed and providing less opportunities for development of potential spawning areas.

4.4.3 Return to Pre-Flood Condition Alternative

Effects to fish and wildlife, if any, would be temporary and occur primarily during construction. These would potentially include an increase in noise, equipment activity, turbidity and air quality.

4.5 Threatened and Endangered Species

4.5.1 Proposed Alternative

Three species listed by the U.S. Fish and Wildlife Service (USFWS) under the ESA as threatened are found in the project area: bull trout (*Salvelinus confluentus*), bald eagle (*Haliaeetus leucocephalus*), and marbled murrelet (*Brachyramphus marmoratus*). Puget Sound Chinook salmon (*Oncorhynchus twtshawytscha*) utilizes the proposed project location and is listed as threatened by the National Marine Fisheries Service (NMFS).

4.5.1.1 Chinook Salmon

The project will be constructed above the OHWM except for the culvert replacement work at Duffner Ditch. This work will be completed during the established fish window of July 1-August 30. The project will set the levees back significantly, opening up previously cut off floodplain and increasing the shoreline and habitat complexity (additional restoration work will be conducted by Whatcom County and the Nooksack Tribe). Again, no in-water work will occur—that is all work will be above ordinary high water (except for the Duffner Ditch culvert replacement); work on the Duffner Ditch culvert replacement will occur when no water is present in Duffner Ditch, and during the work window for salmon, so that salmon would not be present in Bertrand Creek. In addition, best management practices (BMP's) incorporated into the construction process will assure that de minimus materials will find their way to water Therefore, the Corps has determined the project will have **"no effect"** on Puget Sound Chinook salmon. See appendix F for an analysis of effect on critical habitat.

4.5.1.2 Bull Trout

Best management practices to reduce or eliminate the possibility of turbidity during construction will be implemented. This determination is based primarily on the fact that no in-water work will be done; in addition, best management practices (BMP's) incorporated into the construction process will assure that de minimus materials will find their way to water. The Corps determined the project will have **"no effect"** on bull trout.

4.5.1.3 Bald Eagles

The project area is approximately 1/2 mile away from the closest nest and the nest is visible from the project area. The project impacts are not a concern to nesting behavior due to the distance of the closest nest to the site and the fact that work will be done following completion of nesting (work will begin around August 14). Prey (salmonid) production will not be affected by the project construction. As a result the Corps has determined the project will have **"no effect"** on the bald eagle.

4.5.1.4 Marbled Murrelet

Marbled murrelets do not nest or feed in the project area. The project site lacks old-growth forest and does not contain suitable marbled murrelet habitat. As a result the Corps has determined this project will have **"no effect"** on marbled murrelet.

4.5.2 Essential Fish Habitat

The project area currently does not provide Essential Fish Habitat (EFH) for various life stages of three species of Pacific salmon.

In order to qualify as freshwater Essential Fish Habitat (EFH) for Pacific salmon 4 major components must exist: (1) spawning and incubation; (2) juvenile rearing; (3) juvenile migration corridors; (4) adult migration corridors and adult holding habitat. Important features of essential habitat for spawning, rearing, and migration include adequate: (1) substrate composition; (2) water quality (e.g. dissolved oxygen, nutrients, temperature, etc.); (3) water quantity, depth and velocity; (4) channel gradient and stability; (5) food; (6) cover and habitat complexity (e.g. large woody debris, pools, channel complexity, aquatic vegetation, etc.); (7) space; (8) access and passage; and (9) flood plain and habitat connectivity.

This project area currently does not support these requirements. The current substrate is inadequate and warm water temperatures are a problem in the main stem Nooksack River. Water temperatures in the Nooksack River near North Cedarville (RM 30.9) were in the "poor" category (warmer than 16 C) for 54% of the samples in 1996 and 1997 (data from USGS 2001). Conditions worsen downstream near Everson (RM 23.2) where 65% of the samples are warmer than 16 degrees Celsius and the peak temperature was 19.0 degrees Celsius. Near the mouth (RM 3.4), 60% of the samples were warmer than 16 C in July and August of 1996 and 1997 (data from USGS 2001). Shade levels were remarkably poor with no main stem reaches achieving more than 40% of target shade levels, and most reaches had percent canopy cover in the 0 to 20% range (Coe 2001). Other causes include the surrounding agriculture, residential and urban land use and the increased sedimentation from upstream sources. All of these water quality problems pose serious impacts to salmonids and result in a "poor" water quality rating for the main stem Nooksack River.

Washington State Department of Ecology (DOE) has reported that the water quality in Bertrand Creek itself is poor. Water quality criteria were exceeded for bacteria and dissolved oxygen (D.O.), and potentially toxic ammonia concentrations were present when sampled in the spring of 2002.

Because of the existing condition in the Bertrand Creek system this project will not reduce the quality and/or quantity of EFH for Pacific salmon. The project will have **"no effect"** on EFH. However, long-term benefits to EFH are expected due to setting the levees back.

4.5.3 No-Action

Increased sediment levels further degrading the creek bed and providing less opportunities for development of potential spawning areas.

4.5.4 Return to Pre-Flood Condition Alternative

Impacts to Bald Eagle and Marble Murrelet would be the same as the preferred alternative. There would be potential additional temporary impacts to the salmonid species, primarily increased turbidity during the in-water portion of the work. No long term benefits would be realized.

4.6 Cultural Resources

4.6.1 Proposed Alternative

In order to comply with Section 106 of the National Historic Preservation Act of 1966, as amended through 2000 (NHPA; 16 USC § 470, a Corps archaeologist conducted a professional cultural resources investigation. The investigation included background research and a search of the DAHP electronic Historic Sites Inventory Database. The records search indicated that no properties listed in the National Register and no sites or structures listed in the state inventory are located within the project's Area of Potential Effects (APE). Professional pedestrian surveys conducted by a Corps archaeologist in 2004 and 2005 did not produce any evidence of Native American prehistoric or historic-period activity within the APE.

Letters requesting assistance in identifying historic properties that may be of religious or cultural significance and may be eligible for the National Register of Historic Places, including Traditional Cultural Properties, located within the APE were sent on 9 March 2005 to the Nooksack Tribe and the Lummi Nation. At that time neither the Nooksack Tribe nor the Lummi Nation responded with any information concerning knowledge of historic properties located within the project APE, although the Lummi Nation did respond with requests and comments. A cultural resources report on the results of the investigation was prepared on 1 July 2005 and submitted to the Washington Department of Archaeology and Historic Preservation (DAHP) with a determination of No Historic Properties Affected and the DAHP subsequently concurred. Although the cultural resources investigation did not produce any evidence of the presence of historic properties within the project APE, the report recommended archaeological monitoring at selected locations within the APE during construction.

Based on background research that was presented in the 2005 report and supplemental information recently supplied by the Nooksack Tribe, the Corps will conduct archaeological monitoring at selected locations in coordination with the Nooksack Tribe. In addition, the construction contract will contain an inadvertent discovery clause containing the following statement:

> If, during construction activities, the Contractor observes items that might have historical or archeological value, such observations shall be reported immediately to the Contracting Officer so

that the appropriate authorities may be notified and a determination can be made as to their significance and what, if any, special disposition of the finds should be made. The Contractor shall cease all activities that may result in the destruction of these resources and shall prevent his employees from trespassing on, removing, or otherwise damaging such resources.

4.6.2 No-Action Alternative

No effects were anticipated as a result of the No-Action alternative.

4.6.3 Return to Pre-Flood Condition Alternative

No change from proposed alternative.

4.7 Water Quality

4.7.1 Proposed Alternative

Any water quality impacts caused by construction activities will by temporary and minor. Equipment will not enter the water and will remain on dry ground at all times. During construction, best management practices for equipment operation and storage and use of hazardous materials will be employed.

According to the Code of Federal Regulations, Title 33, Section 323.4 (a) (2) levee repair is an activity not prohibited by or otherwise subject to regulation under Section 404 of the Clean Water Act. Therefore, a section 401 Water Quality Certification is not required.

4.7.2 No-Action Alternative

It is likely that if the project is not constructed the remains of the levee would fail during the upcoming flood season, resulting in an increase in erosion, turbidity and sedimentation in the Nooksack River.

4.7.3 Return to Pre-Flood Condition Alternative

Effects would be similar to the proposed alternative, but there would be a temporary, minor increase in turbidity during the in-water portion of the construction.

4.8 Air Quality and Noise

4.8.1 Proposed Alternative

Air quality met the standards as set forth by the Washington Department of Ecology and they will not be permanently affected by the construction of the project. Noise will be intermittent at the site and vary depending on the frequency of trucks arriving with the material and construction of the identified features. Noise disruption factors were considered for their effect on threatened and endangered species in the ESA document.

During construction, there may be a temporary and localized reduction in air quality due to emissions from heavy machinery operating during fill placement, and grading. These emissions are not anticipated to exceed EPA's de minimis threshold levels (100 tons/year for carbon

monoxide and 50 tons/year for ozone) or affect the implementation of Washington's Clean Air Act implementation plan. Therefore, impacts will not be significant.

Ambient noise levels may increase slightly while construction equipment is operating. However, these effects will be temporary and localized, and occur only during daylight working hours. As a result, impacts will be insignificant.

4.8.2 No-Action Alternative

No effects were anticipated as a result of the No-Action alternative.

4.8.3 Return to Pre-Flood Condition Alternative

Effects would be the same as the preferred alternative.

4.9 Utilities and Public Services

4.9.1 Proposed Alternative

Failure to repair the levee could have a serious impact on local commercial and private citizens through increased flood damage to homes, agricultural operations, roads, and other commercial and residential infrastructure. Construction vehicles associated with the project may create a minimal disruption due to increased truck traffic merging, turning and traveling together with local traffic. This disruption will be temporary and highly localized, and therefore impacts will be insignificant.

4.9.2 No-Action Alternative

The No-Action alternative would not result in an increase in traffic on the local roads, and it would not result in providing the desired flood protection to public infrastructure.

4.9.3 Return to Pre-Flood Condition Alternative

Effects would be the same as the preferred alternative.

4.10 Land Use

4.10.1 Proposed Alternative

The project reduces the amount of available farmland for the current landowners.

4.10.2 No-Action Alternative

No repair to the levees would cause continued loss of property and a threaten public utilities and roadways.

4.10.3 Return to Pre-Flood Condition Alternative

The Return to Pre-Flood Condition Alternative would not cause any unique effects or impacts to land use.

4.11 Recreation

4.11.1 Proposed Alternative

Recreational uses of the project area are not expected to change.

4.11.2 No-Action Alternative

No effects were anticipated as a result of the No-Action alternative.

4.11.3 Return to Pre-Flood Condition Alternative

Recreational uses of the project area are not expected to change.

4.12 Hazardous, Toxic, and Radioactive Waste

4.12.1 Proposed Alternative

There are no known sites at the project locations that had any hazardous, toxic, or radioactive waste; therefore, no effect is anticipated.

4.12.2 No-Action Alternative

No effects were anticipated as a result of the No-Action alternative.

4.12.3 Return to Pre-Flood Condition Alternative

No effects would be anticipated.

4.13 Aesthetics

4.13.1 Proposed Alternative

Increased opportunities for natural channel process, along with the re-introduction of native plant species and the removal of existing noxious and invasive plants will increase the overall aesthetics of the system.

4.13.2 No-Action Proposed Alternative Aesthetics

Noxious and invasive plants will continue to overtake native plants in the area and degrade the natural appearance and function of the channel

4.13.3 Return to Pre-Flood Condition Alternative

No effect would be anticipated as a result of this alternative.

5. UNAVOIDABLE ADVERSE EFFECTS

Unavoidable adverse effects associated with this project include:

(1) a temporary and localized increase in noise, which may disrupt wildlife in the area, and
(2) a temporary and localized disruption of local traffic by construction vehicles

6. COORDINATION

The following agencies and entities have been involved with the environmental coordination of this project:

- Washington Department of Ecology (Ecology)
- National Marine Fisheries Service (NMFS)
- U.S. Fish and Wildlife Service (USFWS)
- Washington Department of Fish and Wildlife (WDFW)
- The Nooksack Tribe
- The Lummi Tribe
- Washington State Historic Preservation Officer (SHPO)
- Washington State Department of Archaeology and Historic Preservation (DAHP)
- Whatcom County
- Washington Department of Emergency Management

7. CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this evaluation. Future federal actions would require additional NEPA evaluation at the time of their development.

There are no significant cumulative effects that can be identified from the implementation of this project. Because of frequent flooding in the area, the adjacent property is expected to remain agricultural and no development is anticipated in the vicinity of the project. There are no known plans to raise the levees to provide an increased level of flood protection. The Corps knows of no other actions that are reasonably certain to occur within the action area.

Cumulative impacts from local, short-term disturbances caused by the construction project (noise, emissions, traffic disruptions, etc.) would be minor and temporary.

8. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The irreversible and irretrievable commitment of resources is the use of materials, resources, or land during implementation of an alternative that makes these resources unavailable for other uses, given known technology and reasonable economics.

Industrial resources required during implementation of the selected alternative will include fossil fuels, construction-related materials, as well as labor and capital.

9. ENVIRONMENTAL COMPLIANCE

9.1 National Environmental Policy Act (NEPA) (42 USC 4321 et seq.)

In accordance with the National Environmental Policy Act, federal projects are required to declare potential environmental impacts and solicit public comment. The purpose of this document is to solicit public comment and fulfill the Corps of Engineers documentation requirements under the National Environmental Policy Act.

9.2 Endangered Species Act of 1973, as Amended (16 USC 1531-1544)

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed or proposed threatened or endangered species. ESA documentation has been prepared for the project. A finding of May Effect, Not Likely to Adversely Effect was determined for all potentially occurring threatened or endangered species. The National Marine Fisheries Service (NMFS) and USFWS were notified of the project location and action. The ESA document is contained in Appendix C.

9.3 Clean Water Act, as Amended (33 USC 1251 et seq.)

According to the Code of Federal Regulations, Title 33, Section 323.4 (a) (2) levee repair is an activity not prohibited by or otherwise subject to regulation under Section 404 of the Clean Water Act. Therefore, a section 401 Water Quality Certification is not required.

9.4 Rivers and Harbors Act (33 U.S.C. 403)

The Rivers and Harbors Act of 1899 prohibits the construction of any bridge, dam, dike, or causeway over or in navigable waters of the United States in the absence of Congressional consent and approval of the plans by the Chief of Engineers and the Secretary of the Army. Under Section 10 of the Rivers and Harbors Act, a navigable waterway is defined as those waters that are subject to the ebb and flow of the tide shoreward to the mean high water mark. This act is not applicable to the proposed project because the levee repair does not restrict navigation or access to navigable waters.

9.5 Coastal Zone Management Act (16 U.S.C. 1451-1465)

The Coastal Zone Management Act (CZMA) of 1972 as amended (15 CFR 923) requires Federal agencies to carry out their activities in a manner which is consistent to the maximum extent practicable with the enforceable policies of the approved Washington Coastal Zone Management Program.

The proposed action will move the levee segments away from the shoreline and therefore will not cause substantial adverse effects to shore resources or the environment. Whatcom County is processing a shoreline permit for the project proposal to comply with the CZMA.

9.6 National Historic Preservation Act) (16 USC 470 et seq., 110)

Section 106 requires that Federal agencies identify and assess the effects of federally assisted undertakings on historic properties and to consult with others to find acceptable ways to resolve adverse effects. Properties protected under Section 106 are sites, buildings, structures, or objects included on or eligible for listing on the National Register of Historic Places. Eligible properties must generally be at least 50 years old, possess integrity of physical characteristics, and meet at least one of four criteria for significance. Regulations implementing Section 106 (36 CFR Part 800) encourage maximum coordination with the environmental review process required by the National Environmental Policy Act (NEPA) and with other statutes. The Washington State Archaeological Sites and Resources Act (RCW 27.53) may also apply. In order to comply with Section 106 of the NHPA, the Corps has consulted with the Nooksack Tribe and the Lummi Nation, has completed a professional cultural resources investigation, and has submitted a report on its findings to the DAHP with a determination of No Historic Properties Affected. The

DAHP concurred with the Corps' determination of No Historic Properties Affected in a letter dated June 18, 2005.

9.7 Clean Air Act As Amended (42 USC 7401, et seq.)

The Clean Air Act requires states to develop plans, called State Implementation Plans (SIP), for eliminating or reducing the severity and number of violations of National Ambient Air Quality Standards (NAAQS) while achieving expeditious attainment of the NAAQS. The act also required Federal actions to conform to the appropriate SIP. An action that conforms with a SIP is defined as an action that will not: (1) cause or contribute to any new violation of any standard in any area; (2) increase the frequency or severity of any existing violation of any standard in any area; or (3) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

The U.S. Army Corps of Engineers has determined that emissions associated with this project will not exceed EPA's *de minimis* threshold levels (100 tons/year for carbon monoxide and 50 tons/year for ozone).

9.8 Wild and Scenic Rivers Act (16 U.S.C. 1271-1287)

The Wild and Scenic Rivers Act (P.L. 90-542, as amended) selected rivers of the Nation, which, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values. The purpose of the Act is to preserve these rivers in their free-flowing condition, and be protected for the benefit and enjoyment of present and future generations.

An inventory, the National Wild and Scenic Rivers System, was established in December 1, 1992 and is published by the Department of the Interior and the Department of Agriculture, Forest Service and can be found at web site http://www.nps.gov/rivers/wildriverslist.html#wa. The Nooksack River and Bertrand Creek are not on the inventory.

9.9 Migratory Bird Treaty Act and Migratory Bird Conservation Act (16 USC 701-715)

The project will be conducted in such a manner that migratory birds will not be harmed or harassed. The work will occur outside the nesting season for most birds. Riparian vegetation suitable for nesting will be avoided, where possible. Where potential nesting vegetation may be removed, adequate riparian vegetation for nesting sites exists upstream and downstream from the project site.

9.10 Fish and Wildlife Coordination Act, as Amended (16 USC 661 et seq.)

While the project is a Federal water resources development project, private funds were originally used to construct the levee. Since the project is not a Civil Works activity, the Corps' Seattle District policy is that emergency PL84-99 projects do not require FWCA coordination. Given the size and scope of the project, fish and wildlife coordination issues were not expected, which would have resulted in a "No Action" determination by USFWS. Fish and wildlife coordination information and issues, if any, can be provided during the EA public review comment period. The project is in compliance with this act.

9.11 Federal Water Project Recreation Act, as Amended (16 USCA 4612 et seq.)

The Federal Water Project Recreation Act (P.L. 89-72), as amended, requires that full consideration be given to opportunities for fish and wildlife enhancement in investigating and planning Federal water resources projects. The project is consistent with this act.

9.12 Watershed Protection and Flood Prevention Act, as Amended (16 U.S.C. 1001 et seq.)

The Watershed Protection and Flood Prevention Act (Public Law 83-566) are commonly known as the Small Watershed Program. USDA-Natural Resources Conservation Service (NRCS) administers this program. The program authorizes Federal assistance to local organizations for planning and carrying out projects in watershed areas for conservation and use of land and water and flood prevention. This project is not a product of the Small Watershed Program and therefore this act is not applicable to this project.

9.13 Farmland Protection Policy Act (7 U.S.C. 4201, et seq.)

The Farmland Protection Policy Act (Public Law 97-98, Sec. 1539-1549) requires identification of proposed actions that would affect any lands classified as prime and unique farmlands. The project does not affect farmland classified as prime and unique. The project is consistent with this act.

9.14 Resource Conservation and Recovery Act (RCRA) (42 USC 6901 et seq.)

RCRA was enacted in 1976 to address the issue of how to safely manage and dispose of municipal and industrial waste, regulate underground storage tanks (USTs) that store petroleum or hazardous substances, establish a system for managing solid (primarily nonhazardous) waste, including household waste, and set forth the framework for EPA's comprehensive waste management program. No abandoned waste was observed during project site visits. No abandoned or buried hazardous waste or pesticides are anticipated. If wastes are discovered it will be managed in accordance with RCRA or CERCLA requirements, as applicable. Contractor hazardous materials and waste would be managed in accordance with RCRA requirements if and issues arise. The project is in compliance with this act.

9.15 Executive Order 11988, Floodplain Management (24 May 1977)

Executive Order 11988 requires federal agencies to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy of the floodplain, and to avoid direct and indirect support of floodplain development where there is a practicable alternative. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains."

Section 8 of E.O. 11988 notes that the order does not apply to assistance provided for emergency work essential to save lives or protect public property, health, and safety. The project does not consist of that would affect occupancy of the floodplain. In removing and reconstructing the damaged levee segments, the project is consistent with the act in reducing the risk of flood and minimizes the impact of floods on human safety, health, and welfare, while not changing floodplain occupancy conditions.

9.16 Executive Order 12898, Environmental Justice

Executive Order 12898 directs every federal agency to identify and address disproportionately high and adverse human health or environmental effects of agency programs and activities on minority and low-income populations. The project does not involve siting a facility that will discharge pollutants or contaminants, so no human health effects would occur. Therefore the project is in compliance with this act.

9.17 Executive Order 11990, Protection of Wetlands, May 24, 1977

The purpose of this project is to rehabilitate a damaged levee. No wetlands would be impacted by this project.

Table 9.1. Summary of Consistency of Project with Applicable Laws, Regulations and Policies[1]

LAWS AND REGULATIONS RELATING TO THE PROPOSED ALTERNATIVES	REQUIREMENT SUMMARIZED	CONSISTENCY OF PREFERRED ALTERNATIVE
National Environmental Policy Act (NEPA)	Requires all federal agencies to consider the environmental effects of their actions and to seek to minimize negative impacts.	Consistent
Clean Air Act	Requires federal agencies to consult with state air pollution control agencies to assure that construction plans conform with local air quality standards	Consistent
Clean Water Act (CWA)	Requires federal agencies to protect waters of the United States. Disallows the placement of dredged or fill material into waters (and excavation) unless it can be demonstrated there are no reasonable alternatives. Requires federal agencies to comply with state water quality standards.	Covered by 33 CFR 323.4 (a) 2
Rivers and Harbors Act	Prohibits the construction of any bridge, dam, dike, or causeway over or in navigable waters of the U.S. in the absence of Congressional consent and approval of the plans by the Chief of Engineers and the Secretary of the Army.	Not in Section 10 jurisdiction
Fish and Wildlife Coordination Act	Requires federal agencies to consult with the US Fish & Wildlife Service on any activity that could affect fish or wildlife.	Consistent
Endangered Species Act	Requires federal agencies to protect listed species and consult with US Fish & Wildlife or NMFS regarding the proposed action.	Consistent
National Historic Preservation Act	Requires federal agencies to identify and protect historic properties.	Completed
Wild and Scenic Rivers Act	Requires that "In all planning for the use and development of water and related land resources, consideration shall be given by all Federal agencies involved to potential national wild, scenic and recreational river areas."	Consistent
Executive Order 11988, Floodplain Management	Requires federal agencies to consider how their activities may encourage future development in floodplains.	Consistent

Migratory Bird Treaty Act and Migratory Bird Conservation Act	Requires not harming or harassing migratory birds.	Consistent
Federal Water Project Recreation Act, as Amended	Requires full consideration for fish and wildlife enhancement opportunities when planning Federal water resources projects.	Consistent
Watershed Protection and Flood Prevention Act, as Amended	Authorizes Federal assistance for implementing projects in watershed areas and use of land and water and flood prevention.	Consistent
Farmland Protection Policy Act	Requires identification of proposed actions that would affect any lands classified as prime and unique farmlands.	Consistent
Resource Conservation and Recovery Act (RCRA)	Requires managing hazardous materials and waste in accordance with RCRA requirements.	Consistent
Executive Order 11990, Protection of Wetlands	Requires federal agencies to protect wetland habitats.	Consistent
Coastal Zone Management Act (CZMA)	Requires federal agencies to comply with state and local plans to protect and enhance coastal zones and shorelines.	Consistent to the maximum extent practicable
Washington Hydraulic Code	Requires proponents of developments, etc. to protect state waters, wetlands and fish life.	Not Applicable
Whatcom County Flood Hazard Reduction Plan	Requires implementing projects that would result in innovative, comprehensive and permanent solutions to flooding problems using environmentally sensitive techniques.	Not Applicable

10. CONCLUSION

Based on the above analysis, the levee system rehabilitation project is not a major Federal action significantly affecting the quality of the human environment, and therefore does not require preparation of an environmental impact statement.

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Williams et al. (1975). A Catalog of Washington Streams and Salmon Utilization, Vol. 1, Puget Sound Region. Washington Department of Fisheries. Olympia. W.A.

12. APPENDICES

Appendix A

Requests for Corps Assistance

WHATCOM COUNTY
PUBLIC WORKS DEPARTMENT

JEFFREY M. MONSEN, P.E.
Director

River and Flood Division

322 N. Commercial Street, Suite 120
Bellingham, WA 98225
Phone: (360) 676-6876, (360) 398-1310
Fax: (360) 738-2468

December 15, 2004

Doug Weber
US Army Corps of Engineers
P.O. Box C-3755
4735 E. Marginal Way S.
Seattle, WA 98124-2255

Re: Levee Repair Work in Whatcom County

Dear Mr. Weber:

During the recent flooding in Whatcom County on November 24th, 2004, multiple levees were damaged along the Nooksack River and its tributaries. They include the following:

- The "Williams Levee" - an approximately 100-foot section of this levee located on the left bank of the Nooksack River near Everson was damaged.
- The "Sande-Williams Levee" – an approximately 200-foot section of this levee located on the right bank of the Nooksack River near Deming was damaged.
- The "Right Bank Bertrand Creek Levee" – an approximately 100-foot section of this levee located on the right bank of Bertrand Creek near Ferndale failed.
- The "Hannegan Levee" – an approximately 500-foot section of this levee located on the left bank of the Nooksack River near Lynden was damaged.
- The "Bylsma Levee" – an approximately 500-foot section of this levee located on the left bank of the Nooksack River near Lynden was damaged.
- The "Vanderpol Levee" – the upstream segment of this levee located on the left bank of the Nooksack River near Lynden was damaged.
- The "Twin-View Levee" – a portion of this levee located on the left bank of the Nooksack River near Everson was damaged.

We are officially requesting assistance under the PL84-99 Program in implementing repair projects at these locations. The County will act as the local sponsor and provide all necessary lands, rights-of-way, and easements for these projects.

If you have any questions or need any additional information please don't hesitate to contact me at (360) 676-6876.

Sincerely,

James E. Lee, P.E.
River & Flood Engineer

I:\FLOOD\112 - General Flood Works (Projects)\R & M Proj\2005\ACOE PL84-99 Repairs\ACOE PL84-99 assistance letter.doc

WHATCOM COUNTY
PUBLIC WORKS DEPARTMENT
JEFFREY M. MONSEN, P.E.
Director

River and Flood Division

322 N. Commercial Street, Suite 120
Bellingham, WA 98225
Phone: (360) 676-6876, (360) 398-1310
Fax: (360) 738-2468

March 14, 2005

Doug Weber
US Army Corps of Engineers
P.O. Box C-3755
4735 E. Marginal Way S.
Seattle, WA 98124-2255

Re: Levee Repair Work in Whatcom County

Dear Mr. Weber:

During the flooding in Whatcom County on November 24th, 2004, multiple levees were damaged along the Nooksack River and its tributaries. One of those levees damaged was the "Left Bank Bertrand Creek Levee".

We are officially requesting assistance under the PL84-99 Program in implementing a repair project at this location. The County will act as the local sponsor and provide all necessary lands, rights-of-way, and easements for this project.

If you have any questions or need any additional information please don't hesitate to contact me at (360) 676-6876.

Sincerely,

James E. Lee, P.E.
River & Flood Engineer

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Appendix B

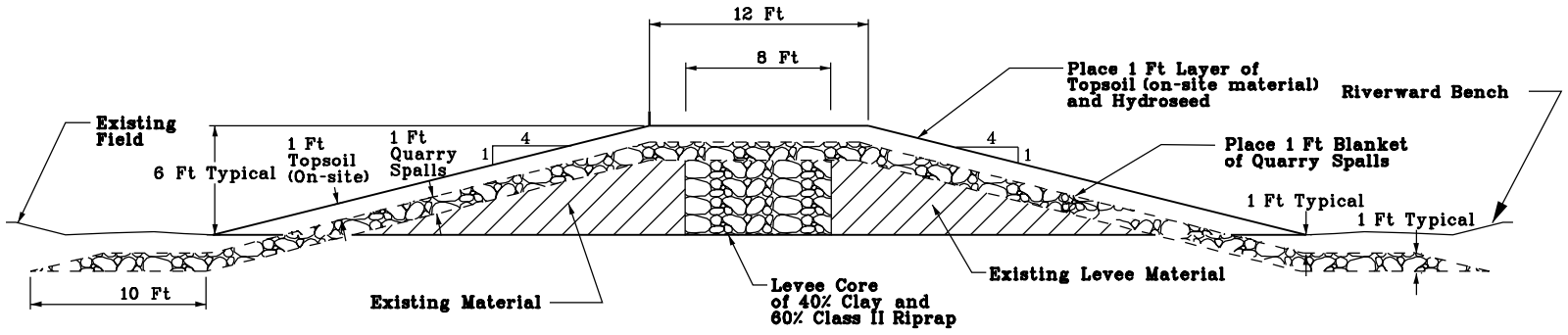
Project Drawings

DESIGN FILE: G:\civ\Noocksack\05 Rehabs\Bertrand left Setback.dgn
DATE AND TIME PLOTTED: 15-AUG-2005 10:14

U.S. ARMY CORPS OF ENGINEERS, SEATTLE DISTRICT

PROJECT: Nooksack Rehab 2005	COMPUTED BY: C. DesJardin	DATE: Aug 05
SUBJECT: Bertrand Creek Left Bank Setback Section	CHECKED BY: Kaiser	SHT. 1 OF 1 PART:

Notes:

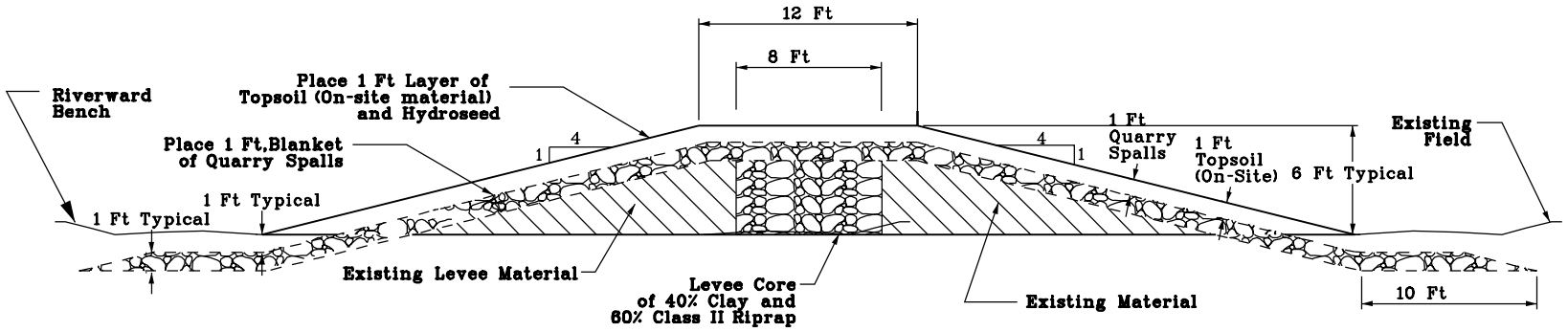


Bertrand Creek Left Bank
Typical Setback
With Riverward Bench

DESIGN FILE: G:\civ\Noocksack\05 Rehabs\Bertrand left Setback.dgn
DATE AND TIME PLOTTED: 15-AUG-2005 10:15

U.S. ARMY CORPS OF ENGINEERS, SEATTLE DISTRICT

PROJECT: Nooksack Rehab 2005		COMPUTED BY: C. DesJardin	DATE: June 05
SUBJECT: Bertrand Creek Right Bank Setback Section		CHECKED BY: Kaiser	SHT. 1 OF 1 PART:



Bertrand Creek Right Bank
Typical Setback
With Riverward Bench

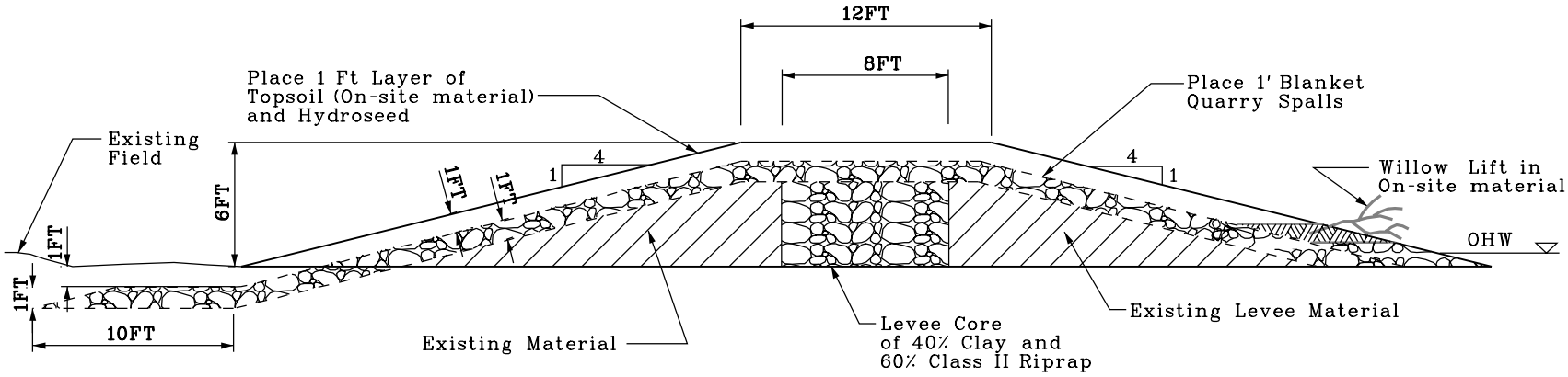
DESIGN FILE: G:\civ\Noocksack\05 Rehabs\BertrandL.dgn
DATE AND TIME PLOTTED: 15-AUG-2005 10:30

U.S. ARMY CORPS OF ENGINEERS, SEATTLE DISTRICT

PROJECT: Nooksack Rehab 2005	COMPUTED BY: C. DesJardin	DATE: Aug 05
SUBJECT: Bertrand Creek Left Bank	CHECKED BY: Kaiser	SHT. 1 OF 1 PART:

Notes:

Final planting elevation of the willows to be determined on site.

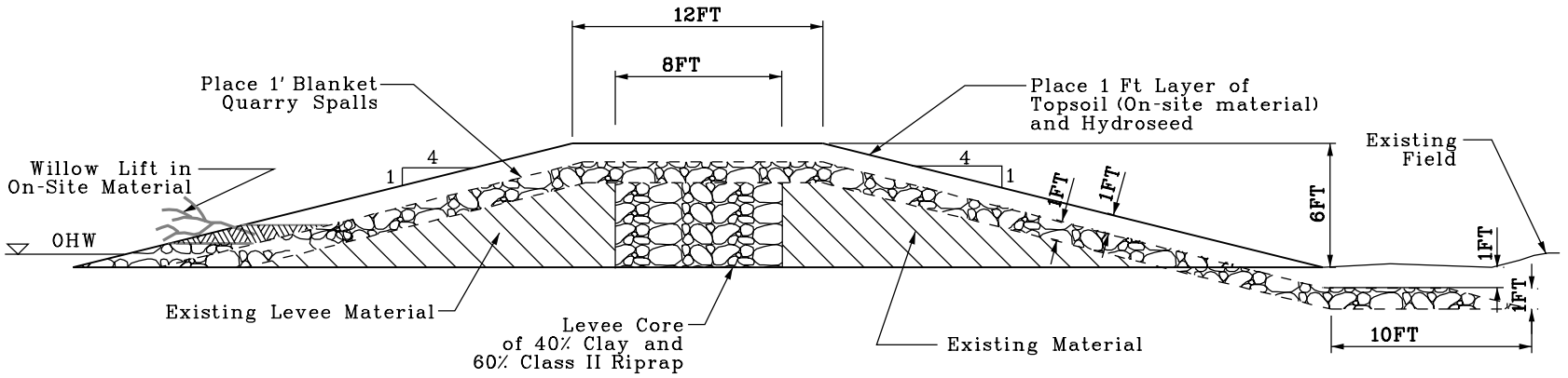


Bertrand Creek Left Bank
No Bench Section

DESIGN FILE: G:\civ\Noocksack\05 Rehabs\BertrandL.dgn
DATE AND TIME PLOTTED: 15-AUG-2005 10:30

U.S. ARMY CORPS OF ENGINEERS, SEATTLE DISTRICT

PROJECT: Nooksack Rehab 2005	COMPUTED BY: C. DesJardin	DATE: Aug 05
SUBJECT: Bertrand Creek Right Bank	CHECKED BY: Kaiser	SHT. 1 OF 1 PART:



Bertrand Creek Right Bank
No Bench Section

Appendix C

Draft FONSI

CENWS-OD-EM

REHABILITATION OF FLOOD CONTROL WORKS BERTRAND CREEK LEVEES WHATCOM COUNTY, WASHINGTON

DRAFT FINDING OF NO SIGNIFICANT IMPACT

1. Background. The Seattle District, U.S. Army Corps of Engineers (Corps) proposes to remove damaged sections of the right and left bank of the Bertrand Creek levees and construct new setback levees. The project is located at River Mile 12.5 of the Nooksack River near Ferndale, Whatcom County, Washington. Construction is scheduled to take place during June-September 2006. All work will occur above the ordinary high water mark with the exception of a possible replacement of existing flap gates to something more appropriate for fish passage. Any work on these flap gates would occur in the designated, allowable work period for in water work. The levees protect 1,790 acres of agricultural land, residential properties, and associated public infrastructure, such as roads. The Nooksack River stream gage near Ferndale (nearest stream gage to site) experienced a 12-year recurrence interval flood event on November 26, 2004. This levee suffered significant damage, with breaches in multiple locations on the right bank, totaling 1500 feet in length. The project will be constructed under the authority of Public Law 84-99 (33 USCA 701n) with Whatcom County acting as the project local sponsor.

2. Purpose and Need. The purpose of this project is to provide protection to the community and infrastructure from flood damage. This section of the levee sustained significant damage and is in need of permanent repair. There is an imminent threat of damage to life and property during the upcoming flood season if a permanent repair is not completed.

3. Action. The project consists of removing the remnants of the existing, damaged levee segments and constructing new levees setback from Bertrand Creek. Additional work includes the removal of an existing agricultural bridge, two culvert replacements, and the relocation of a 6" fertilizer pipe under Bertrand Creek.

4. Summary of Impacts. The primary negative impacts of this action will be the temporary and localized increase in noise in the construction area. Long term impacts will be positive and include restored flood protection and increased flood plain and shoreline habitat availability. Best Management Practices for noise, air quality and erosion control will be utilized to keep temporary negative impacts to a minimum during the construction period.

The attached draft environmental assessment provides an evaluation of the levee rehabilitation project and its effects on the existing environment.

No significant adverse impacts to fish and wildlife habitat, air quality, noise, esthetics, historical resources, cultural resources, or the social or economic environment are anticipated as a result of the project.

5. Finding. For the reasons described above, I have determined that the levee rehabilitation project will not result in significant adverse environmental impacts. The project does not

constitute a major Federal action with significant impacts on the environment and, therefore, does not require an environmental impact statement.

_____ _____

Date

John K. Leighow
Lieutenant Colonel, Corps of Engineers
Acting District Commander

Appendix D

SHPO Documents

STATE OF WASHINGTON

Office of Archaeology and Historic Preservation

1063 S. Capitol Way, Suite 106 • PO Box 48343 • Olympia, Washington 98504-8343 • (360) 586-3065
Fax Number (360) 586-3067 • http:www.oahp.wa.gov

June 18, 2005

Mr. Mark Ziminske
Environmental Resources Section
Seattle District, Corps of Engineers
PO Box 3755
Seattle, Washington 98124-3755

Re: Levee Rehabilitation Project
Log No: 071305-16-COE-S

Dear Mr. Ziminske:

Thank you for contacting our office and providing the cultural resources survey by Ronald Kent for the proposed Six Levee Rehabilitation Project on the Nooksack River in Whatcom County, Washington. We concur with his professional recommendations and your finding of No Historic Properties Effected.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

These comments are based on the information available at the time of this review and on the behalf of the State Historic Preservation Officer in conformance with Section 106 of the National Historic Preservation Act and its implementing regulations 36CFR800. Should additional information become available, our assessment may be revised.

In the event that archaeological or historic materials are discovered during project activities, work in the immediate vicinity must stop, the area secured, and the concerned tribes and this office notified. Thank you for the opportunity to comment and a copy of these comments should be included in subsequent environmental documents.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 586-3080
email: rob.whitlam@dahp.wa.gov

cc: Nicole Baker
George Swanaset, Jr.

Appendix E

Duffner Ditch WSDOT Memo

Washington State Department of Transportation

Memorandum

December 10, 2002

TO: Brian Bigler (MS-138); Marco Foster (MS-

FROM: Bob Warinner (WDFW), Kristin Fredericks (MS-138)

SUBJECT: Stream survey of Duffner Creek and tributary in Tromp Road vicinity

This memorandum documents the results of a quantitative stream survey of Duffner Creek (WRIA 01-0202) and one associated tributary in the vicinity of State Route (SR) 539 and Tromp Road culvert crossings located in Township 40 North, Range 02 East, Section 24, west of the City of Lynden, Whatcom County, Washington (See Figure 1). The Washington State Department of Transportation (WSDOT) is considering participating with the City of Lynden to replace a culvert blocking fish passage at Tromp Road (WDFW 2000) as mitigation for future project impacts to Duffner Creek paralleling SR 539 upstream from the surveyed area. A brief description of the methodology used to document the existing stream conditions follows. The quantitative stream survey described in this document was conducted to assess the benefits of culvert removal and replacement at the Tromp Road stream crossing versus benefits gained from alternative mitigation actions to the channelized Duffner Creek paralleling SR 539. Kristin Fredericks and I conducted an abbreviated stream habitat reconnaissance of the Duffner Creek system upstream of the Tromp Road crossing on October 24 and 30, 2002.

METHODOLOGY

Areas were assessed for the following parameters based on procedures outlined in the Washington State Department of Fish and Wildlife (WDFW) Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual (WDFW 2000). Measurements and classification of habitat units were taken upstream of the Tromp Road culvert inlet with additional parameters taken at intervals throughout the reach. Information gathered in each habitat unit includes habitat type (pool, riffle, or glide) and measurements such as length, average width, average depth, or maximum depth in the case of pools, as well as streambed substrate composition. In each segment the streambed was examined for the dominant and sub-dominant substrate types of which four were identified by visual and manual inspection, these include; muck, sand, pea gravel (<0.5 inches diameter) and gravel (>0.5 inches in diameter, <1.5 inches in diameter). Measurements taken at intervals include percent canopy cover using a spherical densiometer (Model C made by Forest Densiometers).

Characterization and inventory of riparian vegetation within a 100-foot riparian zone along both streambanks was done once in a representative area of each reach. Also noted were general location of associated riparian wetlands. Stream cover was estimated and assigned a value of high, medium, or low based on percent canopy cover and other elements such as undercut banks, overhanging vegetation, and large woody debris (LWD), and root wads.

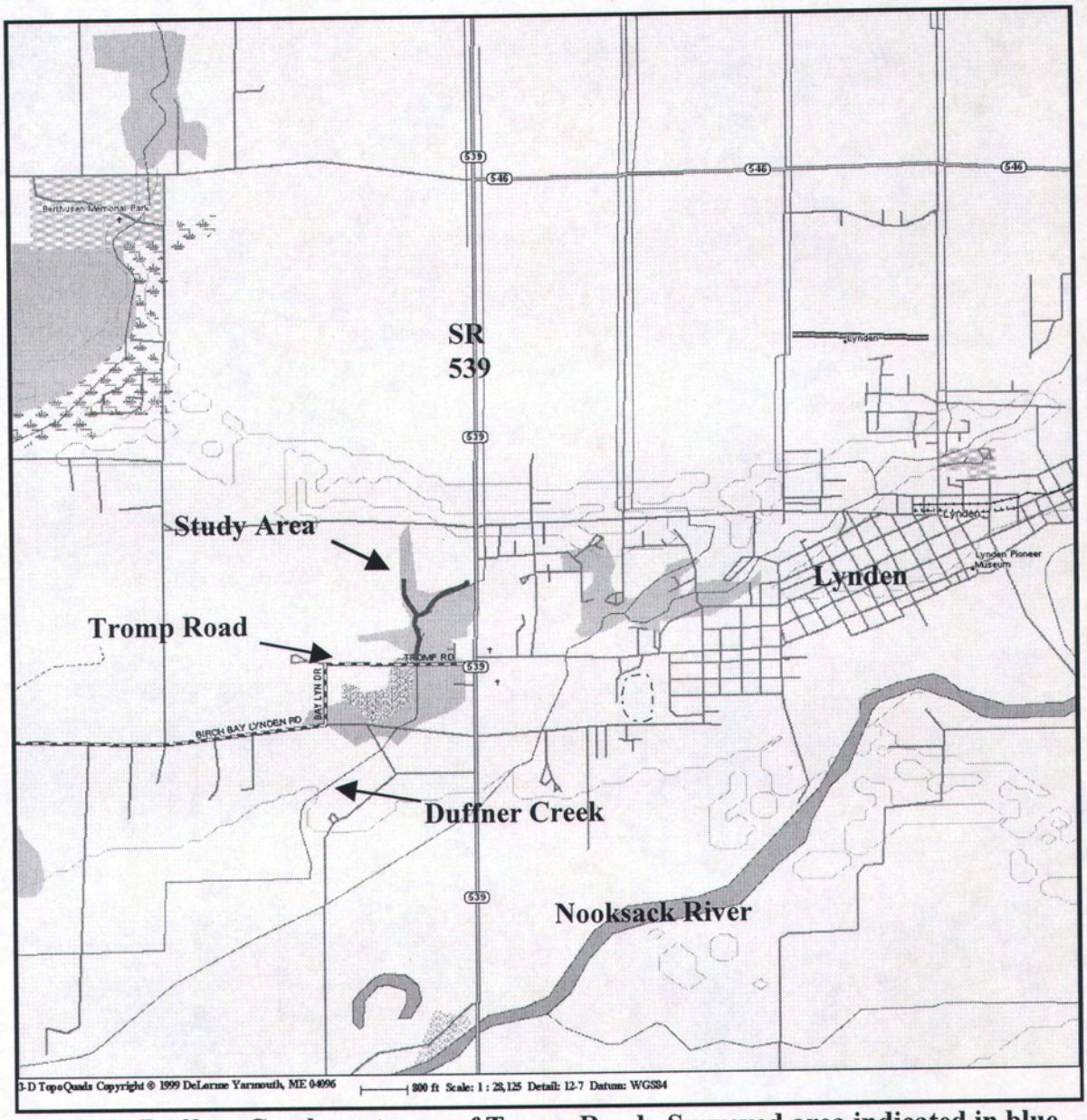


Figure 1. Duffner Creek upstream of Tromp Road. Surveyed area indicated in blue.

Other observations noted include fish species present, areas of obvious potential for salmonid spawning, observed bacterial colonies, and manmade in-stream structures.

RESULTS

Duffner Creek

Duffner Creek was surveyed for a length of 2,113.6 ft. upstream of the Tromp road culvert revealing the presence of approximately 9,743 ft^2 of stream habitat. A total of 12 riffles, 10 glides, and 28 pools were measured representing 1,041, 1,653, and 6,333 ft^2 of habitat area respectively. At 2,384 feet upstream from Tromp Road the creek passes through a 54" X 50'

culvert, the culvert appeared passable but a detailed passage analysis was not performed. Another barrier to fish passage was encountered at a private road crossing and water diversion dam at approximately 1,618 stream feet. Overall, dominant percent substrate composition for the surveyed reach tallied at 9% gravel, 75% pea gravel, 11% sand, and 6% muck.

Riparian vegetation along Duffner Creek was intact with an average stream canopy cover of 80.2% and consisted of an overstory dominated by red alder (*Alnus rubra*), black cottonwood (*Populus balsamifera*), paper birch (*Betula papyrifera*), and big-leaf maple (*Acer macrophyllum*). Shrub components consist of Himalayan blackberry (*Rubus discolor*), salmonberry (*Rubus spectabilis*), and scattered black twinberry (*Lonicera involucrata*), Sitka willow (*Salix sitchensis*) and Scouler's willow (*Salix scouleriana*). The herbaceous layer is primarily dominated by reed canarygrass (*Phalaris arundinacea*), with scattered lady fern (*Athyrium filix-femina*), pig-a-back plant (*Tolmiea menziesii*), and stinging nettle (*Urtica dioica*). One large forested and scrub-shrub wetland was noted at the confluence with the surveyed Duffner Creek tributary.

In stream cover was rated as moderate due to a relatively intact riparian corridor, high stream canopy cover, overhanging vegetation, and undercut banks. The presence of good in-stream cover, and stream habitat complexity indicate this creek would provide adequate rearing habitat and some spawning habitat for salmonid species. The presence of large plumes of iron-fixing bacteria were noted along a majority of the surveyed reach. Observed fish species include three-spine stickleback (*Gasterosteus aculeatus*).

Duffner Creek tributary

Duffner Creek tributary (west fork) was surveyed for a length of 611 ft. upstream of the confluence with Duffner Creek revealing the presence of approximately 2,387 $ft.^2$ of stream habitat. A total of 7 riffles, 3 glides, and 7 pools were measured representing 1,251, 293, and 842 ft^2 of habitat area, respectively. Another barrier to fish passage was encountered at the end of the habitat survey consisting of a perched culvert outletting to an in-stream detention pond. Overall, dominant percent substrate composition for the surveyed reach tallied at 22% sand, and 78% muck.

Riparian vegetation along the Duffner Creek tributary was dominated by shrubs and herbaceous vegetation including red alder saplings, salmonberry, sparse Himalayan blackberry, reed canarygrass, skunk cabbage (*Lysichiton americanum*), water parsley (*Oenanthe sarmentosa*), burreed (*Sparganium emersum*), field mint (*Mentha arvensis*), and reed canarygrass. Average stream canopy cover was 54% with an overall lack of canopy cover at the end of the survey. A scrub-shrub and emergent wetland complex was associated with the creek for a majority surveyed stream segment.

In stream cover was rated as moderate due to a lack of stream canopy cover, absence of LWD, low amount of overhanging vegetation, and lack of undercut banks. The presence of canopy cover, and stream habitat complexity indicate this creek would provide adequate rearing

habitat and some spawning habitat for salmonid species. The presence of large plumes of iron fixing bacteria were noted along a majority of the surveyed reach. . Observed fish species include three-spine stickleback (*Gasterosteus aculeatus*).

CONCLUSIONS

Duffner Creek and its tributary upstream from the Tromp Road culvert likely provides high quality rearing habitat for fish species as evidenced by results of stream survey including the presence of stream habitat complexity (pools, riffles, glides), high pool frequency, a relatively intact riparian corridor, associated riparian wetlands. Substrate composition suggests surveyed reaches of the Duffner Creek stream system could support some spawning for salmonid species. Recent studies on the effectiveness of stream restoration techniques suggest that restoring fish passage can result in large increases in available habitat and potential fish production for a nominal cost. In addition, making stream channel with high quality habitat available rather than providing stream length was shown to produce greater benefits for fish (Roni et al 2002).

Please call me at 360-466-4345, Ext 252 or Kristin Fredericks 206-440-4951 if you have any questions regarding these findings.

Reference:

WDFW. 2000. Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual. Olympia, Washington.

WDF. 1975. Washington Department of Fisheries. A Catalog of Washington Streams and Salmon Utilization - Volume I, Puget Sound Region.

Roni, P., T.J. Beechie, et al. 2002. A Review of Stream Restoration Techniques and a Hierarchical Strategy for Prioritizing Restoration in Pacific Northwest Watersheds. *North American Journal of Fisheries Management* 22 (1-20).

Appendix F

Critical Habitat Analyses

BERTRAND CREEK LEVEE REHABILITATION AND SETBACK
ANALYSIS OF CRITICAL HABITAT EFFECTS
ESA SUPPLEMENT TO 2006 ENVIRONMENTAL ASSESSMENT—
CRITICAL HABITAT ANALYSES
July 14, 2006

I. Introduction/Background

This supplement addresses potential effects of the Bertrand Creek levee setback project on critical habitat for Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*) and Coastal/Puget Sound bull trout (*Salvelinus confluentus*).

The Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531, *et. Seq.*) requires the action agency to address the effects of a proposed project on critical habitat. Critical habitat for Puget Sound Chinook salmon was designated on September 2, 2005 (70 FR 52630), and for Coastal/Puget Sound bull trout on September 26, 2005 (70 FR 56211)—the Environmental Assessment (EA) for this project, which included an analysis of effects on listed species under the Endangered Species Act (ESA), inadvertently omitted an analysis of effects on critical habitat. In order to allow the Services to complete its joint Biological Opinion (BO), the following discussion addresses the Primary Constituent Elements (PCEs) of both Chinook salmon and bull trout critical habitat, as contained in the critical habitat designations for the two species.

II. Proposed Action

The proposed action addressed in the EA is primarily setting back the levees on both the right and left banks for approximately 4,800 feet to allow for an expanded floodplain and riparian zone along this section of Bertrand Creek. Material from the existing levees will be used to construct the new levees. Deconstruction of the existing levees will not occur below the ordinary high water line; BMPs will be followed to assure that de minimus materials will find their way to the water. As part of the action an existing agricultural bridge will be removed, including the rerouting of the small, fertilizer pipeline that is nearby. This bridge is being removed because with the new setback levee system the bridge would become a choke point and not allow Bertrand Creek to meander. The pipe will be routed under Bertrand Creek below the scour depth. The pipe will be directionally drilled (or pipe jacked) under Bertrand Creek, requiring no excavation in Bertrand Creek for the new pipe. Please refer to the BA for details of these activities. In addition, a culvert leading from Duffner Ditch into Bertrand Creek that is under the existing levee will be replaced, and extended under the new levee. Whatcom County will replace the flap gates once the culvert has been replaced. The culvert replacement will be done during the work window when no salmon are present, and when Duffner Ditch is dry (August). Thus, all work associated with this project will be above water or done when no water is present.

III. Effects of the Proposed Action on Primary Constituent Elements

A. PUGET SOUND CHINOOK SALMON

Bertrand Creek is included in the critical habitat designation for Puget Sound Chinook salmon, though only fall-run-Chinook are known to inhabit Bertrand Creek (Smith 2002). This section evaluates the potential for effects to the PCEs determined to be essential to the conservation of Pacific coast salmon (including Puget Sound Chinook salmon).

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

> The Nooksack Salmon Enhancement Association has been conducting spawning surveys on Bertrand Creek for at least two years. The survey reach includes River Miles 7.5-9.7 (project locations approximately River Mile 0.25-1.0). In 2002, no Chinook or Chinook redds were identified and in 2003, 9 Chinook and 7 redds were identified in Bertrand Creek. In the project area Bertrand Creek is a backwater area during high and low flows. Water velocities are extremely low as evidenced by the lack of gravel substrate and the presence of fines—thus, the immediate project area does not provide adequate water velocities or substrate for Chinook spawning. Aquatic vegetation is virtually non-existent and the entire channel in the project area is covered with a layer of fine sediment. Visual and olfactory observations of the large quantities of manure spread on the surrounding fields and comparisons with sediment in the channel suggest that the channel substrate (silt) also partially includes manure. Department of Ecology investigations indicate that wastewater or manure is likely contributing to poor water quality in Bertrand Creek (Dickes 1992). Although no gravels or sand substrate appear to be present in the project area, and water quality is at times poor, the existing riparian vegetation and occasional small woody debris may provide rearing, feeding, and predator avoidance habitat in the project reach.

(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.

> See (1) for details of habitat quality. Regarding rearing habitat the existing riparian vegetation and occasional small woody debris may provide rearing, feeding, and predator avoidance habitat in the project reach. The project action of setting back the levee is in part designed to expand flood plain habitat and should provide additional organic input, shade, and improved water quality.

(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 channel, and undercut banks supporting juvenile and adult mobility and survival.

> Though present, riparian, aquatic, and overhanging vegetation, rocks and boulders, and side channels, are limited in the project area. The creek channel characteristics will not

be affected by the project, but the flood plain, and riparian zone, will be expanded through the setting back (and removal) of the existing levees. Furthermore, the removal of the existing bridge, currently a choke point on the creek, will remove an existing potential obstruction. Therefore, the migration corridor is expected to be improved as a result of this action.

(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.

There are no estuarine areas within the action area of Bertrand Creek.

(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.

There are no nearshore marine areas within the action area of Bertrand Creek.

(6) Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

There are no offshore marine areas within the action area of Bertrand Creek.

B. COASTAL/PUGET SOUND BULL TROUT

The Nooksack River is included in the critical habitat designation for coastal/Puget Sound bull trout; however, Bertrand Creek is not specifically named in Federal Register as included in designated critical habitat. Bull trout have not been documented as utilizing Bertrand Creek. It is possible that bull trout could use Bertrand Creek for juvenile rearing, and larger bull trout could transit through the project area to feed on juvenile salmon. Existing habitat suitability for char in this reach of the creek is low during summer months as the water temperatures are likely quite high. The following section evaluates the potential for effects to the bull trout PCEs determined to be essential to the conservation of Coastal/Puget Sound bull trout:

(1) Water temperatures that support bull trout use. Bull trout have been documented in streams with temperatures from 32 to 72 °F (0 to 22 °C) but are found more frequently in temperatures ranging from 36 to 59 °F (2 to 15 °C). These temperature ranges may vary depending on bull trout life history stage and form, geography, elevation, diurnal and seasonal variation, shade, such as that provided by riparian habitat, and local groundwater influence. Stream reaches with temperatures that preclude bull trout use are specifically excluded from designation.

Water temperatures in Bertrand Creek have not been measured, but because of its low elevation, low water levels in the summer and the relative openness of the riparian habitat the water temperatures are expected to exceed the tolerance of bull trout. It may be that Bertrand Creek was excluded from critical habitat designation because water temperatures are too high to support bull trout. However, this does not necessarily mean that bull trout would not be present at other seasons.

(2) Complex stream channels with features such as woody debris, side channels, pools, and undercut banks to provide a variety of depths, velocities, and instream structures.

Bertrand Creek at the action area is a simple channel with no complexity. The setting back of the levee is expected to at least increase the flood plain and allow for establishment of a larger riparian zone. Livestock will also be excluded from the creek at the project location, which should promote a more natural shoreline and improved water quality.

(3) Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. This should include a minimal amount of fine substrate less than 0.25 inch (0.63 centimeter) in diameter.

The substrate of Bertrand Creek at the project area consists of fines (primarily silts), which would not be suitable for eggs or embryos.

(4) A natural hydrograph, including peak, high, low, and base flows within historic ranges or, if regulated, currently operate under a biological opinion that addresses bull trout, or a hydrograph that demonstrates the ability to support bull trout populations by minimizing daily and day-to-day fluctuations and minimizing departures from the natural cycle of flow levels corresponding with seasonal variation. This rule finds that reservoirs currently operating under a biological opinion that addresses bull trout provides management for PCEs as currently operated.

The hydrograph of Bertrand Creek is “natural” (there are no impoundments on the creek). Flows are affected by the past removal of riparian vegetation, channelization, and constriction of the channel by levees. The project will result in an improved hydrograph in the project area by expanding the local flood plain.

(5) Springs, seeps, groundwater sources, and subsurface water to contribute to water quality and quantity as a cold water source.

The presence or function of springs, seeps, or subsurface water at the project area is not known. However, the project will not adversely affect any of these resources, and should in fact improve groundwater recharge by enlarging the flood plain in the project area and therefore allowing a greater volume of water to flow over the local area and seep into the ground over time.

(6) Migratory corridors with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows.

The removal of the existing bridge, currently a choke point on the creek, will remove an existing potential obstruction. Therefore, the migration corridor is expected to be improved as a result of this action. The project will not otherwise affect the migratory corridor.

(7) An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

The floodplain will be expanded through project implementation, allowing greater access to potential foraging areas and improving organic inputs to the river. The forage base in the local project area may increase as a result of project construction (i.e., set-back of the levees).

(8) Permanent water of sufficient quantity and quality such that normal reproduction, growth, and survival are not inhibited.

Bertrand Creek is a perennial stream with permanent water. Currently, water quality is compromised by levee constrictions, livestock use of the shoreline and creek, and limited riparian habitat. Project construction will expand the floodplain and riparian zone, and will exclude livestock, leading to noticeably improved water quality.

IV. Conclusion

The Bertrand Creek project, consisting of setting back levees on both sides of the creek, removing a bridge that constricts flow, and excluding livestock, will not only meet the intent and goals of most of the PCEs for both Chinook salmon and bull trout, but will also improve water quality and rearing and foraging habitat of this portion of Bertrand Creek. Furthermore, all work associated with the project (except for the Duffner Ditch culvert replacement) is above ordinary high water; work on the Duffner Ditch culvert replacement will occur when no water is present in Duffner Ditch, and during the work window for salmon, so that salmon would not be present in Bertrand Creek. Therefore, the Bertrand Creek levee rehabilitation project will have "**no effect"** on designated critical habitat for either Chinook salmon or bull trout.

V. References

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