

FINAL ENVIRONMENTAL ASSESSMENT

LEVEE REHABILITATION
SNOQUALMIE RIVER, KING COUNTY, WASHINGTON

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1.0 INTRODUCTION

The US Army Corps of Engineers, Seattle District, in concert with King County, Washington, is proposing to repair levee damage at four sites along the Snoqualmie River including one site at the mouth of the Raging River, a tributary of the Snoqualmie, in King County. Work would be done beginning in July 2008. These sites incurred damage during flooding that occurred as a result of a “pineapple express” rain event in November 2006. The storm originated in the tropical Pacific Ocean, and included rainfall of up to 13 inches over a 36-hour period in parts of western Washington. This heavy rain event caused peak flows of 67,000 cubic feet per second (cfs) in the Snoqualmie River. Several levees along the Snoqualmie River and one of its tributaries, the Raging River, were damaged as a result of these floods. A number of other river basins and levee systems in western Washington were adversely affected by flooding.

A major portion of the Snoqualmie River System is lined with levees. These levees serve to reduce the risk of flooding of the surrounding agricultural and suburban areas including the towns of North Bend, Snoqualmie, Fall City, Carnation, and Pleasant Hill. Due to the dynamic process of rivers and heavy storm events, damages caused by erosion to levees and other structures is cumulative unless addressed by repair efforts. During high stages, such as that of the November 2006 flood, of the Snoqualmie River flows could erode through previously weakened or damaged portions of the levees making them more susceptible to seepage leading to a potential breach. This project is intended to repair the portions of the levees damaged by the November 2006 floods.

This environmental assessment is being prepared pursuant to Sec. 102(C) of the National Environmental Policy Act, or NEPA (42 U.S. Code sections 4321-4370f).

1.1 Project Location

The Snoqualmie River is located in western Washington (Fig. 1). It is part of the Snoqualmie basin, which is part of the larger Snohomish basin, and meanders more than 43 miles from Three Forks Park, where the South, Middle, and North Forks converge near the town of Snoqualmie, to its confluence with the Skykomish River near Monroe. There are two sites which are in need of repair below Snoqualmie Falls: McElhoe-Pearson (river mile 23 of the mainstem Snoqualmie River) and Raging River Bridge to Mouth (river mile 0 of the Raging River), and two sites in need of repair located above Snoqualmie Falls: Mason-Thorson Ells (river mile 47 on the Middle Fork) and Mason-Thorson Extension (river mile 46 on the Middle Fork). Figure 2 illustrates the project sites in the basin.



Figure 1. Map of Washington showing river basins that require levee repair projects, including Snoqualmie basin.



Figure 2. Levee rehabilitation projects in Snoqualmie basin.

1.2 Project Purpose and Need

1.2.1 Need

A heavy rainstorm during November 2006 created flooding in many river basins in western Washington. That in turn caused damage to a number of levee sites, including eight in the Snoqualmie River basin in King County, Washington, four of which are addressed in this Environmental Assessment as a result of King County's request for Corps of Engineers assistance. The sites requiring rehabilitation constitute relatively minor segments of the lengthy reaches of locally constructed levees in the Snoqualmie basin. These levees are integral to protecting life, safety, and property, including public facilities, private residences and farmland in floodplains along the river. The Corps has determined that if the four segments of the Snoqualmie River levees are not repaired before the next flood event, each segment would present an imminent threat of loss of private and/or public property. The flood season in the Snoqualmie basin typically begins November 1 of each year. It is essential that the levees be restored to their pre-flood condition before November 2008, in order to minimize risk of compounded levee damage and possible breaching, which could have major consequences to life, health, safety, and property.

1.2.2 Purpose

The purpose of the project is to repair and restore, to the pre-existing level of flood protection, certain Snoqualmie River levees that were damaged in the November 2006 flood event.

1.3 Authority

The levee segments proposed to be repaired were not built by and are not maintained by the Corps. The proposed levee repairs are authorized by Public Law 84-99 (33 U.S. Code section 701n). Corps rehabilitation and restoration work under this authority is limited to flood control works damaged or destroyed by flood. The statute authorizes rehabilitation to the condition and level of protection exhibited by the flood control work prior to the damaging event.

2.0 ALTERNATIVES CONSIDERED

Alternatives considered under NEPA must include the proposed action (Preferred Alternative), and the no-action alternative. Other reasonable alternatives that meet the project purpose and need must also be considered in detail.

Multiple alternatives were considered including the No-Action Alternative, the Non-Structural Alternative, and the Repair the Damage Alternative (the Preferred Alternative). In order for any alternative to be acceptable for consideration it must meet certain objectives. The alternative must provide for flood protection equivalent to the level of protection that pre-existed the flood event. Pursuant to Corps policy, the selected alternative must be economically justified, it should be environmentally acceptable, and it should minimize costs for both the non-Federal Sponsor and the Federal government.

2.1 No-Action Alternative

This alternative would consist of leaving the levees in their existing state, and taking no action to address the damage incurred during the 2006 floods.

2.2 Repair the Damage (Preferred Alternative)

This alternative would consist of providing repairs at four individual levee sites along the Snoqualmie and Raging Rivers that were damaged in the 2006 floods. The nature and extent of damage at each site, and the consequent proposed actions are described specifically below. All work would take place in areas falling within the levee footprint that predated the damaging event; that is, no work would be conducted, nor would any levee structure be expanded, beyond the footprint of each respective levee as it existed prior to the flood event. See Appendix A for project drawings and maps.

2.2.1 McElhoe-Pearson

The McElhoe-Pearson levee project is located on the right bank of the Snoqualmie River near Carnation (T 25N, R 07E, Sec. 09) from about river mile (RM) 23.40 to RM 23.75. The levee project protects residential, agricultural and public use land. The levee is constructed with earthen material and is armored with riprap on both the riverward and landward sides. The November 2006 flood event resulted in approximately 750 linear feet (LF) of damaged landward levee slope and lost armor rock on both the levee crest and landward levee slope due to overtopping. The damage is spread over two distinct sites along the levee; the landward levee slope scour extends approximately 11 feet vertically above the apparent levee toe elevation at one of the sites and the other site experienced loss of riprap and fill material across the top of the levee.

The proposed repair would restore the levee to pre-flood conditions by repairing the crest and landward slope damage for approximately 750 LF. Site 1 requires repairing 200 LF of damage due to overtopping and restoring a driving surface on the crown of the levee. Site 2 requires re-grading of 550 LF of landward slope and restoring armor protection. Access to Site 1 is available off of NE 55th Street. Access to site 2 is available via NE 60th Street (public road) across two King County parcels. A temporary construction staging area is proposed on the King County parcel on the upstream side of this access road. See drawing C1 (Appendix A) for locations of site 1 and 2 within this levee.

Work would not be conducted below the ordinary high water mark. For both repair sites, in-water work for this project would be completely avoided since the repair would be restricted to the crown and landward face of the levee. USACE biologists determined that there would be no wetland impacts due to the repair. All work would be conducted within the pre-existing levee structure footprint using similar construction methods and materials as the original construction in order to achieve a final repair with a profile and orientation the same as the pre-existing condition.

The proposed repair at Site 1 would be accomplished in three phases:

Phase I (Site Preparation): This phase consists of excavating the eroded portions of the levee crown in order to provide a clean cavity that allows the placement of a 3-foot blanket of riprap. Approximately 25 young sapling cottonwoods and sparse shrub vegetation are growing on the eroded portion. Roughly 1500 ft² of the levee crown would be removed.

Phase II (Crown Repair): The excavated crown portion from Phase I would be replaced with Class III riprap. Riprap material would be placed into excavated cavity in a manner to achieve the most inter-locked and compacted placement possible. Replacement would extend vertically to an elevation approximately level with the undamaged levee crown.

Phase III (Finish Work / Environmental Mitigation Feature Installation): A 6” minimum blanket of 6”-minus quarry spalls and 1 ¼” crushed gravel would be placed on the levee crown to provide a driving surface. Twenty-five trees would be planted parallel to the levee, between the landward face and the extent of O&M easement (30’ landward from the riverward crown edge). Species to be planted would include Douglas fir, Sitka spruce, big-leaf maple, and cottonwood.

The proposed repair at Site 2 would be accomplished in two phases:

Phase I (Site Preparation): This phase consists of re-grading the landward face of the levee to achieve an approximate 2H:1V slope to provide continued stability and to allow a minimum 24” blanket of riprap armor protection. Trees within the damaged area would be worked around during the course of repair.

Phase II (Armor Protection): The re-graded face from Phase I would be armored with compacted ballast rock consistent with Class I riprap specifications.

2.2.2 Raging River Bridge to Mouth

The Raging River Bridge to Mouth Right Bank levee project is located on the right bank of the Raging River extending from RM 0.0 to RM 0.45 near the town of Fall City (T24N, R07E, Sec. 14), and protects public use land and facilities including the Twin Rivers Golf Club and an RV park. The levee is constructed with earthen material and is armored with riprap on both the riverward and landward sides. It is at the corner of the confluence of the Raging River and the Snoqualmie River. The November 2006 flood event resulted in severe degradation of a 100’ section of levee manifesting as breaching and overtopping, and extending from the riverward toe across the crown and including backslope erosion. During the event, the local landowner moved materials into the site in an attempt to reinforce the levee.

Repair at this location would include removal of the materials moved into position by the landowner and re-establishment/reconstruction of the levee approximately fifteen feet landward of the present location. The western end of the setback levee would tie in to the existing Raging River levee at the existing 4-foot diameter culvert; the eastern end would tie in to the existing Snoqualmie River levee. New material would be brought in for the toe due to flood erosion of pre-existing toe. The site is readily accessible from SE 44th Pl/Dike Road, with ingress/egress suggested from this downstream access road location. Material stockpile locations include a large open area adjacent to the State boat launch facility at the end of Dike Road.

Work would not be conducted below the ordinary high water mark. In-water work for this project would be completely avoided since the proposed repair is set back approximately 15 feet from the pre-existing footprint. USACE biologists determined that there would be no wetland impacts due to the repair. Construction methods and materials similar to the original

construction would be used in order to achieve a final repair with a profile and orientation the same as the pre-existing condition.

The proposed repair at this site would be accomplished in five phases:

Phase I (Site Preparation): This phase consists of removing materials placed by the landowner and grading the footprint of the setback levee. No vegetation exists in within the proposed setback footprint; further, no vegetation would be removed outside of the setback footprint.

Phase II (Environmental Mitigation Feature Installation): This phase consists of preparing (possible tilling and soil amendment) and planting 60 trees within the pre-setback levee footprint area, approximately 1,500 ft². Species to be planted would include Douglas fir, Sitka spruce, big-leaf maple, cottonwood, red-osier dogwood, Indian plum, and snowberry.

Phase III (Riverward Toe and Face Installation): This phase includes placing Class V riprap in the toe cavity and extending vertically forming the levee face. The levee face would be constructed at an approximate 2H:1V slope to an elevation approximately seven feet above the existing base elevation, accommodating a 48" thick blanket of Class V riprap armor protection. As the face progresses upward, it would be backfilled with compacted core material consisting of well graded sand and gravel.

Phase IV (Landward Face / Levee Core Installation): This phase includes building up the landward levee face with Class V riprap on a 2H:1V slope, backfilling with compacted core material. Core material would fill the void between the riverward and landward slopes until the two intersect which results in an approximate horizontal surface atop the newly constructed levee (crown).

Phase V (Finish Work): This phase includes placing a lift of Class I riprap along the levee crown followed by a lift of combined pit-run material and 1¼"-minus crushed gravel in order to tie in with the existing surface of the adjacent Raging and Snoqualmie River levees

2.2.3 Mason Thorson Ells

The Mason Thorson Ells levee project is located on the left bank of the Middle Fork Snoqualmie River extending from about RM 46.8 to RM 47.2, near the town of North Bend (T 23N, R 08E, Secs. 03, 10) , and protects a primarily residential area of approximately 147 structures. The levee is armored with riprap on both the landward and riverward slopes. The November 2006 flood event resulted in approximately 400 LF of damaged toe and lost armor rock on the riverward bank. The damage is continuous along the levee and the scour extends approximately 17 feet vertically above the apparent toe elevation.

The proposed repair would consist of restoring the grading of the riverward toe-to-crown slope to pre-flood dimensions, replacing toe material to reestablish toe protection, incorporating two lifts of native riparian vegetation and replacing riverward riprap armor. This site can be accessed from SE 114th Street, and construction ingress/egress would be from this street as well.

Work would be conducted below the ordinary high water (OHW) mark. In-water work would be avoided to the extent possible, but is possible based on river levels at the time of construction. USACE biologists determined that there would be no wetland impacts due to the repair. All work would be conducted within the pre-existing levee structure footprint using similar construction methods and materials as the original construction in order to achieve a final repair with a profile and orientation the same as the pre-existing condition.

The proposed repair would be accomplished in five phases:

Phase I (Site Preparation): This phase consists of excavating sloughed material from the toe of the levee and re-grading the face of the levee to achieve an approximate 2H:1V slope. Excavation at the toe of the levee would be conducted in order to allow a buried toe that does not encroach beyond the current riverward extent. To do so, the toe would be excavated vertically and the face would be excavated horizontally in the landward direction in order to provide the appropriate size cavity. The re-grading would be conducted to a depth that would accommodate a minimum 48" blanket of riprap armor protection. Vegetation located within the repair area, approximately 20 immature deciduous trees and 6,000 ft² of shrub cover, would be removed during construction

Phase II (Toe Replacement): The excavated toe portion from Phase I would be replaced with Class V riprap. Riprap material would be placed into the toe area with use of a hydraulic excavator in order to achieve the most inter-locked and compacted placement possible. Replacement would extend vertically to an elevation approximately 1 foot above the OHW mark, based upon on-site observations, such that a horizontal surface is formed.

Phase III (Environmental Mitigation Feature Installation): A minimum 6" lift of soil would be placed on the horizontal surface formed in Phase II. One row of willows or another designated species of riparian vegetation would be planted horizontally atop the lift of soil at a density of approximately two cuttings per foot in accordance with planting guidance provided by Corps biologists to idealize growing conditions to the extent possible. An approximate 6" lift of soil would be placed on top of the plantings. In addition, 80 trees of native species would be planted as off-site mitigation at King County's Three Forks Park on the Middle Fork Snoqualmie in November 2008. Species to be planted would include Douglas fir, Sitka spruce, big-leaf maple, and cottonwood. See Mitigation (Sec. 4.13) and Table 5 for details.

Phase IV (Armor Protection): A minimum 48"-thick blanket of Class V riprap material would be placed on top of the willow lift and would extend at least 3 feet vertically up the re-graded 2H:1V slope in order to prevent further erosion and scour. A horizontal surface would be formed at this elevation and another lift of willows and/or red osier dogwood (Phase III procedure) would be placed. Following emplacement of the second environmental mitigation feature, armoring would continue until flush with the crown of the levee.

Phase V (Finish Work): A combination of pit-run material and 1¼"-minus crushed gravel would be placed on the horizontal portion of exposed Class V riprap along the top of the levee crown in order to tie in with the existing driving surface.

2.2.4 Mason Thorson Extension

The Mason Thorson Extension levee project is on the left bank of the Middle Fork Snoqualmie River extending from about RM 46.2 to RM 46.4, near the town of North Bend (T 23N, R 08E, Sec. 03) , and protects a primarily residential area of approximately 12 structures. The levee is armored with riprap on both the landward and riverward slopes. The November 2006 flood event resulted in approximately 150 LF of damaged toe and lost armor rock on the riverward bank. Evidence of scour extends approximately 16 feet vertically above the apparent toe elevation.

The proposed repair would consist of grading of the riverward toe-to-crown slope to pre-flood dimensions, replacing toe material to reestablish toe protection, incorporating two lifts of native riparian vegetation and replacing riverward riprap armor. This site is accessible from SE 108th Street, and staging/stockpiling would occur along the top of the levee.

Work would be conducted below the OHW mark. In-water work would be avoided to the extent possible, but is possible based on river levels at the time of construction. USACE biologists determined that there would be no wetland impacts due to the repair. All work would be conducted within the pre-existing levee structure footprint, profile and orientation, using construction methods and materials similar to the original construction.

The proposed repair would be accomplished in five phases:

Phase I (Site Preparation): This phase consists of excavating sloughed material from the toe of the levee and re-grading the face of the levee to achieve an approximate 2H:1V slope. Excavation at the toe of the levee would be conducted in order to allow a buried toe that does not encroach beyond the current riverward extent. To do so, the toe would be excavated vertically and the face would be excavated horizontally in the landward direction in order to provide the appropriate size cavity. The repair footprint on the levee face is sparsely populated with young shrubs and those would be removed as a result of construction. The re-grading would be conducted to a depth that would accommodate a minimum 48" blanket of riprap armor protection.

Phase II (Toe Replacement): The excavated toe portion from Phase I would be replaced with Class V riprap. Riprap material would be placed into the toe area with use of a hydraulic excavator in order to achieve the most inter-locked and compacted placement possible. Replacement would extend vertically to an elevation approximately 1 foot above the OHW mark, based upon on-site observations, such that a horizontal surface is formed.

Phase III (Environmental Mitigation Feature Installation): A minimum 6" lift of soil would be placed on the horizontal surface formed in Phase II. One lift of willows and/or red-osier dogwood would be planted horizontally atop the lift of soil at a density of approximately two cuttings per foot in accordance with planting guidance provided by Corps biologists to idealize growing conditions to the extent possible. An approximate 6" lift of soil would be placed on top of the plantings.

Phase IV (Armor Protection): A minimum 48” thick blanket of Class V riprap material would be placed above the willow lift and would extend at least 3 feet vertically up the re-graded 2H:1V slope in order to prevent further erosion and scour. A horizontal surface would be formed at this elevation and another vegetation lift (Phase III procedure) would be placed. Following emplacement of the second environmental mitigation feature, armoring would continue until flush with the crown of the levee.

Phase V (Finish Work): A combination of pit-run material and 1¼”-minus crushed gravel would be placed on the horizontal portion of exposed Class V riprap along the top of the levee crown in order to tie in with the existing driving surface.

2.3 Non-Structural Alternative

The Non-Structural Alternative would relocate all existing residential structures, utilities, and public facilities. The non-structural alternative is an option under PL84-99 upon the written request of the non-Federal sponsor, but is not being considered further here because there is no realistic way to provide for buyout or relocation of properties at risk in time for the next flood season. In fact, the local sponsor (King County) has not identified willing sellers.

3.0 EXISTING CONDITIONS

3.1 Geology/soils/hydrology

The Snoqualmie River is a product of tributaries from the west slopes of the Cascade Mountains, which join at North Bend. The Snoqualmie flows northwesterly to near Monroe, where it joins with the Skykomish to form the Snohomish. The Snohomish River flows more or less northwesterly and enters Puget Sound at Everett.

Two major runoff patterns exist in the watershed: November-December-January rain-on-snow events, and May-June spring snowmelt (Solomon and Boles 2002). However, the spring runoff pattern has no snowmelt-driven peak in low-elevation tributaries such as the Raging, which lack any snowpack buildup. According to Bethel (2004), average rainfall is 40 inches in the lower Snoqualmie valley to 160 inches close to the Cascade crest. At the Carnation gage, a two-year (average frequency of about every two years) runoff event is about 30,200 cubic feet per second (cfs), and a 100-year event is 79,700 cfs. The November 2006 event peaked at 67,200 cfs at Carnation (USGS, 2008). Lowest flows are in August.

Human land use alters topography, vegetation, geomorphology, and fluvial processes (Bethel 2004), and has been a major influence in the Snoqualmie valley. Logging has occurred over much of the Snoqualmie watershed; there remains little old-growth forest compared to pre-European settlement. Logging increases sedimentation in runoff, as a result of reduced root structure to hold soil in place, and through increased peak runoff which may result in erosion and slope failures.

Levees provide flood control, with the consequence that they confine rivers and isolate them from floodplains, restricting or preventing channel migration. Approximately 90% of the

mainstem Snoqualmie River is lined with levees, and many of its tributaries are lined with them as well.

Clearing of land for agriculture and other development has reduced input of large woody debris (LWD), which is an essential element of fish habitat and a factor in channel diversity. The development process has also eliminated many wetlands through ditching and draining.

Development of drainage systems and impervious surface (pavement and buildings) increases the rate of runoff during storm events, creating shorter, sharper peaks in the hydrograph (Booth 1991), with lower flows during intervening dry periods. This is because less water percolates slowly through the ground to moderate flows. Deforestation also contributes to higher storm runoff because of the reduction in uptake and evapotranspiration of rainwater by trees. These factors are at work in the altered Snoqualmie valley, though apparently mainly in smaller tributaries, and not to the extent found in a highly urbanized area like Seattle.

Geologic characteristics of the lower Snoqualmie valley are largely a product of glacial action, with widespread and various deposits of gravel, sand and silt (Bethel 2004). Exposed bedrock features are also present. Bedrock is a more prominent aspect of the alpine portion of the Snoqualmie watershed. The gradient below Snoqualmie Falls is gradual; the elevation below Snoqualmie Falls (river mile ~40.5) is just over 100 feet, and at the confluence with the Skykomish (RM 0) it is somewhat under 20 feet.

Soils in the local project areas are shown in Table 1 (NRCS 2007). Some of these soils are characteristic of Prime and Unique farmlands (NRCS [undated]). However, not all of the sites are agricultural; some are more urban.

Table 1. Soil types in the areas in and behind the project levee footprints.

<i>Location</i>	<i>Soil type in levee footprint</i>	<i>Other prominent soil type</i>	<i>Prime or Unique Farmland present?*</i>
McElhoe Pearson	Oridia silt loam	Oridia silt loam	
Raging R. Bridge to Mouth	Edgewick silt loam	Edgewick silt loam	Yes
Mason Thorson Ext.	Riverwash	Si silt loam	Yes
Mason Thorson Ells	Riverwash	Si silt loam, Pilchuck loamy fine sand	Yes

* Based on soil types (NRCS [undated]).

3.2 Water quality

Washington Department of Ecology (WDE 2008a) rates water quality in the Snoqualmie as Class A or Class AA, depending on location sampled. The most recent sampling in the project area was at Snoqualmie in 2008, resulting in a long-term rating of Class A. Sporadic variances (labeled as exceedances) from water quality standards have been observed at that site since October 2006 for several parameters, including conductivity, fecal coliform, ammonia nitrogen, nitrates+nitrites nitrogen, pH, temperature, suspended solids and turbidity. The last two

parameters had values outside of standards on November 13, 2006, and may have been associated with the storm that damaged the levees.

Also, the Snoqualmie has been cited on WDE's Clean Water Act Sec. 303(d) list (WDE, 2008b) for water quality impairments. The majority of these exceedances have occurred in the downstream reaches located below Snoqualmie Falls. WDE water quality monitoring of the Snoqualmie River near the town of Monroe indicates exceedances of fecal coliform counts in 1996, 1997, 1998, 2003, and 2006. Water quality data for the Raging River is not available past 2001; however, that year, fecal coliform was up to 6.5 times the allowable limit established for public and wildlife health.

Maximum temperature standards have been exceeded on the Snoqualmie near Monroe for five out of the last seven years, all of which occurred in the summer. Summertime mainstem Snoqualmie River temperature conditions observed by the University of Washington (cited in Solomon and Boles 2002) were above 18° C at times, violating Washington water quality standards for Class A water bodies and putting conditions in the stressful or lethal range for salmonids. The University of Washington indicated that some of this was derived from high tributary water temperatures. Seven-day maximum average temperatures were measured by WDE (R. Svrjcek, WDE, unpublished) in 2006, from near the headwaters (RM 75) to the mouth of the Snoqualmie. Values exceeded 16° C (the 7-day maximum average criterion for core summer salmonid habitat: WAC 173-201A-200) from about RM 69 downstream. Currently, WDE is working on a TMDL (total maximum daily load) for temperature on the Snoqualmie River due to extreme temperature spikes as high as 22° C during the summer (Svrjcek, unpublished)

Nevertheless, WDE (2008a) states, "Overall water quality at this station met or exceeded expectations and is of lowest concern (based on water-year 2006 assessment)."

3.3 Vegetation and Wetlands

Forest cover in 2000 was about 16% of its mapped presettlement condition on the valley floor (Collins and Sheikh 2002). Riparian vegetation along the mainstem is dominated by non-native species along a majority of the river banks, and by natives on a relatively small percentage (Solomon and Boles 2002). They reported that some areas had dense vegetation, and some were more sparse. Invasives included purple loosestrife, yellow tansy, butterfly bush, English ivy, virgin's bower, Japanese knotweed, and Himalayan blackberry. Natives included Indian plum, elderberry, Oregon grape, red-osier dogwood, salmonberry, snowberry and willow. Tree species were similar to those seen in 1870, but conifer composition was lower in 2000, and average diameters were lower. In 2000, mature trees were observed on only a very small percentage of river bank.

Collins and Sheikh (2002) reported that as of 2000, only 19 percent of presettlement wetland area existed in the Snoqualmie valley. Historically the Snoqualmie River Valley consisted almost entirely of continuous forested and/or shrub wetland. The U.S. Fish and Wildlife Service's Online Wetland Mapper (USFWS, 2008) characterizes the remaining wetlands in the Snoqualmie River Valley as freshwater forested, scrub-shrub and emergent, the majority of which exist as disconnected pockets dotting the river valley. Two sizable wetland complexes

remain in the river valley. One is located south of the river situated between the towns of Snoqualmie and North Bend; the other is located on both sides of the river beginning near the town of Carnation, spanning south past the town of Pleasant Hill. Very few wetlands are present in the valley above Snoqualmie Falls or along the three forks, as the landscape is too mountainous.

One repair site (Mason Thorson Extension) has wetlands nearby, but not within the footprint of the project. The wetland is characterized as palustrine scrub shrub with seasonal flooding (USFWS, 2008).

Riparian and Channel Habitat

Solomon and Boles (2002) summarized Snoqualmie basin habitat condition findings of others. Highlights included “loss of channel area and complexity resulting from bank protection, disconnecting the channel from its floodplain; dearth of LWD; increased sediment input to rivers and streams as a result of unnaturally high rates of erosion; and poor quality riparian forests” According to Lucchetti (2005), the lower mainstem Snoqualmie is mostly unsuitable for salmon spawning, with the notable exceptions of the confluences of the Tolt and Raging rivers with the Snoqualmie, where gravel deltas have formed. However, WDFW biologists report that spawning occurs in patches throughout the mainstem Snoqualmie (C. Jackson, WDFW, pers. comm. 2008).

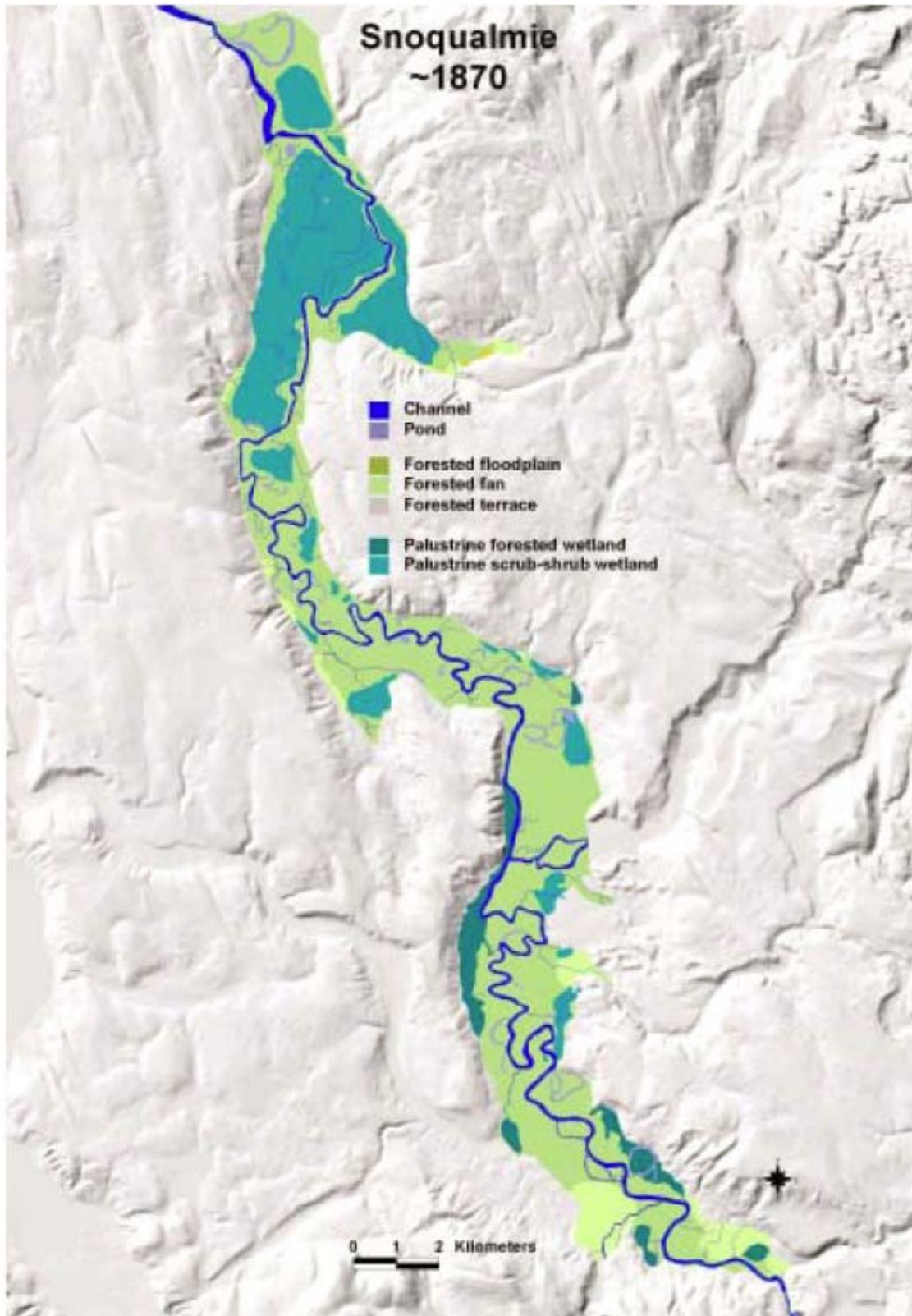


Figure 3. Historic (ca. 1870) environmental conditions in the Snoqualmie valley (from Collins and Sheikh [2002]).

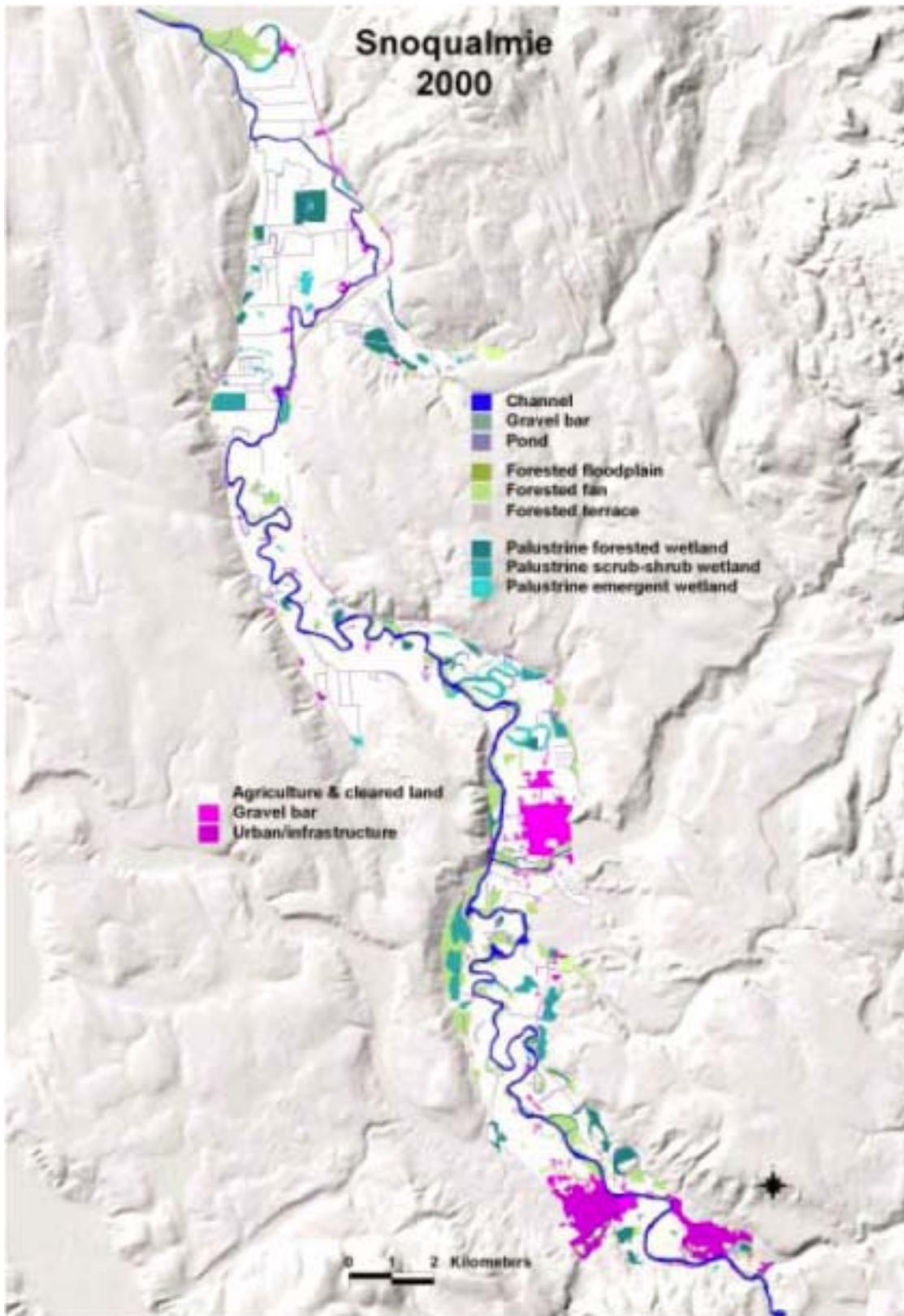


Figure 4. Snoqualmie valley environmental conditions in 2000 (from Collins and Sheikh [2002]).

Solomon and Boles (2004) characterized habitat in the lower 1.3 miles of the Raging River as “poor.” The channel was confined between levees about 60 feet apart, with a wetted width of about 10-60 feet. The channel had aggraded with sediment deposition, and the gravel was embedded. Riparian vegetation was predominantly invasives, and overall was of poor quality, though some mature cottonwoods were present. Little large woody debris was found. Observers found young coho and trout fry at river mile 0.2. Observations by USACE biologists in December 2007 indicated a strong, elevated gravel delta with a somewhat steep terminal gradient at the mouth of the Raging, and small, shallow, channels distributed through it at low flow. Fish passage would be impeded at low flows, although a February 2008 visit revealed a more pronounced and consolidated channel, the result of intervening higher flows redistributing gravels. Delta channel conditions appear very dynamic. There is some standing vegetation at the outlet where the levee repair is planned for the right bank, in front of the levee itself.

3.4 Floodplains

The four projects are located by definition in floodplains; the levees are intended to protect property in floodplains. The Snoqualmie valley below Snoqualmie Falls constitutes a floodplain due to its flat nature and relatively low relief compared to the Snoqualmie River elevation.

3.5 Land use

Bethel (2004) described the major characteristics of land use in the Snoqualmie watershed. The upper watershed is mostly either in the Alpine Lakes Wilderness Area, which makes up 16 percent of the watershed, or in the Mt. Baker-Snoqualmie National Forest. The National Forest is managed for mixed uses, including timber harvest and various types of recreation. The lower slopes and foothills include both public and private parcels, many of which are in forest production. The valley floor is to a great extent agricultural, with suburban development occurring in and around the towns of North Bend, Snoqualmie, Carnation, Duvall, Preston and Fall City. Figures 3 and 4 provide a general contrast between historic (ca. 1870) and present day (2000) conditions. Solomon and Boles (2002) stated that zoning of the floodplain downstream of Snoqualmie Falls is 70.4% for agriculture and 22.2% for rural residential use. They also said that the human population of the Snoqualmie watershed essentially doubled between 1980 and 2000 from fewer than 20,000 residents to about 40,000.

3.6 Fish and Wildlife

Despite all the pressures over the last century on the Snoqualmie system, the mainstem and its tributaries still serve as an important migration corridor, and foraging and spawning habitat for both anadromous and resident salmonids. The Snoqualmie watershed contains some of the healthiest aquatic habitat remaining in King County and supports wild populations of Chinook (*Oncorhynchus tshawytscha*), chum (*O. keta*), coho (*O. kisutch*), and pink salmon (*O. gorbuscha*), steelhead (*O. mykiss*), rainbow (*O. mykiss*), and cutthroat trout (*O. clarki*), and native char, i.e., Dolly Varden (*Salvelinus malma*) and bull trout (*S. confluentus*) (Solomon and Boles, 2002). No anadromous salmon, steelhead, or bull trout are found above Snoqualmie Falls, as it is a natural 268-foot natural barrier to the migration of these species. However, resident rainbow, cutthroat, and brook trout are present and utilize the habitat for spawning and foraging (Solomon and Boles, 2002). Anecdotal information from Snoqualmie Tribal members suggests that bull trout occur above Snoqualmie Falls (K. Suyama, Snoqualmie Nation, pers.

comm., 2008), but this has not been confirmed (see Sec. 3.7.3). Other fish found throughout the system include mountain whitefish, suckers, sculpins, and pikeminnows (C. Jackson, WDFW, pers. comm., 2008).

Status and biology of salmon, steelhead and bull trout listed as threatened under the Endangered Species Act are discussed individually below. The following are not listed under ESA. Coho salmon spawn from November to June in the Snoqualmie. The stock is considered to be healthy as of 2002. Chum salmon spawn November through December. The 2002 stock status is unknown (WDFW, 2002). Pink salmon spawn from mid-September through October. As of 2002, pink salmon stocks were considered to be healthy.

Forested areas in the Snoqualmie basin and riparian corridors along the river provide habitat for many species of wildlife. Typical species that can be expected to frequent the project area include such mammals as the black-tailed deer, beaver, raccoon, river otter, Douglas squirrel, and Townsend's chipmunk; amphibians such as the Pacific chorus frog and ensatina (salamanders); reptiles like the common garter snake and the northern alligator lizard; and such birds as osprey, pileated woodpecker, northern flicker, black-capped chickadee, spotted towhee, song sparrow, Bewick's wren, great blue heron, belted kingfisher, Canada goose, American crow, Steller's jay, sharp-shinned hawk and violet-green swallow.

3.7 Sensitive, Threatened and Endangered Species

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed and proposed threatened or endangered species. Several species listed as threatened are potentially found in or around the project area (see Table 2)

Table 2. Threatened and endangered species and their critical habitat in the Snoqualmie River basin.

<i>Species</i>	<i>Listing Status</i>	<i>Critical Habitat</i>
Puget Sound Chinook Salmon	Threatened	Designated
Puget Sound Steelhead	Threatened	Not designated
Coastal/Puget Sound Bull Trout	Threatened	Designated
Marbled Murrelet	Threatened	Designated; does not include project area
Northern Spotted Owl	Threatened	Designated: does not include project area

The following are descriptions of the species and their occurrences in the project area:

3.7.1 Puget Sound Chinook Salmon

Puget Sound Chinook were listed as threatened in March of 1999 (NMFS 1999). Critical habitat was designated effective January 2006 (NMFS 2005). Chinook are anadromous and semelparous (spawn once and die). Within this general life history strategy, Chinook display a wide range of variation in life histories including variation in age at seaward migration, variation in length of freshwater, estuarine, and oceanic residence, variation in ocean distribution and ocean migratory patterns, and variation in age of spawning migrations. There are two

predominant life history patterns in the eastern north Pacific populations: stream-type and ocean-type (Healy 1991). Stream type populations may rear as juveniles in streams for 2-3 years prior to migrating out to marine waters. Under natural conditions stream-type Chinook salmon appear to be unable to smolt as subyearlings. Ocean type populations migrate within their first year, although when exactly they migrate depends on environmental conditions. Summer/fall run populations are typically considered to be ocean-type fish. Reproductive strategies such as fecundity and run timing vary greatly in Chinook salmon and are influenced by a variety of genetic and environmental factors.

The reaches of the Snoqualmie River and its tributaries downstream of Snoqualmie Falls are within the Puget Sound Chinook salmon distribution and are designated as critical habitat (USFWS, 2005). The two levee rehab sites downstream of the falls are within this area. Snoqualmie Chinook are a fall run stock, spawning throughout the Snoqualmie River and major tributaries including the Raging River, Tolt River, and Tokul Creek from mid-September through October (WDFW, 2002). The majority of Snoqualmie Chinook are ocean-type and a small percentage are stream-type (C. Jackson, WDFW, pers. comm., 2008). According to the Washington Department of Fish and Wildlife, the status of Chinook salmon in the Snoqualmie system is classified as depressed because the mean number of recruits is lower than the set recovery goal (WDFW, 2002). Snoqualmie populations of Puget Sound Chinook are estimated to be less than 10% of historic levels (Snohomish Basin Salmon Recovery Forum, 2005). Puget Sound Chinook salmon are not present above Snoqualmie Falls, which is a natural barrier to their migration.

3.7.2 Puget Sound Steelhead

Puget Sound steelhead were listed as threatened in May of 2007 (NMFS 2007). Critical habitat has not been designated as of yet. Steelhead are anadromous, and can spend up to seven years in freshwater prior to smoltification and then three years in salt water prior to first spawning. Steelhead are iteroparous (spawn more than once). Steelhead have a complicated life history, and differing combinations of freshwater/saltwater periods lead to many different possible life cycles.

The reaches of the Snoqualmie River and its tributaries downstream of Snoqualmie Falls are within the Puget Sound steelhead distribution (WDFW, 2002). The two levee rehab sites downstream of the falls fall within this area. Steelhead in the Snoqualmie River are a wild winter run stock. Run timing is generally from November through April and spawning occurs from early March to mid-June (WDFW, 2002). Most spawning occurs in the mainstem Snoqualmie, Tolt, and Raging Rivers (WDFW, 2002). The majority of steelhead juveniles in the Snoqualmie are thought to reside in the river for two years, with a small percentage residing for either one or three years (C. Jackson, WDFW, pers. comm. 2008). According to the Washington Department of Fish and Wildlife (WDFW, 2002), the status of steelhead in the Snoqualmie system is classified as depressed due to short-term severe decline in total escapement estimates since 1999. Puget Sound steelhead are not present above Snoqualmie Falls, since it constitutes a natural barrier to their migration.

3.7.3 Puget Sound Bull Trout

Puget Sound bull trout were listed as threatened in November of 1999 (USFWS 1999). Critical habitat was designated effective September of 2005 (USFWS 2005). Bull trout populations have declined throughout much of the species' range; some local populations are extinct, and many other stocks are isolated and may be at risk (Rieman and McIntyre 1993). Combinations of factors including habitat degradation, expansion of exotic species, and exploitation have contributed to the decline and fragmentation of indigenous bull trout populations.

Bull trout within the Snohomish/Snoqualmie basin exhibit a fluvial life history, meaning they migrate within river systems (C. Jackson, WDFW, pers. comm. 2008).

Temperatures above 15° C are believed to limit bull trout distribution, which may explain their patchy distribution (Fraley and Shepard 1989; and Rieman and McIntyre 1993). Spawning occurs between late August and early November in habitats consisting of low gradient streams with loose, clean gravel (Fraley and Shepard 1989) and low water temperatures of 5°C to 9°C.

The reaches of the Snoqualmie River, and its tributaries, downstream of Snoqualmie Falls are within the Coastal/Puget Sound bull trout distribution and are designated as critical habitat (USFWS, 2005). The two levee rehab sites downstream of the falls are within this area. In January 2000, U.S. Forest Service (USFS) and WDFW biologists reported seeing bull trout near the mouths of the Tolt and Raging Rivers, and in the mainstem Snoqualmie River between these two tributaries. It is speculated that these bull trout present in the Snoqualmie are migrants from the much larger population from the Skykomish looking to forage (Solomon and Boles 2002). Although there is no documented bull trout spawning habitat in the lower reaches of the Snoqualmie River, the USFWS (2004) has concluded that this part of the Snoqualmie is used by bull trout for subadult and adult foraging, migration, and over-wintering. Unconfirmed anecdotal information from Snoqualmie Tribal members indicates possible bull trout presence above the falls (K. Suyama, Snoqualmie Nation, pers. comm., 2008). However, Berge and Mavros (2001) did not find any bull trout in surveys above Snoqualmie Falls, and it is assumed at this point that they are not present there. Others support this conclusion (C. Jackson, WDFW, pers. comm., 2008; F. Goetz, USACE, pers. comm., 2008).

3.7.4 Marbled Murrelet

Marbled murrelets were listed as threatened in October of 1992 (USFWS 1992). Critical habitat was designated effective May of 1996 (USFWS 1996). Murrelets inhabit shallow marine waters and nest in mature old-growth forests. Critical habitat has been designated to include upland forested stands containing large trees (greater than 32 inches) in diameter with potential platforms for nesting (greater than 33 feet) and the surrounding forested areas within 0.5 mile of these stands with a canopy height of at least 1/2 the site-potential height (USFWS, 2006). All nest locations in Washington have been located in old-growth trees that were greater than 32 inches in diameter at breast height (dbh) (Ralph et al., 1995). Nest stand characteristics generally include a second story of the forest canopy that reaches or exceeds the height of the nest limb, thereby providing a protective enclosure surrounding the nest site. A single, large, closed-crowned tree, which provides its own protective cover over the nest site may also be used by murrelets (Ralph et al., 1995). Large, moss-covered limbs (greater than 7 inches diameter) in tall trees are utilized for egg-laying. Marbled murrelet nests have been located in stands as small

as approximately seven acres (Hamer and Nelson, 1995) and are generally within 50 miles of marine waters. In Washington, marbled murrelet abundance was found to be highest in areas where old-growth/mature forest comprised more than 30 percent of the landscape. Marbled murrelets in the Pacific Northwest forage on coastal marine waters and typically nest on trees in old growth or mature forest stands. Even so, at least one nest has been detected in a younger (40- to 80-year old) stand of deformed trees that provide suitable nesting platforms (Ralph et al., 1994). Nests are usually located near the coast, but nests up to 52 miles inland have been found in Washington (Hamer et al., 1991). Thus, the project area is within the breeding range of murrelets, and could include potential nesting habitat. No surveys have been conducted to verify the absence of murrelets from the Snoqualmie River levee repair project area, but there is only a remote chance that murrelets nest there because there is little potential habitat, and what is there occurs in small noncontiguous stands. In addition, the close proximity of the project to the nearby towns means that potential nest sites would be close to high levels of disturbance.

Apparently, limited surveys have been done in the project area by the Washington DNR in 1997 and 1998 (B. Ritchie, WDFW, pers. comm., 1998). No detections were recorded in 1997. No murrelet critical habitat is located within the project areas. The nearest nesting areas are on the Middle Fork of the Snoqualmie River, a considerable distance from the project sites. G. Ging (USFWS, pers. comm., 1998) determined that no suitable habitat is present in the project area or North Bend vicinity.

3.7.5 Northern Spotted Owl

Northern spotted owls were listed as threatened in June 1990 (USFWS 1990). Critical habitat was designated effective February of 1992 (USFWS 1992). Primary constituent elements are forested lands that are used or potentially used by the northern spotted owl for nesting, roosting, foraging, or dispersing.

Spotted owls can be found throughout the west slope of the Washington Cascades below elevations of 4,200 feet. Preferred owl habitat is composed of closed-canopy coniferous forests with multi-layered, multi-species canopies dominated by mature and/or old-growth trees (USFWS, 2007). Habitat characteristics include moderate to high canopy closure (60-80%); large (greater than 30" dbh) overstory trees; substantial amounts of standing snags, in-stand decadence, and coarse woody debris of various sizes and decay classes scattered on the forest floor (Gore et al. 1987; Thomas et al. 1990). Critical habitat is characterized as large continuous blocks of coniferous/mixed-hardwood forests that contained one or more of the primary constituent elements (primarily nesting and roosting, but also foraging and dispersal). It is usually equivalent to structures of Douglas fir stands 80 or more years of age (USFWS, 1992).

Owls do not build their own nests but rely on naturally occurring nest sites, such as broken top trees and cavities. In western Washington, spotted owls nest most often in cavities of trees with a dbh greater than 20 inches. In fact, there is much evidence that spotted owls require old-growth forests for reproduction. The USFWS (1989) found that "1282 [of 1502 owl observations] were in old-growth, 22 in mature forest, 131 in old-growth/mature forest, and 67 in stands less than 100 years of age, demonstrating an overwhelming preference for old growth."

Due to the fragmented nature of habitat and lack of suitable habitat in and around the project area, no spotted owls are expected to occur at any of the four project sites. A review of the Washington State PHS database (WDFW 2005) indicated no records for spotted owl in the area. No spotted owl critical habitat is located within the project areas.

3.7.6 Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) has been removed from listing under the Endangered Species Act effective August 8, 2007 (USFWS 2007), but is protected under the Bald and Golden Eagle Protection Act.

The bald eagle is found only in North America and ranges over much of the continent, from the northern reaches of Alaska and Canada to northern Mexico. Bald eagles in Washington are most commonly found along lakes, rivers, marshes, or other wetland areas west of the Cascades, with an occasional occurrence along major rivers in eastern Washington.

The bald eagle wintering season extends from October 31 through March 31. Food is recognized as the essential habitat requirement affecting winter numbers and distribution of bald eagles. Other wintering habitat considerations are communal night roosts and perches. Generally large, tall, and decadent stands of trees on slopes with northerly exposures are used for roosting; eagles tend to roost in older trees with broken crowns and open branching (WDFW 1998). Bald eagles select perches on the basis of exposure, and proximity to food sources. Trees are preferred over other types of perches, which may include pilings, fence posts, utility poles, the ground, rock outcrops, and logs (Steenhof 1978).

Bald eagles nest between early January and mid-August. The characteristic features of bald eagle breeding habitat are nest sites, perch trees, and available prey. Bald eagles primarily nest in uneven-aged, multi-storied stands with old-growth components. Factors such as tree height, diameter, tree species, position on the surrounding topography, distance from water, and distance from disturbance also influence nest selection. Bald eagles normally lay two to three eggs once a year, which hatch after about 35 days. Snags, trees with exposed lateral branches, or trees with dead tops are often present in nesting territories and are critical to eagle perching, movement to and from the nest, and as points of defense of their territory. There do not appear to be any bald eagle nests or perches near any of the project sites, or foraging areas specifically identified (WDFW 2005).

Bald eagles are found in the Snoqualmie basin as they are throughout much of western Washington. An adult bald eagle was observed flying and perching at the McElhoe-Pearson levee rehab site on 21 February 2008 by Corps, County, Tribal and resource agency personnel. It perched on a large cottonwood at the levee repair site as well as on trees in county parkland across the river. WDFW (2005) does not reveal any information concerning any bald eagle nesting site close by this or any other of the seven sites. No nests were observed in the area during the 21 February 2008 site visit.

3.7.7 Essential Fish Habitat (EFH)

Pursuant to the MSFCMA and the 1996 Sustainable Fisheries Act (SFA), an EFH evaluation of impacts is necessary for federal actions, including activities that are associated with dredged

material disposal. The EFH evaluation applies to all species managed under a federal Fishery Management Plan (FMP). For the Snoqualmie River, Pacific salmon, including Chinook, coho, and pink salmon, are evaluated for EFH.

EFH for the Pacific coast salmon fishery means those waters and substrate necessary for salmon production needed to support a long-term sustainable salmon fishery and salmon contributions to a healthy ecosystem. To achieve that level of production, EFH must include all those streams, lakes, ponds, wetlands, and other currently viable water bodies and most of the habitat historically accessible to salmon in Washington, Oregon, Idaho, and California. Exceptions include areas upstream of certain impassable manmade barriers (as identified by the PFMC), and longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for several hundred years). EFH has been designated for coho and Chinook salmon, both of which are present in the Snoqualmie basin. Therefore the freshwater habitat provided by the Snoqualmie basin is essential for spawning, egg, larval, and adult stages of their life history.

3.8 Cultural Resources

The Bureau of Indian Affairs map of 1978, depicting “Indian Land Areas Judicially Established,” shows the Snoqualmie River valley as the ceded lands and traditional tribal territory of the Snoqualmie Tribe (Docket Number 164). The Snoqualmie people lived in villages and houses from the area known as The Forks at the confluence of the Skykomish and Snoqualmie Rivers, upstream to Snoqualmie Falls, which they considered sacred. The Snoqualmie people were divided into two groups; the lower Snoqualmie lived in about 38 houses along the stretch of the river from The Forks upstream to the confluence of the main stem with the Tolt River, and the upper Snoqualmie lived in about 58 houses from the Tolt upstream to the falls (Larson 1987). Suttles and Lane (1990) placed the Snoqualmie within the Southern Lushootseed dialect of the Southern Coast Salish speakers. The Snoqualmie Chief Patkanin signed the Point Elliott Treaty of 1855. After the treaty the Snoqualmie tried unsuccessfully to establish a reservation on their ancestral lands in the vicinity of present-day Carnation, but they were removed after the Point Elliott Treaty to the Tulalip Reservation where Chief Patkanin later died and was buried. In 1870 there were 301 Snoqualmie on the Tulalip Reservation under their Chief Sanawa. The Snoqualmie Tribe lost their Federal status in 1953 when the United States limited recognition to tribes having reservations (Ruby and Brown 1992). In 1999 the Snoqualmie Tribe regained Federal recognition.

3.9 Recreation

The upper watershed is mostly either in the Alpine Lakes Wilderness Area or in the Mt. Baker-Snoqualmie National Forest. This area contains many trails for hiking, mountain biking, and camping. The Middle Fork, where the Mason Thorson Ells and Extension levees are located, is used extensively for white water rafting, canoeing, and kayaking. Recreational fishing and swimming are common throughout the system. A very popular swimming spot, the “blue hole,” is present at the downstream end of the Mason Thorson Ells site. There is a golf course (Twin River) behind the Raging River Bridge to Mouth site at Fall City and a boat launch nearby that is commonly used by anglers. The crowns of the levee system on the Snoqualmie are often utilized by runners and hikers.

3.10 Air Quality, Climate, Noise and Traffic

3.10.1 Air Quality

Air quality is generally good within the Snoqualmie River basin area. The Puget Sound Clean Air agency reported that in 2006 King and Snohomish counties had an air quality index of “good” approximately 80% of the time and “moderate” approximately 20% of the time. Although there is no information available specific to the Snoqualmie basin, it is assumed that air quality is even better than those indicated in the report as the numbers are skewed by the cities of Seattle and Everett. The Snoqualmie area is part of Puget Sound maintenance areas for ozone and carbon monoxide. The main sources of air pollution in Washington come from cars, outdoor burning, and wood stoves. Interstate 90 is the state’s major east-west route. It runs close to North Bend, and therefore the four upstream levee sites. Automobile traffic, especially during the summer recreational season, is a notable source of emissions. Truck traffic is a large component of total use on I-90 year-round.

3.10.2 Climate

Indications are that average atmospheric temperatures are trending upward over the previous several decades, and are correlated to increased atmospheric carbon dioxide levels (IPCC 2001). Internal combustion engines emit carbon dioxide (CO₂) as one byproduct of efficient burning of fuel (gasoline or diesel). International efforts are being directed at reducing carbon release into the atmosphere. The UW CIG (2008) predicts warmer, wetter winters for western Washington as one manifestation of global climate change.

3.10.3 Noise

Much of the noise in the project area is from traffic (see Traffic, below). Interstate 90 is a major source of noise, especially given the large percentage of volume that comprises trucks. Traffic volumes along the major north-south corridor in the valley are not huge, but they do contribute also. Receptors in the area include town centers, and developments around the project sites. Nearly all sites are within about 200 yards of private residences. There are also homes on materials transportation routes close to Mason Thorson Extension.

3.10.4 Traffic

Traffic is generally light in this region of small towns; however, sometimes Snoqualmie experiences a high volume of truck traffic. According to the Washington Dept. of Transportation (undated), average daily traffic volumes in Duvall and Carnation on Highway 203 and in North Bend on Highway 202 were 10,000-19,999 vehicles per day. On nearby I-90, average traffic volumes in 2006 past North Bend were 30,000 vehicles per day, with trucks making up 21% of the total.

3.11 Socioeconomics

A distinct standard of living differential occurs within the Snoqualmie Valley. Parts of the valley are occupied by spacious newly constructed homes, and other areas contain trailer parks and run-down farmhouses. Snoqualmie valley towns are becoming “bedroom communities” for commuters to the Seattle metropolitan area, and growth has been considerable over the past two decades or so. The town of North Bend features a number of new developments near I-90,

including factory outlet stores. However, parts of the valley retain their rural character, and dairy farming is still important economically.

3.12 Aesthetics

The Snoqualmie River valley is surrounded by a mountainous landscape characterized by forest in the upper reaches and agriculture in the lower reaches. Spectacular views of the Cascade Mountains can be seen from several points along the river. Mt. Si is an internationally-known landmark overlooking North Bend, and is popular with hikers in King County. Hiking trails meander through the forested regions to be enjoyed by nature enthusiasts. Snoqualmie Falls is one of the tallest waterfalls in the United States and is visited daily by hundreds of tourists and locals. Much of river itself is lined with levees and armored with riprap, especially along the mainstem, decreasing its aesthetic value. Regardless, the Snoqualmie River is still utilized by anglers, picnickers, and hikers. Many people use the top of the levees to run or walk along the river edge.

4.0 ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

Alternatives considered in this analysis are the No-Action Alternative and Preferred Alternative (Repair the Levees). Effects in this analysis apply to all four sites unless specifically stated.

4.1 Geology/Soils/Hydrology

Under the No-Action Alternative, continued erosion on the banks of the Snoqualmie River and a higher risk of damage from flooding of the river, would persist. The current soil conditions and topography would likely not be impacted from their present condition, but loss of floodplain function due to diking has negatively impacted soil values from which Prime and Unique Farmland status is derived.

Under the Preferred Alternative, impacts to geology, soil, and hydrology are expected to be minimal as the repair in each of the four sites would fall only within the footprint of the levee as it pre-dated the flood event, and in each case the levee structure would be restored to pre-flood conditions. The proposed work would restore the pre-existing stabilizing riprap on the banks. In general, the placement of the riprap can restrict channel movement and increase velocity; however, these impacts on channel conditions and channel performance of riprap restoration and replacement would be insignificant as compared with pre-flood conditions. In addition, soils would be compacted in areas such as the access road where heavy machinery would be operating.

Impacts to Prime and Unique Farmland would be minimal from the project action itself. However, it should be noted that the value of these soils for agriculture is derived in part from seasonal flooding, which deposits sediments, organics and nutrients. Upon initial construction, the levees cut the floodplain off from much seasonal flooding, and have gradually reduced the value of the soils and land for agriculture.

4.2 Water Quality

4.2.1 Temperature

Under the No-Action Alternative, it is presumed that shrubs and saplings would remain intact for the near future. However, assuming the sponsor fulfills its stated intention to meet the Corps' levee vegetation standards, removal of vegetation greater than four inches dbh would occur in summer 2008 and at periodic intervals thereafter, and riparian habitat functions (shading and cooling, and input of organics, nutrients, and insects) would be impaired.

Under the Preferred Alternative, the removal of vegetation may cause an elevation of temperature. The effects on temperature due to vegetation removal activities in the federal action would vary among the sites. For example, Mason-Thorson Ells would have approximately 20 trees and 1500 ft² of shrubby vegetation removed which would decrease the amount of direct shade provided to the stream and allow the riprapped bank to become directly exposed to the sun, making increases in temperature both in the immediate and downstream environment likely. Seven-day maximum average temperatures have been measured by WDE (R. Svrjcek, WDE, unpublished) in 2006, from near the headwaters (RM 75) to the mouth of the Snoqualmie. Values exceeded 16° C (the 7-day maximum average criterion for core summer salmonid habitat: WAC 173-201A-200) from about RM 69 downstream. Therefore any vegetation removal on the Middle Fork of the Snoqualmie River would likely further exacerbate the temperature problems downstream to a degree capable of detection.. In contrast, the Mason Thorson Extension, McElhoe-Pearson, and Raging River Bridge to Mouth sites would require only a minimal amount of vegetation removal, making incremental increases in temperature attributable to the federal rehabilitation project unlikely. See Cumulative Effects (below) concerning temperature effects likely resulting from vegetation removal by the non-federal sponsor.

With mitigative plantings at all sites, as well as the planned planting of 80 trees offsite at King County's Three Forks Park (see Mitigation [Sec. 4.13 (2)] and Table 5 for details) to mitigate for tree removal at Mason Thorson Ells, the combined effect on water temperature through vegetation removal by the federal action is not expected to have significant effect on the quality of the human environment.

4.2.2 Turbidity

Under the No-Action Alternative, no changes in turbidity would occur.

Under the Preferred Alternative, work at Mason Thorson Ells and Mason Thorson Extension, but not at Raging River Bridge to Mouth or McElhoe-Pearson, would be below the OHW mark, Whether work in the water at would occur at Mason Thorson Ells and Mason Thorson Extension would depend on the height of the river at the time of construction. It is anticipated that water levels would be lower than that of the construction footprint as summer flows in the Snoqualmie River are generally low. If water levels are higher than that of the construction footprint, then excavation and placement of rock may lead to elevated turbidity levels downstream of the sites. However, clean rock would be used and turbidity during project construction would be periodically monitored downstream of the project at a distance appropriate to allow for acceptable mixing and dilution of any released sediment, as allowed under the state regulations (Washington Administrative Code 173-201A-400). Should monitoring indicate that state water

quality maximum standards for turbidity are exceeded, project work would be halted and modified such that standards can again be met. It is anticipated at this time that effects of increased turbidity would be insignificant at the sites possibly requiring in-water work. If the degree of in-water work substantially exceeds the anticipated maximum scope and the turbidity effects become significant, the Corps will reevaluate the EA and FONSI. Those sites not requiring in water work are also expected to have insignificant impacts on turbidity. If rain occurs during construction, it is possible that soil from willow lifts would be washed into the river. A silt fence would be used at the Raging River Bridge to Mouth site to minimize runoff during rain events. Best management practices, as reflected in Section 4.13, would be employed to control erosion on site

4.2.3 Nutrients and Fecal Coliform

Under the No-Action Alternative, no changes in nutrient or fecal coliform levels would occur.

Under the Preferred Alternative the only potential impacts to nutrients and fecal coliform would result from off-site mitigative planting efforts at King County's Three Forks Park in compensation for the vegetation removal at Mason Thorson Ells. Eighty trees would be planted in a riparian area that has a dense blackberry patch covering the majority of the stream bank. In order to successfully plant the eighty trees the blackberry, and other invasives, would need to be grubbed either by goat grazing or by manual removal. If goat grazing is the selected method of removal then there may be temporary increases in fecal coliform and nutrient levels. However, it is expected that this contribution would be minor and insignificant in comparison with the agricultural runoff in the basin.

4.3 Vegetation

Under the No-Action Alternative, it is presumed that shrubs and saplings would remain intact for the near future. However, assuming the sponsor fulfills its maintenance responsibility to meet the Corps' levee vegetation standards, removal of vegetation greater than four inches dbh would occur in summer 2008 and at periodic intervals thereafter, and riparian habitat functions (shading and cooling, and input of organics, nutrients, and insects) would be impaired.

Under the Preferred Alternative, the federal action would remove vegetation occurring only within the footprint of the repair area or blocking access to the site, and only as essential to execution of the rehabilitation effort. Vegetation removal and riparian impacts would vary among sites (see Table 3 below). The Mason Thorson Ells repair would require the removal of numerous large trees and shrubs. The loss of this vegetation would decrease shade provided to the stream, potentially leading to elevated temperatures both onsite and downstream of the repair area. It would also lead to decreases in organic input and insect fall that fuels the food chain in riverine ecosystems. This loss of vegetation at Mason Thorson Ells would also impact birds and small mammals as it functions as nesting and foraging habitat and migration corridors. To mitigate for the loss of vegetation at Mason Thorson Ells, two willow lifts would be planted onsite on the riverward side starting at the ordinary high water mark and trees would be purchased to be planted elsewhere on the same section of the Middle Fork. There would, however, be a temporal lag of 5-15 years before the plantings are of a similar functional value to the pre-repair vegetation. At Mason Thorson Extension very little vegetation is growing on the repair area and two willow lifts would be planted at this site as well, so impacts to the

surrounding environment would be minimal. The McElhoe Pearson site would require the removal of several sapling cottonwoods; however, due to their size and location on the landward side, they are providing little functional habitat value. Also, a mixture of trees including Douglas fir, Sitka spruce, big-leaf maple, and cottonwood would be planted on the landward side of the repair area within King County’s operational easement. At Raging River Bridge to Mouth, no vegetation would be removed under the federal action, and the levee would be set back and would leave a 1,500-ft² area that would be planted with native trees and shrubs. Any brush removed by the Corps would be either disposed of on the landward side of the levee or hauled off and disposed of in an approved manner. Mitigation for vegetation removal at Mason Thorson Ells would consist of planting 80 trees at King County’s Three Forks Park on the Middle Fork Snoqualmie; see Sec. 4.13 (2) below.

Given the small scale of the project areas and the compensatory plantings at all four sites as well as off-site mitigation at the Three Forks Park, it is not anticipated that the vegetation removal at these sites would generate significant effects on the quality of the human environment. See Threatened and Endangered Species (Section 4.6.1) for the effects of vegetation removal on ESA listed species and Cumulative Effects (Section 4.14) concerning vegetation removal on these levees by the non-federal sponsor.

Table 3. Vegetation removal by the federal action at each site.

<i>Site</i>	<i>Approximate Extent of Vegetation Removal by the Federal Action</i>
McElhoe-Pearson (site 1)	25 small cottonwoods
McElhoe-Pearson (site 2)	blackberry brush
Raging River Bridge to Mouth	none
Mason-Thorson Ells	20 trees, 4500 ft ² shrub cover
Mason-Thorson Extension	none

4.4 Land Use

Under the No-Action Alternative, further damage to levees is possible with later flooding, increasing the risk of flooding, and putting properties at greater risk. This may affect property values, and hence use of the land for structures.

Under the Preferred Alternative, the proposed project would not directly cause any unique effects or impacts to land use, because the structures would be restored to their pre-existing condition. However, maintenance and repair of levees on the Snoqualmie River would likely contribute to continued development of the remaining vegetated and/or forested areas in the floodplain by way of reinstating the pre-existing level of protection from flood inundation. By rehabilitating the damaged levee sections, the projects would not interrupt the further reduction of forested and wetland habitat in the floodplain and riparian areas, as existed prior to the flood event.

4.5 Floodplains

Under the No-Action Alternative, floodplains adjacent to the project sites would be subject to increased likelihood of flooding. This might have the effect of restoring natural floodplain values, with deposition of sediment, organics, and nutrients, depending on how likely the

flooding would become. Structures protected by the levees would be at imminent and substantial risk of damage with the start of the ensuing flood season.

Under the Preferred Alternative, the likelihood of flooding would be reduced in areas of the floodplain left exposed to the damaged levee sections. The proposed action would restore the level of flood protection that had been afforded prior to the November 2006 floods at each of the four rehabilitation sites. This would have the effect of reducing natural floodplain function, meaning less long-term deposition of sediments and nutrients, as compared to the No-Action Alternative. It would also mean less likelihood of floodway function, which might otherwise serve to reduce the severity of downriver flooding. Completion of the rehabilitation project would permit development of the floodplain to continue over the long term as it did prior to the damaging flood event, as a result of continued maintenance of levees and the protection thus provided to structures behind the levees.

4.6 Fish and Wildlife

Under the No-Action Alternative, no impacts to fish and wildlife would occur beyond those already having taken place through construction of the existing levees and the vegetation maintenance requirements for the non-federal sponsor to remain eligible for the PL84-99 levee repair program (see “Cumulative Impacts” section 4.14 for details). Those include degradation of riparian habitat with consequent impacts to shade, cover, organic input and food production for fish, and loss of some benthic habitat. Under the No-Action Alternative, it is presumed that shrubs and saplings would remain intact for the near future. However, assuming the sponsor fulfills its maintenance responsibility to meet the Corps’ levee vegetation standards, removal of vegetation greater than four inches dbh would occur in summer 2008 and at periodic intervals thereafter, and riparian habitat functions (shading and cooling, and input of organics, nutrients, and insects) would be impaired.

Under the Preferred Alternative, the most immediate impact would be a temporary displacement of fish and wildlife due to construction activities. Excavation, transportation, and placement of embankment materials would require the use of heavy construction equipment whose presence and noise may temporarily displace some species at both the borrow pit and construction sites. Currently, construction is scheduled to take place during the appropriate construction windows, July 1 to September 15 for sites below Snoqualmie Falls and July 15 to October 31 for Middle Fork (above the falls).

Birds, mammals and other wildlife would be disturbed by construction activities, but would be able to recolonize remaining habitat in vegetation, logs and burrows. It is possible that tree removal could result in the loss of nestling birds such as woodpeckers, robins, chickadees, nuthatches, flycatchers, and warblers. In the project sites, which are largely already disturbed compared to undeveloped areas, many wildlife species are relatively tolerant of humans and their activities.

Removal of shrubs and bushes at Mason-Thorson Ells adjacent to the river may result in a temporary loss, and the removal of trees may result in a long term loss, of habitat for species utilizing the vegetation as a refuge from predators and high water velocities. The reduction of leaf fall associated with the removed vegetation can reduce total organic input to the river

system, in turn affecting the food chain. Elevated water temperatures due to reduction of shade provided to the stream and warming of the riprapped bank may negatively impact aquatic biota both onsite and downstream of the site. Based on the preponderance of information documenting the biological benefits of stream-riparian corridor interactions it is possible the removal of vegetation, including brush, and mid-story and canopy cover, from the riparian corridor would alter the ecosystem within and adjacent to the river and decrease the functional value of these sites (Murphy and Meehan 1991; May and Horner 2000; Naiman and Decamps 1997). Such values include shading, cooling, cover from predators, and input of insects and leaf matter (necessary to benthic invertebrates) as a food source for fish. Vegetation removal at Mason Thorson Extension, McElhoe-Pearson, and Raging River Bridge to Mouth would be minimal (see section 4.3 for details) so impacts to fish and wildlife due to vegetation removal are expected to be minor.

As detailed in Sec. 4.13(2) concerning Mitigation, 80 trees of native species would be planted in November 2008 at King County's Three Forks Park on the Middle Fork Snoqualmie River to mitigate for vegetation removal at Mason Thorson Ells.

Vegetation removal by the Corps would occur only to access the sites and as necessary to repair the damaged area, and placement of willow lifts and other native riparian plant species on- and off-site would mitigate for any loss of vegetation. Given the compensatory plantings discussed in the Vegetation section (4.3) and in the Mitigation section (4.13), the minimal amount of vegetation being removed at three out of the four sites, and in-water work being completed during the approved WDFW construction window, impacts to fish and wildlife by the federal action are expected to be insignificant. See the Cumulative Effects section (below) concerning vegetation removal by the non-federal sponsor.

4.6.1 Sensitive, Threatened and Endangered Species

Under the No-Action Alternative, no impacts to listed species would occur beyond those already having taken place through construction of existing levees and the vegetation maintenance requirements for the non-federal sponsor to remain eligible for the PL84-99 levee repair program (see "Cumulative Impacts" section 4.14 for details). Those include degradation of riparian habitat with consequent impacts to temperature, cover, organic input and food production for fish, and loss of some benthic habitat. Under the No-Action Alternative, it is presumed that shrubs and saplings would remain intact for the near future. However, assuming the sponsor fulfills its maintenance responsibility to meet the Corps' levee vegetation standards, removal of vegetation greater than four inches dbh would occur in summer 2008 and at periodic intervals thereafter, and riparian habitat functions (shading and cooling, and input of organics, nutrients, and insects) would be impaired.

Separate consultation pursuant to Sec. 7 of the Endangered Species Act is taking place with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service for effects to threatened species and habitat under the proposed action (Preferred Alternative). Those effects are summarized below.

Table 4. Summary of effects to listed species.

<i>Species/Critical Habitat</i>	<i>Listing Status</i>	<i>Effect (McElhoe-Pearson and Raging River Bridge to Mouth)</i>	<i>Effect (Mason Thorson Ells)</i>	<i>Effect (Mason Thorson Extension)</i>
Puget Sound Bull Trout	Threatened	May affect, not likely to adversely affect	Likely to adversely affect	May affect, not likely to adversely affect
Puget Sound Bull Trout Critical Habitat	n/a	May affect, not likely to adversely affect	Likely to adversely affect	May affect, not likely to adversely affect
Puget Sound Chinook	Threatened	May affect, not likely to adversely affect	Likely to adversely affect	May affect, not likely to adversely affect
Puget Sound Chinook Critical Habitat	n/a	May affect, not likely to adversely affect	Likely to adversely affect	May affect, not likely to adversely affect
Puget Sound Steelhead	Threatened	May affect, not likely to adversely affect	Likely to adversely affect	May affect, not likely to adversely affect
Marbled Murrelet	Threatened	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Marbled Murrelet Critical Habitat	n/a	No effect (not present)	No effect (not present)	No effect (not present)
Northern Spotted Owl	Threatened	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Northern Spotted Owl Critical Habitat	n/a	No effect (not present)	No effect (not present)	No effect (not present)

4.6.1.1 Puget Sound Chinook Salmon

Effects of Action

Raging River Bridge to Mouth. Construction would likely cause temporary disturbances to Chinook salmon due to increased noise, if they are present. However, these temporary disturbances would be largely overcome by working within the appropriate construction windows designated by WDFW; the work would be done before spawners are likely to arrive, and after fry have departed. No impacts to Chinook salmon due to elevated turbidity levels are anticipated as there would be no in-water work at this site. This levee is covered primarily with large shrubs and trees. Many of the trees are directly along the stream bank. A setback of approximately 15 feet is planned for the levee at this site. All excavating and repair of this levee is expected to take place landward of the trees and shrubs that line the river. The Corps' action would not require the removal of large vegetation, and a 1500 ft² area in front of the levee will be planted with a mixture of native trees and shrubs (see section 2.2.2 for details). Therefore impacts to Chinook salmon due to the federal action are expected to be minimal. See the Cumulative Effects section (4.14) concerning vegetation removal by the non-federal sponsor and its effect on Chinook salmon.

McElhoe-Pearson. Construction would likely cause temporary disturbances to Chinook, if they are present, due to increased noise. However, these temporary disturbances would be largely overcome by working within the appropriate construction windows designated by WDFW; the work would be done before spawners are likely to arrive, and after fry have departed. No impacts to Chinook salmon due to elevated turbidity levels are anticipated as there would be no in-water work at this site. The repair area on this levee is located on the landward side and the crown. Therefore, no in-water work is required and no vegetation on the riverward side would be

removed by any federal action. It is possible that some vegetation on the back side may be removed to obtain site access and repair the damaged areas. There are approximately 25 sapling cottonwoods that would need to be removed in order to repair the damaged area. However, a mixture of trees would be planted on the landward side of the area from which the cottonwoods would be removed (see Section 2.2.1 for details). Therefore, impacts to Chinook salmon due to the federal action are expected to be minimal. See the Cumulative Effects section (4.14) concerning vegetation removal by the non-federal sponsor and its effect on Chinook salmon.

Mason-Thorson Ells. There are no Chinook salmon present at this site; therefore, disturbances due to construction and noise would be non-existent. However, there is potential for downstream effects to all life stages of Chinook salmon present below Snoqualmie Falls. Elevated turbidity levels may affect Chinook downstream of the site; however, turbidity would be monitored to ensure that maximum state water quality standards are not exceeded. Approximately 20 medium sized trees and 4,500 ft² of shrubby vegetation would need to be removed to repair the damaged areas of this levee. This loss of vegetation would decrease the amount of shade provided to the river and allow the riprapped banks to be directly exposed to the sun, therefore increasing temperatures downstream. A study by the Department of Ecology has shown that summer temperatures are elevated in the Snoqualmie River beginning along the Middle Fork. These elevated temperatures may be intolerable to salmonids (Svrjcek, unpublished). In addition, the loss of vegetation would reduce the amount insect fall and organic input necessary for benthic invertebrates, both of which are important food source for juvenile Chinook. To mitigate for this loss of vegetation, two willow lifts would be planted on the riverward side of the levee onsite, and trees and shrubs would be planted as collective mitigation on the same stretch of river at the other three project sites. Also, 80 trees would be planted off-site at King County's Three Forks Park on the Middle Fork Snoqualmie River; accounting for typical mortality, this number was selected to achieve a compensation ratio of over 3:1. However, there would be at least a 10-year lag before this vegetation is of the same functional value as the pre-repair vegetation. See the Cumulative Effects section (4.14) concerning vegetation removal by the non-federal sponsor and its effect on Chinook salmon.

Mason-Thorson Extension. There are no Chinook salmon present at this site; therefore, disturbances due to construction and noise would be non-existent. However, there is potential for downstream effects to all life stages of Chinook salmon present below Snoqualmie Falls. Elevated turbidity levels may affect Chinook downstream of the site; however, turbidity would be monitored to ensure that maximum state water quality standards are not exceeded. Very little vegetation exists within the repair area, and two willow lifts would be planted on the riverward side of the levee. Therefore, no impacts to temperature or organic input are anticipated. Anticipated impacts to Chinook salmon are thus considered to be minor. See the Cumulative Effects section (4.14) concerning vegetation removal by the non-federal sponsor and its effects on Chinook salmon.

The vegetation removal necessary to execute the construction at each of the four sites would cause loss of shade and refuge habitat, and would adversely affect food and habitat functions by reducing organic input and insect fall. Furthermore, it is likely that the vegetation removal at the sites both above and below Snoqualmie Falls would generate an increase in water temperature within Puget Sound Chinook habitat below the Falls that would be, at the minimum, perceptible

and adverse. The ameliorative effect of the planting efforts on- and off-site would substantially compensate for those adverse effects. However, the inescapable temporal lag between removal and maturation of the replacement trees would prevent full compensatory offset of these adverse effects. Thus, the removal and replacement of vegetation at the Mason-Thorson Ells site, combined with other minor construction impacts, is anticipated to have a likely, albeit minor, net adverse effect on Puget Sound Chinook. This minor net effect is not, however, expected to constitute a significant impact on the quality of the human environment. Vegetation removal and other listed impacts at the Mason-Thorson Extension, Raging River Bridge to Mouth, and McElhoe-Pearson sites may affect but are not anticipated to adversely affect Puget Sound Chinook. Likewise, therefore, the effects on Puget Sound Chinook of project execution at the Mason-Thorson Extension, Raging River Bridge to Mouth, and McElhoe-Pearson sites is not expected to constitute a significant impact on the quality of the human environment.

4.6.1.2 Puget Sound Steelhead

Effects of Action

Raging River Bridge to Mouth. Construction would likely cause temporary disturbances to steelhead due to increased noise, if they are present. However, these temporary disturbances would be largely overcome by working within the appropriate construction windows designated by WDFW; the work would be done before spawners are likely to arrive. No impacts to steelhead due to elevated turbidity levels are expected as there would be no in-water work at this site. This levee is covered primarily with large shrubs and trees. Many of the trees are directly along the stream bank. A setback of approximately 15 feet is planned for the levee at this site. All excavating and repair of this levee is expected to take place landward of the trees and shrubs that line the river. The Corps' action would not require the removal of large vegetation, and a 1500 ft² area in front of the levee will be planted with a mixture of native trees and shrubs (see section 2.2.2 for details). Therefore impacts to steelhead due to the federal action are expected to be minimal. See the Cumulative Effects section (4.14) concerning vegetation removal by the non-federal sponsor and its effect on steelhead.

McElhoe-Pearson. Construction would likely cause temporary disturbances to steelhead, if they are present, due to increased noise. However, these temporary disturbances would be largely overcome by working within the appropriate construction windows designated by WDFW; the work would be done before spawners are likely to arrive. No impacts to steelhead due to elevated turbidity levels are expected as there would be no in-water work at this site. The repair area on this levee is located on the landward side and the crown. Therefore, no in-water work is required and no vegetation on the riverward side would be removed by any federal action. It is possible that some vegetation on the back side may be removed to obtain site access and repair the damaged areas. There are approximately 25 sapling cottonwoods, of little functional value, that would need to be removed in order to repair the damaged area. However, a mixture of trees will be planted on the landward side of the area from which the cottonwoods will be removed (see section 2.2.1 for details). Therefore impacts to steelhead due to the federal action are expected to be minimal. See the Cumulative Effects section (4.14) concerning vegetation removal by the non-federal sponsor and its effect on steelhead.

Mason-Thorson Ells. There are no Puget Sound steelhead present at this site; therefore, disturbances due to construction and noise would be non-existent. However, there is potential for

downstream effects to all life stages of steelhead present below Snoqualmie Falls. Elevated turbidity levels may affect steelhead downstream of the site, although turbidity will be monitored to ensure that maximum state water quality standards are not exceeded. Approximately 20 medium sized trees and 4500 ft² of shrubby vegetation would need to be removed to repair the damaged areas of this levee. This loss of vegetation would decrease the amount of shade provided to the river and allow the riprapped banks to be directly exposed to the sun, therefore increasing temperatures downstream. A study by the Department of Ecology has shown that summer temperatures are elevated in the Snoqualmie River beginning along the Middle Fork. These ambient elevated temperatures may be intolerable to salmonids (Svrjcek, unpublished). In addition, the loss of vegetation would reduce the amount insect fall and organic input necessary for benthic invertebrates, both of which are important food source for juvenile steelhead. To mitigate for this loss of vegetation, two willow lifts would be planted on the riverward side of the levee onsite, and trees and shrubs would be planted as collective mitigation on the same stretch of river at the other three project sites. Additionally, 80 trees would be planted off-site at King County's Three Forks Park on the Middle Fork Snoqualmie River; accounting for typical mortality, this number was selected to achieve a compensation ratio of over 3:1. However, there would be at least a 10-year lag before this vegetation is of the same functional value as the pre-repair vegetation. See the Cumulative Effects section (sec 4.14) concerning vegetation removal by the non-federal sponsor and its effect on steelhead.

Mason-Thorson Extension. There are no Puget Sound steelhead present at this site; therefore; disturbances due to construction and noise would be non-existent. However, there is potential for downstream effects to all life stages of steelhead present below Snoqualmie Falls. Elevated turbidity levels may affect steelhead downstream of the site, however turbidity would be monitored to ensure that maximum state water quality standards are not exceeded. Very little vegetation exists within the repair area and two willow lifts would be planted on the riverward side of the levee. Therefore, no impacts to temperature or organic input are anticipated. Anticipated impacts to steelhead due to the federal action are expected to be minimal. See the Cumulative Effects section (below) concerning vegetation removal by the non-federal sponsor and its effect to steelhead.

The vegetation removal necessary to execute the construction at each of the four sites would cause loss of shade and refuge habitat, and would adversely affect food and habitat functions by reducing organic input and insect fall. Furthermore, it is likely that the vegetation removal at the sites both above and below Snoqualmie Falls would generate an increase in water temperature within salmonid habitat below the Falls that would be, at the minimum, perceptible and adverse. The ameliorative effect of the planting efforts on- and off-site would substantially compensate for those adverse effects. However, the inescapable temporal lag between removal and maturation of the replacement trees would prevent full compensatory offset of these adverse effects. Thus, the removal and replacement of vegetation at the Mason-Thorson Ells site, combined with other minor construction impacts, is anticipated to have a likely, albeit minor, net adverse effect on Puget Sound steelhead. This minor net effect is not, however, expected to constitute a significant impact on the quality of the human environment. Vegetation removal and other listed impacts at the Mason-Thorson Extension, Raging River Bridge to Mouth, and McElhoe-Pearson sites may affect but are not anticipated to adversely affect Puget Sound steelhead. Likewise, therefore, the effects on Puget Sound steelhead of project execution at the

Mason-Thorson Extension, Raging River Bridge to Mouth, and McElhoe-Pearson sites is not expected to constitute a significant impact on the quality of the human environment.

4.6.1.3 Coastal/Puget Sound Bull Trout

Effects of Action

Raging River Bridge to Mouth Levee. Construction would likely cause temporary disturbances to bull trout due to increased noise, if they are present. However, these temporary disturbances would be largely overcome by working within the appropriate construction windows designated by WDFW. No impacts to bull trout due to elevated turbidity levels are expected as there would be no in-water work at this site. This levee is covered primarily with large shrubs and trees. Many of the trees are directly along the stream bank. A setback of approximately 15 feet is planned for the levee at this site. All excavating and repair of this levee are expected to take place landward of the trees and shrubs that line the river. The Corps action would not require the removal of large vegetation, and a 1500 ft² area in front of the levee would be planted with a mixture of native trees and shrubs (see section 2.2.2 for details). Therefore, impacts to bull trout due to the federal action are expected to be minimal. See the Cumulative Effects section (4.14) concerning vegetation removal by the non-federal sponsor and its effect on bull trout.

McElhoe-Pearson. Construction would likely cause temporary disturbances to bull trout, if they are present, due to increased noise. However, these temporary disturbances would be largely overcome by working within the appropriate construction windows designated by WDFW. No impacts to bull trout due to elevated turbidity levels are expected as there would be no in-water work at this site. The repair area on this levee is located on the landward side and the crown. Therefore, no in-water work is required and no vegetation on the riverward side would be removed by any federal action. It is possible that some vegetation on the back side may be removed to obtain site access and repair the damaged areas. There are approximately 25 sapling cottonwoods, of little functional value, that would need to be removed in order to repair the damaged area. However, a mixture of trees would be planted on the landward side of the area the cottonwoods would be removed from (see Section 2.2.1 for details). Therefore, impacts to bull trout due to the federal action are expected to be minimal. See the Cumulative Effects section (sec 4.14) concerning vegetation removal by the non-federal sponsor and its effect on bull trout.

Mason-Thorson Ells. There are no Coastal/Puget Sound bull trout present at this site therefore disturbances due to construction and noise would be non-existent. However, there is potential for downstream effects to bull trout present below Snoqualmie Falls. Elevated turbidity levels may affect bull trout downstream of the site. However, turbidity would be monitored to ensure that maximum state water quality standards are not exceeded. Approximately 20 medium sized trees and 4500 ft² of shrubby vegetation would need to be removed to repair the damaged areas of this levee. This loss of vegetation would decrease the amount of shade provided to the river and allow the riprapped banks to be directly exposed to the sun, therefore increasing temperatures downstream. A study by the Department of Ecology has shown that summer temperatures are elevated in the Snoqualmie River beginning along the Middle Fork. These ambient elevated temperatures may be intolerable to salmonids (Svrjcek, unpublished). In addition, the loss of vegetation would reduce the amount of insect fall and organic input necessary for benthic invertebrates, both of which are important food source for juvenile steelhead. To mitigate for

this loss of vegetation, two willow lifts would be planted on the riverward side of the levee onsite, and trees and shrubs would be planted as collective mitigation on the same stretch of river at the other three sites. Also, 80 trees would be planted off-site at King County's Three Forks Park on the Middle Fork Snoqualmie River; accounting for typical mortality, this number was selected to achieve a compensation ratio of over 3:1. However, there would be at least a 10-year lag before this vegetation is of the same functional value as the pre-repair vegetation. See the Cumulative Effects section (4.14) concerning vegetation removal by the non-federal sponsor and its effect on bull trout.

Mason-Thorson Extension. There are no Coastal/Puget Sound bull trout present at this site; therefore, disturbances due to construction and noise would be non-existent. However, there is potential for downstream effects to bull trout present below Snoqualmie Falls. Elevated turbidity levels may affect bull trout downstream of the site; however, turbidity would be monitored to ensure that maximum allowable levels are not exceeded. Very little vegetation exists within the repair area and two willow lifts would be planted on the riverward side of the levee; therefore, no impacts to temperature or organic input are anticipated. Anticipated impacts to Coastal/Puget Sound bull trout due to the federal action are expected to be minimal. See the Cumulative Effects section (4.14) concerning vegetation removal by the non-federal sponsor and its effect on bull trout.

The vegetation removal necessary to execute the construction at each of the four sites would cause loss of shade and refuge habitat, and would adversely affect food and habitat functions by reducing organic input and insect fall. Furthermore, it is likely that the vegetation removal at the sites both above and below Snoqualmie Falls would generate an increase in water temperature within Coastal/Puget Sound bull trout habitat below the Falls that would be, at the minimum, perceptible and adverse. The ameliorative effect of the planting efforts on- and off-site would substantially compensate for those adverse effects. However, the inescapable temporal lag between removal and maturation of the replacement trees would prevent full compensatory offset of these adverse effects. Thus, the removal and replacement of vegetation at the Mason-Thorson Ells site, combined with other minor construction impacts, is anticipated to have a likely, albeit minor, net adverse effect on Coastal/Puget Sound bull trout. This minor net effect is not, however, expected to constitute a significant impact on the quality of the human environment. Vegetation removal and other listed impacts at the Mason-Thorson Extension, Raging River Bridge to Mouth, and McElhoe-Pearson sites may affect but are not anticipated to adversely affect Coastal/Puget Sound bull trout. Likewise, therefore, the effects on Coastal/Puget Sound bull trout of project execution at the Mason-Thorson Extension, Raging River Bridge to Mouth, and McElhoe-Pearson sites is not expected to constitute a significant impact on the quality of the human environment.

4.6.1.4 Marbled Murrelet

Effects of Action

All four levee repair sites. Murrelets may transit the project area via flyover between marine areas for feeding and upland forest where they nest, and designated critical habitat exists in the upper portions of the Snoqualmie River watershed. However, the project areas contain little suitable habitat, so it is not likely that murrelets would be present. Therefore, there would be little to no chance of disturbances to them from construction at any of the four sites. The Federal

project may affect but is not likely to adversely affect marbled murrelets and would have no effect on their designated critical habitat.

4.6.1.5 Northern Spotted Owl

Effects of Action

All four levee repair sites. Although spotted owls are not present in the project area, designated critical habitat does exist in upper portions of the Snoqualmie River watershed. No effects on spotted owls are anticipated due to lack of suitable habitat within the immediate project area, and no conservation measures are indicated at this time. The Federal project may affect but is not likely to adversely affect the northern spotted owl and would have no effect on its designated critical habitat.

4.6.1.6 Bald Eagle

There are no documented bald eagle nesting or roosting sites in the local project areas, nor have they been observed during site visits, but an adult bald eagle was seen flying and perching at the McElhoe-Pearson site in February 2008. There may be negligible effects to bald eagles due to construction if they are active in the area in summer. However, if nests are observed, the U.S. Fish and Wildlife Service would be contacted and, depending on their advice, construction may be halted until the young fledge.

4.6.1.7 Essential Fish Habitat

The construction work consists of repairing structures during low flows and when salmonids are generally not present. No in-water work would occur at the two sites below the falls where EFH has been established. Best management practices would be employed and mitigation measures would be incorporated. However, removal of trees at the Mason Thorson Ells site may cause impairment of ecosystem function in terms of elevated temperatures, as well as loss of input of nutrients, organics, and insects. Therefore, the suite of levee rehabilitation projects on the Snoqualmie River may adversely affect Essential Fish Habitat for Chinook, coho, and pink salmon.

4.7 Native American and Cultural Resources

Under the No-Action Alternative, there would be no effect to cultural resources.

The Corps has determined that the proposed rehabilitation projects (Preferred Alternative) are an undertaking of the type that could affect historic properties and must comply with the requirements of Section 106, as amended through 2004, of the National Historic Preservation Act of 1966, as amended through 2000 (NHPA) (16 USC 470). Section 106 requires that Federal agencies identify and assess the effects of Federal undertakings on historic properties and to consult with others to find acceptable ways to resolve adverse effects. Properties protected under Section 106 are those that are listed or are eligible for listing in the National Register of Historic Places (NRHP). 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.

To comply with Section 106 of the NHPA, a Corps archaeologist conducted a cultural resources reconnaissance survey of the proposed project Areas of Potential Effect (APEs) with negative results. Cultural resources studies conducted for the project included a search of the Washington Department of Archaeology and Historic Preservation (DAHP) Electronic Historic Sites Inventory Database, and other background and archival research. No properties listed in the National Register and no sites or structures listed in the state inventory were found to have been previously recorded within or closely adjacent to the individual project APEs. The Corps sent letters to the Snoqualmie and Tulalip Tribes on 25 February 2008 (at that time there were eight levees proposed for repair) soliciting any knowledge or concerns or religious significance for the APEs. See Appendix C.

A report was sent via letter dated June 13, 2008, to the Washington Department of Archeology and Historic Preservation (State Historic Preservation Office, or SHPO), detailing the no-effect determination. A letter dated June 16, 2008, from the SHPO was received, and concurred with the Corps' determination. Both the Corps' and the SHPO's letters are reproduced in Appendix C.

4.8 Recreation

Under the No-Action Alternative, impacts to recreation would be minimal. However, if the levees were to breach due to lack of repair, nearby parks may potentially flood and likely cause damage to picnicking and play areas.

Under the Preferred Alternative, the construction would cause temporary disturbances to those using the area for recreational purposes due to the presence and noise of dump trucks and heavy machinery. Running and hiking on the levee crown would be inhibited for the duration of the construction. Swimming in the river at Mason Thorson Ells would likely be restricted during construction, again for 2-3 weeks. However, given the short duration of the construction it is not expected that impacts to recreation would be significant.

4.9 Air Quality, Climate, Noise and Traffic

4.9.1 Air Quality

Under the No-Action Alternative, air quality would remain as it is without the planned construction. Local traffic, and traffic on Interstate 90, would continue to be a major and gradually increasing source of emissions, as would scattered sources of wood smoke.

Under the Preferred Alternative, the exhaust from diesel fuel for the trucks and heavy machinery and gasoline for cars would produce a variety of pollutants including carbon dioxide, carbon monoxide, nitrogen and sulfur oxides, hydrocarbons, and unburned carbon particles. However, air quality would meet standards set forth by the Washington Department of Ecology and would not be permanently affected by the construction of the project. During construction, there would be temporary and localized reduction in air quality due to emissions from heavy machinery operating during fill retrieval and delivery, fill placement, and grading.

On average, construction equipment would require roughly 27 gallons of diesel fuel per each of four sites to repair the damaged levees (D. Weber, USACE, pers. comm., 2008). This number does not include fuel needed to haul rock from the quarry, as the quarry(ies) would be selected by the Corps' contractor, and distances and numbers of trips are not known. It is estimated that roughly 485 gallons of gasoline would be used for site visits by Corps and King County employees, and construction contractors (equal to about 9,700 miles at 20 miles per gallon), based on consecutive project construction, as well as on 20 levee construction days, and up to 80 miles per round trip, plus 5 additional days for work at the mitigation site (see Sec. 4.13, Mitigation). For every gallon of diesel fuel burned, 22 pounds of CO₂ are produced, and every gallon of gasoline produces 19.4 pounds of CO₂ (US EPA, 2008). To repair these four sites it is calculated that a rough minimum of 12,000 pounds of CO₂ would be emitted into the atmosphere. Even accounting for the reasonably likely emissions of truck trips between the quarry(ies) and the construction sites, actions taken to repair and maintain existing facilities are specifically excluded from the Clean Air Act conformity requirements where the action, as here, would result in an increase in emissions that is clearly *de minimis* (40 CFR section 93.153(c)(2)(iv)). Therefore, impacts would not be significant.

4.9.2 Climate

Under the No-Action Alternative, gradual climate change would continue, in correlation with increasing CO₂ emissions worldwide.

For the Preferred Alternative, the CO₂ emissions outlined above under Air Quality may seem insignificant compared to the thousands of metric tons emitted per year globally (Raupach et. al., 2007). Nevertheless, diesel fuel consumption by heavy machinery required for construction and repair and gasoline consumption for travel to the sites for all Corps projects, including levee repairs, are a part of world-wide cumulative contributions to change in climate by way of increases in greenhouse gas emission. Furthermore, climate change models in the Pacific Northwest are predicting warmer, wetter winters and dryer summers which may trigger more flooding and frequent maintenance and repair of levees (UW CIG, 2008). However, given the minuscule contribution of CO₂ emissions resulting from this project to overall global emissions, impacts are considered to be insignificant.

4.9.3 Noise

Under the No-Action Alternative, local noise would continue as before, with traffic as the major source.

Under the Preferred Alternative, noise levels would increase while construction equipment was operating. Local residences are very close and may be impacted by noise related to construction, materials transport or both, at Mason Thorson Extension, Mason Thorson Ells, and Raging River Bridge to Mouth. However, these effects would be temporary and localized, and would occur only during daylight working hours. As a result, impacts are considered temporary and insignificant.

4.9.4 Traffic

Under the No-Action Alternative, traffic patterns would remain essentially the same as they currently are, with gradual long-term growth in volumes in the project area.

Under the Preferred Alternative, there would be short-term, insignificant increases in traffic during the course of the 1-2 month construction period in the area of each rehabilitation site. This would consist of movement of equipment to and from the sites, truck traffic hauling materials between sources and the sites, commutes by construction workers, and daily trips between the Seattle metro area and the sites by Corps and possibly County personnel. Distance from each of the project sites to the respective quarries would not generate a significant volume of heavy traffic, as each would be located within King County.

4.10 Aesthetics

Under the No-Action Alternative, no impacts to aesthetics would occur beyond those already created by presence of the levees and the vegetation maintenance requirements for the non-federal sponsor to remain eligible for the PL84-99 levee repair program (see “Cumulative Impacts” Section 4.14 for details).

Under the Preferred Alternative, temporary impacts to aesthetics would result from the presence of trucks and heavy machinery and the noise they create, and from reduced access to the river. More long term impacts to aesthetic values include removal of vegetation and restoration of riprap along the river banks where it previously existed, and the indirect encouragement of floodplain development by way of offering protection from flooding, which in turn would lead to a loss of natural areas. However, given that construction would be temporary and vegetation removal would be minimal at three out of four of the sites, impacts are expected to be insignificant.

4.11 Environmental Justice

Executive Order 12898, dated February 11, 1994, requires Federal agencies to consider and address environmental justice by identifying and assessing whether agency actions may have disproportionately high and adverse human health or environmental effects on minority or low-income populations.

The No-Action Alternative would increase the risk of flooding to those living in affected floodplains areas. However although the Snoqualmie valley is home to minority and low-income populations, there is no evidence that they would be disproportionately affected, as many of the structures affected by the action are owned by higher-income, non-minority segments of the population.

The Preferred Alternative would not have a disproportionate or adverse impact on low-income or minority populations, since it would restore pre-existing levels of protection to structures in the floodplain. It is possible that construction would create some economic benefit to the total population, either directly through hiring, or indirectly through local spending by construction personnel, but would not inequitably disadvantage minority or low-income segments of the respective communities..

4.12 Unavoidable Adverse Effects

Unavoidable adverse effects associated with this project include:

- (1) minor temporary increases in river turbidity,

- (2) possible, though unlikely, temporary dislocation of migrating salmon to other parts of the river channel,
- (3) temporary and localized increase in noise, which may disrupt wildlife in the area, as well as causing some disturbance to local residents,
- (4) temporary and localized disruption of, and increase in, local traffic by construction vehicles,
- (5) loss of wildlife habitat due to removal of vegetation within the footprint of the repair, and
- (6) adverse impacts to fish habitat (reduced shade, decreased organic input, lack of refuge) by way of riparian removal

4.13 Mitigation

The following steps would be taken as best management practices and offsetting measures to reduce and/or mitigate the above adverse affects:

- (1) As described in more detail in section 2.2, willow lifts would be planted at sites where work is being done on the face of the levee (Mason-Thorson Ells and Mason-Thorson Extension).
- (2) A mix of deciduous and coniferous trees of at least sapling size (Table 5) would be planted at Three Forks Park along the Middle Fork Snoqualmie to mitigate for loss of vegetation due to the federal action at the Mason Thorson Ells site. Eighty trees would be planted along a total of roughly 300 feet of bank on the south side of the river at King County's Three Forks Park, north of North Bend. This is a roughly 4:1 ratio of planted trees to lost trees, and accounts for some mortality in an attempt to achieve in excess of 3:1 replacement. Removal of blackberry and other invasive shrubs would be necessary using manual removal or hired goat grazing. If goat grazing is the selected method, there may be minor and temporary impacts to water quality due to fecal coliform. However, a silt fence would be put in place along the river's edge. Grubbing and planting of the mitigation site would be done in November 2008 through the use of a USACE-initiated contract. The sponsor would commit to watering the plantings as needed for the first two years to better ensure their success.
- (3) The Raging River Bridge to Mouth levee would be set back 15 feet and approximately a 1500-ft² area located in front of the riverward side of the levee would be planted with a mixture of native trees and shrubs including big leaf maple, Douglas fir, Indian plum, willow, and red-osier dogwood (Table 5). Topsoil would be incorporated into the substrate as necessary, depending on its composition.
- (4) A silt fence would be used at the Raging River Bridge to Mouth site to prevent runoff into the river due to rain events.
- (5) At the McElhoe-Pearson site 1, trees and shrubs would be planted parallel to the levee, between the landward face and the extent of O&M easement (30' landward from the riverward crown edge). Species would include big leaf maple, Douglas fir, cedar, and Indian plum (Table 5).
- (6) For work at Mason Thorson Ells and Mason Thorson Extension that is below the OHW mark, turbidity would be monitored downstream of the project. If maximum state water quality standards are exceeded, then construction would be halted and modified such that standards can be met.

- (7) For Mason Thorson Ells and Mason Thorson Extension, in-water work would be avoided to the extent possible, and any in-water work necessary would be completed during the appropriate construction windows established by the Washington Department of Fish and Wildlife. Depending on conditions, best efforts would be made to complete all construction within appropriate construction windows regardless of whether it is in the water.
- (8) The site would be monitored by an Army Corps of Engineers environmental coordinator to ensure no violation of environmental standards or harassment of wildlife, including bald eagles.
- (9) Further actions recommended by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service pursuant to coordination under the Endangered Species Act would be undertaken as described in Sec. 5.1.5.

Table 5. Off-site mitigation plantings planned for Mason Thorson Ells at Three Forks Park, and best management planting measures for McElhoe-Pearson and Raging River Bridge to Mouth.

Common Name	Species Name	McElhoe-Pearson	Raging River Bridge to Mouth	Mason Thorson Ells Mitigation ¹
Douglas fir	<i>Pseudotsuga menziesii</i>	7	10	18
Sitka spruce	<i>Picea sitchensis</i>	3	4	10
Big leaf maple	<i>Acer macrophyllum</i>	4	4	30
Cottonwood	<i>Populus trichocarpa</i>	11	15	22
Red-osier dogwood	<i>Cornus stolonifera</i>		8	
Indian plum	<i>Oemleria cerasiformis</i>		8	
Snowberry	<i>Symphoricarpos alba</i>		11	

¹ Plantings based on a 6,700 ft² area as calculated by King County Habitat Restoration Plan found at: <http://dnr.metrokc.gov/wlr/cposa/shrp/assist.htm>

4.14 Cumulative Effects

By 1936 most of the wetland and forest in the Snoqualmie valley had been converted to agriculture. Between 1936 and 2000 there have been minor changes in landscape mostly due to suburban development. As of 2000 only about 1,500 hectares of the original 45,000 hectares of forest and wetland remained in the valley (King County, 2008). Most of this farmland falls within the floodplain and is therefore subject to periodic flooding. This flooding provoked the diking of the river as early as the turn of the century. Presently, from the mouth of the Snoqualmie River to the base of Snoqualmie Falls approximately 80% of the riverbanks are lined with either levees or revetments. From the top of Snoqualmie Falls to the town of North Bend, a few river miles up the South Fork, approximately 90% of the banks are lined with levees. Above the town of North Bend there is another ten miles or so of levees on the Middle and South forks. Many of the tributaries of the Snoqualmie River are lined with levees as well. Periodic repairs of these levees are expected to continue into the future as the river continues to erode them. Approximately 60% of the banks of the Snoqualmie and Snohomish rivers have no riparian vegetation other than grass, or have a riparian buffer that is only one tree wide. In the Snohomish basin as a whole, almost 30% of the floodplain tributaries have been channelized (King County, 2008). The levee systems were built decades ago by non-Federal parties, and are each presently maintained by King County.

The majority of this system, excluding the headwaters, is confined to narrow channels completely disconnected from the floodplain and devoid of the natural complexity characteristic of alluvial processes and morphology. Because of these alterations of the system, the aquatic and terrestrial organisms inhabiting the area, whose life history is dependent upon complex riverine processes, have likely suffered major negative habitat impacts. Most of the rivers in both the Puget Sound basin and western Washington, including the Green-Duwamish and Skagit watersheds, have the majority of their banks lined with dikes, levees, and/ revetments as well. All of these systems host listed species of fish either as migration corridors, foraging habitat, and/or spawning areas, and have undergone serious impacts due to flood control practices. This is relevant as it highlights the widespread habitat impacts faced by threatened Puget Sound Chinook, Puget Sound steelhead, and Puget Sound bull trout.

Notwithstanding the fact that the Corps did not construct many of the levee systems in western Washington, Federal assistance is provided through the Corps to repair and rehabilitate damaged sections. One of the prerequisites to receipt of this Federal assistance is meeting published Corps standards of levee maintenance. In 2005, the Corps inspected these four levee systems and found them each to have marginally satisfactory rating elements due to profusion of vegetation, resulting in each of these levee systems being rated as “minimally acceptable” overall. Pursuant to Corps policy, King County was notified that it then had one year to correct the marginally satisfactory elements in order to remain on “active” status and thus eligible for Federal rehabilitation assistance. King County did not meet the applicable standards within the specified deadline to assure eligibility of these four levee systems by the time of the November 2006 floods. Nevertheless, the Corps elected to exercise its discretion to extend that deadline until the date that rehabilitation activities in each of the four damaged segments is complete. Thus, in order to establish and maintain eligibility for this suite of four rehabilitation efforts, and for Federal rehabilitation efforts in the future, King County must bring them up to the Corps’ levee vegetation requirements as reflected in a regional variance, promulgated by the Corps’ Seattle District, to the national standard before the completion of construction. The County has indicated its intention to bring all four levee systems on which rehabilitation of damaged sections will be conducted, to a condition meeting the Corps’ eligibility standards by fall 2008. If the County retracts this statement of intention, the Corps would not proceed with the proposed Federal rehabilitation effort on the applicable damaged segment(s). Thus, for each of the four levee segments on which rehabilitation would be conducted, King County is expected to remove many large trees and other vegetation from these levees either shortly prior to or contemporaneous with the Federal work. The Corps revisited its levee system inspection in March 2008, and identified for King County the existing trees and other vegetation that were larger than specified in the Corps’ Federal assistance eligibility standards (no larger than 4 inches diameter at breast height, or dbh), as shown in Table 6. Deciduous trees identified for removal are mainly alder and cottonwood. Conifers are mostly cedar and Douglas fir. Removal would be accomplished by cutting near ground level.

Table 6. Site-specific tree removal recommendations for non-federal maintenance of Snoqualmie basin levees, including repair areas.

<i>Site</i>	<i>Trees for removal</i>		<i>Linear Extent of tree removal (ft)</i>	
	<i>Deciduous</i>	<i>Coniferous</i>	<i>Total levee length</i>	<i>Repair length (% of total levee)</i>
Raging R. Bridge to Mouth	21	0	2376	100 (4%)
McElhoe-Pearson	18	1	2376	750 (32%)
Mason Thorson Extension	3	0	1056	150 (14%)
Mason Thorson Ells	22	2	1637	400 (24%)

Other than the trees identified by the Corps as exceeding the maximum regional variance standards, no additional vegetation removal is anticipated. Site-specific impacts resulting from the cumulative impacts of vegetation removal to be undertaken by King County and the federal actions are as follows:

Raging River Bridge to Mouth. The majority of the trees lining the river along this levee system are marked to be removed in the course of maintenance by King County. Some are mature and quite tall, providing a substantial amount of shade and organic input to one of the most productive spawning areas in the Snoqualmie system. The trees also provide habitat to terrestrial animals. In contrast, no vegetation would be removed by the Corps along this levee reach.

McElhoe-Pearson. The trees to be removed by King County along this levee reach are on both the landward and riverward sides of the levee. These trees provide habitat to terrestrial mammals and birds, and they provide shade and organic input to the stream. However, the vast majority of the trees on this levee are small, and would remain as they are. No trees would be removed by the Corps.

Mason Thorson Extension. Very little vegetation would be removed by King County or Corps; therefore, impacts to habitat, shade, refuge, and organic input are expected to be insignificant.

Mason Thorson Ells. Of the trees that are to be removed from this levee reach, 45% would be removed from the repair site due to the Corps' action and 55% would be removed from the levee reach in the course of King County maintenance. These trees are located on both the landward and riverward sides of the levees providing shade, refuge, and organic input to the stream. These trees also provide habitat and migration corridors to terrestrial animals.

Pentec Environmental and NW GIS (1999) documented that two of the top four conditions limiting the freshwater production and survival of salmonids in the basin were: 1) a reduction of rearing and high-flow refuge habitat (relative to natural conditions) in side channels, sloughs, abandoned oxbows connected to the main channels, and flood-plain tributaries resulting from channel alteration, diking, and construction of fish passage barriers, and 2) a shortage of woody debris, shade, and cover in flood-plain tributaries and rivers resulting from loss of riparian forest.

Both of these conditions may be exacerbated by the removal or alteration of riparian habitat by the Corps and the sponsor, King County, from the levees in need of repair.

Maintenance of levee vegetation is also expected to occur every three years by the sponsor, King County. Maintenance would consist of removing vegetation that does not fall within the variance established by the Seattle District. Taking into account the habitat effects of tree removal, including the temperature concerns on the Middle Fork attributed to lack of shade and its effect on the mainstem (see Section 4.2.1), as well as the loss of habitat, refuge, and organic input, the incremental effect of Federal tree removal would not be a significant contribution to the cumulative impacts of vegetation loss. The Federal project would result in removal of only 45 trees plus shrubbery along 1,400 lf of levee, in contrast to the overall effects of past and contemporaneous vegetation removal along over 7,400 lf of levee reaches of which the sections to be repaired are a part. The additive effect of the Federal vegetation removal action is less than significant, especially when considered in conjunction with the 1,100 lf of willow and/or red-osier dogwood lifts that will be installed. One hundred thirteen deciduous trees and 52 coniferous trees would be incorporated on-site and planted in off-site riparian locations during the Federal project.

Local municipalities are projected to continue recent growth patterns. Housing construction has accelerated in the project area as local towns increasingly serve as “bedroom communities” within the Seattle metropolitan commuting area. This may be moderated by a falling housing market in the short term. However, in the long term, the effects of growth are expected to be exacerbated by encouragement of floodplain development which is facilitated by levee repair unless County controls are implemented to check this development. The effects would include continued loss of habitat as construction occurs along rivers, with consequent removal of riparian vegetation, which is often replaced by lawns and landscaping. The incremental effect of the levee repair projects is not clear. However the development-inducing effect of 1,400 lf of levee repair is not expected to significantly contribute to overall development in the Snoqualmie basin region.

5.0 COMPLIANCE WITH LAWS, REGULATIONS AND EXECUTIVE ORDERS

5.1 Federal Statutes

5.1.1 American Indian Religious Freedom Act

The American Indian Religious Freedom Act of 1978 (AIRFA) (42 U.S.C. 1996) establishes protection and preservation of Native Americans’ rights of freedom of belief, expression, and exercise of traditional religions. Courts have interpreted AIRFA to mean that public officials must consider Native Americans’ interests before undertaking actions that might impact their religious practices, including impact on sacred sites.

No alternative is expected to have any effect upon Native Americans' rights of freedom of belief, expression, and exercise of traditional religions. There are no known cultural resources sites, at the project location.

5.1.2 Bald and Golden Eagle Protection Act

The BGEPA (16 U.S.C. 668-668d) prohibits the taking, possession or commerce of bald and golden eagles, except under certain circumstances. Amendments in 1972 added to penalties for violations of the act or related regulations.

No take of either bald or golden eagles is likely through any of the actions discussed in this EA; since there are no known nests near any of the work locations. However, if nests are observed, consultation with the US Fish and Wildlife Service would occur and, depending on their advice, construction may be halted until the young fledge.

5.1.3 Clean Air Act

The Clean Air Act (CAA) (42 U.S.C. 7401 et seq.), amended in 1977 and 1990, was established "to protect and enhance the quality of the nation's air resources so as to promote public health and welfare and the productive capacity of its population." The CAA authorizes the EPA to establish the National Ambient Air Quality Standards to protect public health and the environment. The CAA establishes emission standards for stationary sources, volatile organic compound emissions, hazardous air pollutants, and vehicles and other mobile sources. The CAA also requires the states to develop implementation plans applicable to particular industrial sources.

This EA analyzes effects on air quality from the two alternatives; effects would be minimal, the project is exempted from the conformity requirements of the CAA because it would not exceed *de minimis* levels of emissions.

5.1.4 Coastal Zone Management Act

Under the Coastal Zone Management Act of 1972 (16 USCA 1451-1465), Sec. 307(c)(1)(A), "[e]ach Federal agency activity within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State management programs."

King County is considered coastal under the CZMA. This project, including planned mitigation measures, has been determined to be consistent with the King County Shoreline Management Plan (see Appendix B). The determination of consistency is further confirmed through analogy to the provisions of the regional conditions under Nationwide Permit 3 pursuant to the Corps of Engineers' Clean Water Act Section 404 permitting program. The regional conditions under NWP 3 provide that the State of Washington has predetermined its concurrence that a levee rehabilitation project meeting NWP 3 parameters is consistent with the State's coastal management program as long as individual review under CWA Section 401 is not triggered. Because the Snoqualmie River rehabilitation projects are either non-jurisdictional, or are exempt from the application of CWA Section 404 under 33 U.S. Code Section 1344(f)(1)(B), and because they fall within the parameters of NWP 3, the projects are not subject to State

certification under Section 401. The consequent State predetermination of concurrence with a conclusion of consistency provides extrinsic validation for the Corps' analysis

5.1.5 Endangered Species Act

This ESA (16 U.S.C. 1531-1544), amended in 1988, establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants and the habitat upon which they depend. Section 7(a) of the ESA requires that Federal agencies consult with the USFWS and NOAA Fisheries, as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or to adversely modify or destroy their critical habitats.

The EA, and embedded language on effects determinations concerning species listed or proposed for listing under the Endangered Species Act, addresses effects on those species and their critical habitat. Formal consultation under Sec. 7 with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (NOAA Fisheries) was initiated through the submission of a Biological Assessment on June 17, 2008.

Due to the urgent nature of completing this rehabilitation project prior to the oncoming flood season, the Corps may proceed with construction prior to completion of the consultation with the Services pursuant to the "emergency circumstances" provisions of the ESA consultation regulation, and complete ESA consultation after the fact rather than delaying the urgent work in order to complete ESA consultation before construction begins. The applicable regulation is set out at 50 CFR Section 402.05 (a) and (b) and provides as follows:

- (a) Where emergency circumstances mandate the need to consult in an expedited manner, consultation may be conducted informally through alternative procedures that the Director determines to be consistent with the requirements of section 7(a)-(d) of the Act. This provision applies to situations involving acts of God, disasters, casualties, national defense or security emergencies, etc.
- (b) Formal consultation shall be initiated as soon as practicable after the emergency is under control. The Federal agency shall submit information on the nature of the emergency actions(s), the justification for expedited consultation, and the impacts to endangered or threatened species and their habitats. The Service will evaluate such information and issue a biological opinion including the information and recommendations given during emergency consultation.

Though consultation is not complete, the Corps has reached an agency determination, based on the best factual and technical information available at the time of decision, and following preliminary coordination with the Services, that the impacts are *not likely to adversely affect* ESA-listed species at Mason Thorson Extension, McElhoe-Pearson, and Raging River Bridge to Mouth, and *likely to adversely affect* ESA-listed species at Mason Thorson Ells. The Corps believes that this work *is not likely to jeopardize* the continued existence of the listed species, by reducing appreciably the likelihood of either the survival or recovery of the listed species; nor does the work constitute an adverse modification of critical habitat.

The Corps will also commit to fully funding and performing all Reasonable and Prudent Alternatives necessary to avoid the likelihood of jeopardy to listed species or destruction or adverse modification of designated critical habitat, as well as Reasonable and Prudent Measures (RPMs) necessary and appropriate to minimize the impact of Incidental Take, that are described if a Biological Opinion is received from the Services. The Environmental Assessment will be reevaluated at the time that consultation is complete. If necessary, this EA will be supplemented with necessary and applicable corresponding modifications to the scope and/or nature of the project, the procedures and practices used to implement the project, and/or the type and extent of compensatory mitigation associated with the project.

5.1.6 Federal Water Pollution Control Act

The Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.) is more commonly referred to as the Clean Water Act (CWA). This act is the primary legislative vehicle for Federal water pollution control programs and the basic structure for regulating discharges of pollutants into waters of the United States. The CWA was established to “restore and maintain the chemical, physical, and biological integrity of the nation’s waters.” The CWA sets goals to eliminate discharges of pollutants into navigable waters, protect fish and wildlife, and prohibit the discharge of toxic pollutants in quantities that could adversely affect the environment.

This EA evaluates possible impacts to water quality, primarily with respect to suspended solids, turbidity and temperature. There are no other water quality effects anticipated. The project is exempt per Section 404(f)(1)(B) of the Clean Water Act, which allows for emergency reconstruction of recently damaged parts of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, bridge abutments or approaches, and transportation structures. For each of the four rehabilitation sites, the proposed work would not result in changes to the character, scope, or size of the original fill design in a manner that affects the waters of the U.S., and would occur within a reasonable period of time after damage occurred. During the February 21, 2008 site visit, the Corps concluded that no jurisdictional wetlands are present along the riverward toe, face, crown, or landward slope of the respective levees where repair would occur, and no wetlands would thus be impacted as a result of this project. Because no work subject to Section 404 regulation is being conducted, a Section 401 certification is not required.

5.1.7 Federal Water Project Recreation Act

In the planning of any Federal navigation, flood control, reclamation, or water resources project, the Federal Water Project Recreation Act, as amended (16 U.S.C. 460(l) (12) et seq.) requires that full consideration be given to the opportunities that the project affords for outdoor recreation and fish and wildlife enhancement. The Act requires planning with respect to development of recreation potential. Projects must be constructed, maintained, and operated in such a manner if recreational opportunities are consistent with the purpose of the project.

This EA assesses impacts of alternative actions on recreation, but the proposed actions are not intended to provide recreational benefits.

5.1.8 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), (16 U.S.C. 1801 et. seq.) requires Federal agencies to consult with NMFS on activities that may adversely affect Essential Fish Habitat (EFH). The objective of an EFH assessment is to determine whether or not the proposed action(s) “may adversely affect” designated EFH for relevant commercial, federally-managed fisheries species within the proposed action area. The assessment also describes conservation measures proposed to avoid, minimize, or otherwise offset potential adverse effects to designated EFH resulting from the proposed action.

Effects on EFH are considered in this EA. The Corps has initiated consultation with NMFS on the effects to EFH in conjunction with consultation under Section 7 of the Endangered Species Act.

5.1.9 National Environmental Policy Act

The NEPA (42 U.S.C. 4321 et seq.) provides a commitment that Federal agencies will consider the environmental effects of their actions. It also requires that an EIS be included in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment. The EIS must provide detailed information regarding the proposed action and alternatives, the environmental impacts of the alternatives, appropriate mitigation measures, and any adverse environmental impacts that cannot be avoided if the proposal is implemented. Agencies are required to demonstrate that these factors have been considered by decisionmakers prior to undertaking actions. Major Federal actions determined not to have a significant effect on the quality of the human environment are evaluated through an EA. This EA has been undertaken specifically in pursuit of NEPA. As of the date of finalization of this EA, consultation under Section 7 remains incomplete. The Preferred Alternative would nevertheless proceed in light of the urgent need for the repair work, pursuant to the “emergency circumstances” provisions of the ESA consultation regulation. The Environmental Assessment would be reevaluated at the time that consultation is complete. If necessary, this EA would be supplemented with necessary and applicable corresponding modifications to the scope and/or nature of the project, the procedures and practices used to implement the project, and/or the type and extent of compensatory mitigation associated with the project.

5.1.10 National Historic Preservation Act

Section 106 of the NHPA (16 U.S.C. 470) requires that Federal agencies evaluate the effects of Federal undertakings on historical, archeological, and cultural resources and afford the Advisory Council on Historic Preservation opportunities to comment on the proposed undertaking. The lead agency must examine whether feasible alternatives exist that would avoid eligible cultural resources. If an effect cannot reasonably be avoided, measures must be taken to minimize or mitigate potential adverse effects.

An evaluation was conducted, and is referenced in this document. Coordination has taken place with affected tribes and with the Washington Dept. of Archeological and Historic Preservation. No archeological resources have been identified in the project area. The Corps prepared a Section 106 compliance report and submitted it via letter dated June 13, 2008, to the Washington State Historic Preservation Officer (SHPO), requesting that the SHPO concur with a

determination of No Historic Properties Affected for the four proposed 2008 Snoqualmie levee rehabilitation projects. No archaeological monitoring is recommended at any of the repair sites. In a letter dated June 16, 2008, the SHPO concurred with the Corps' determination. See Appendix C.

If, during construction activities, the Contractor observes items that might have historical or archeological value, such observations shall be reported immediately to the Corps construction supervisor 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.

5.1.11 Rivers and Harbors Act of 1899

The Rivers and Harbors Act of 1899 regulates structures or work in or affecting navigable waters of the United States including discharges of dredged or fill material into waters of the United States. Structures include without limitation, any pier, boat dock, weir, revetment, artificial islands, piling, aid to navigation or any other obstacle or obstruction.

This action is not in a navigable waterway, and thus does not fall under Sec. 10, concerning construction in navigable waters.

5.2 Executive Orders

5.2.1 Executive Order 11990, Protection of Wetlands

Executive Order 11990 encourages Federal agencies to take actions to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands when undertaking Federal activities and programs.

This EA concludes that the project would have no effect on wetlands.

5.2.2 Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order 12898, dated February 11, 1994, requires Federal agencies to consider and address environmental justice by identifying and assessing whether agency actions may have disproportionately high and adverse human health or environmental effects on minority or low-income populations. Disproportionately high and adverse effects are those effects that are predominantly borne by minority and/or low-income populations and are appreciably more severe or greater in magnitude than the effects on non-minority or non-low income populations.

This EA addresses environmental justice effects of the alternatives it evaluates.

6.0 CONCLUSION

Based on the above analysis, this project is not a major Federal action significantly affecting the quality of the human or natural environment, and therefore does not require preparation of an environmental impact statement. Because this project would be undertaken pursuant to the “emergency circumstances” provision of the ESA implementing regulations, and consultation is not yet complete, this Environmental Assessment will be reevaluated when consultation is complete and the EA will be supplemented, and the FONSI modified, as necessary and appropriate in light of the conclusions of the consultation process.

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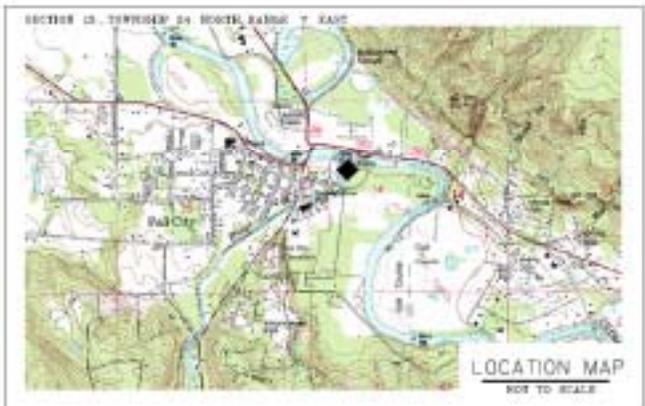
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Ron Kent, Archeologist, US Army Corps of Engineers

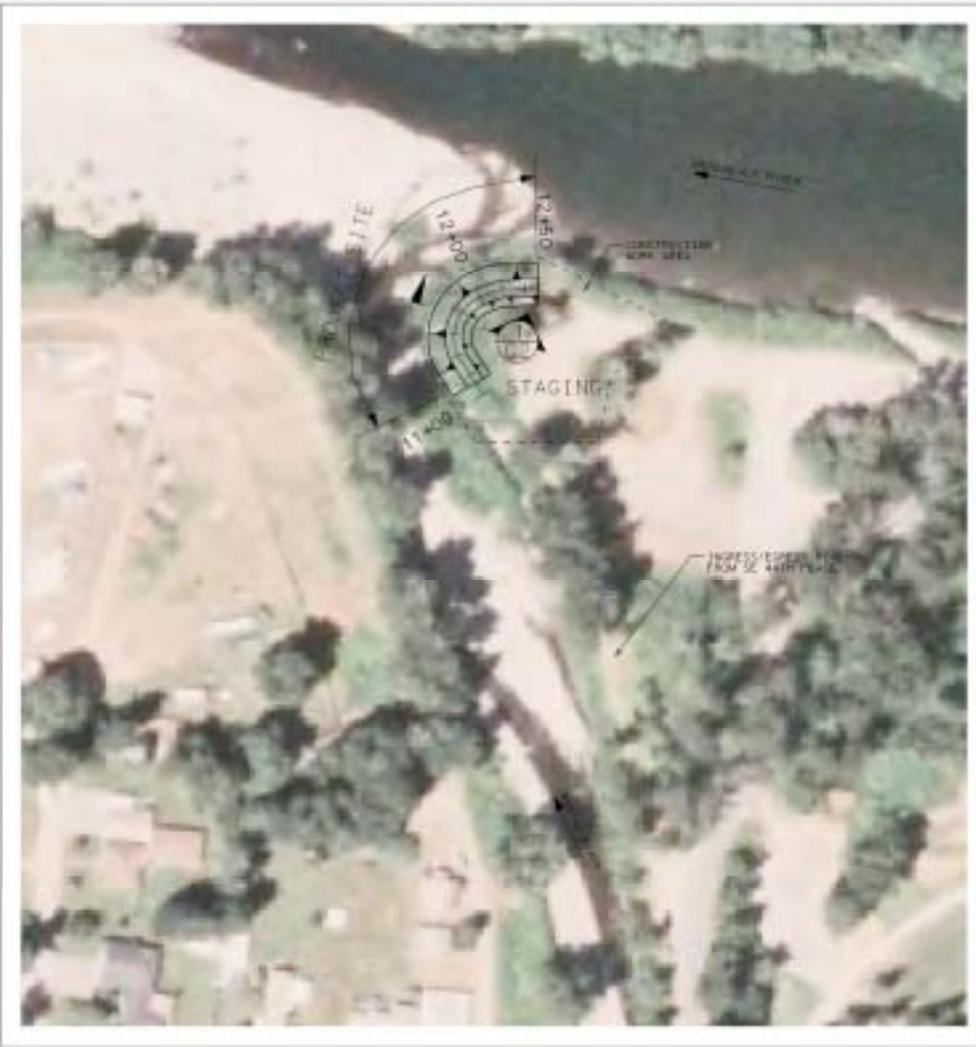
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APPENDIX A: Project Drawings

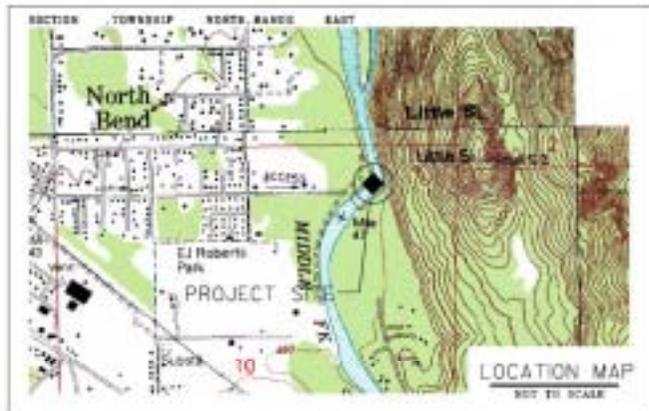


GENERAL NOTES

1. CONSTRUCTOR SHALL DEFEND, INDEMNIFY AND HOLD THE U.S. ARMY CORPS OF ENGINEERS (USACE) AND THE ARCHITECT/ENGINEER (A/E) HARMLESS FROM AND FOR ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPT FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE A/E OR THE ARCHITECT/ENGINEER.
2. THE PLANS AND TYPICAL CROSS SECTIONS SHOWN ON THESE DRAWINGS WERE DEVELOPED AT A PLANNING LEVEL FOR THE PURPOSES OF ESTIMATING THE APPROXIMATE QUANTITIES AND COSTS FOR RESTORING EXISTING LEAVES TO PRE-FLOOD CONDITION. THEY ARE NOT INTENDED FOR CONSTRUCTION WITHOUT DIRECTION AND SUPERVISION BY A QUALIFIED FIELD ENGINEER.
3. EXISTING CONDITIONS SHOWN ON THESE DRAWINGS ARE BASED ON AVAILABLE INFORMATION AND AERIAL PHOTO RECONNAISSANCE. SITE VISITS WERE NOT WITHIN THE SCOPE OF WORK FOR THIS PROJECT AND WERE NOT PERFORMED. UNLESS SPECIFIC NOTATIONS AND CHECKS ARE APPROVATE AND PROVED BY FIELD VISITS BY THE OWNER OR CONTRACTOR PRIOR TO CONSTRUCTION, GEOLOGICAL INVESTIGATIONS AND DETAILED ANALYSES FOR HYDRAULICS, SOIL MECHANICS, STABILITY, OR SOILS/ROCK MASS INTEGRITY WERE NOT WITHIN THE SCOPE OF WORK FOR THIS PROJECT AND WERE NOT PERFORMED.
4. THE EXISTENCE OR LOCATION OF UTILITIES (INCLUDING GAS, ELECTRIC, WATER, SEWER, PHONE, CABLE, FIBER OPTIC, ETC.) HAVE NOT BEEN INVESTIGATED. IT WILL BE THE RESPONSIBILITY OF THE OWNER OR THE CONTRACTOR TO IDENTIFY, LOCATE, AND PROTECT ALL UTILITIES.
5. EXISTING STRUCTURES INCLUDING HOMES, GARAGES, SHEDS, BENT PILES, ETC. HAVE NOT BEEN LOCATED AND ARE NOT SHOWN ON THE DRAWINGS. IT WILL BE THE RESPONSIBILITY OF THE OWNER OR THE CONTRACTOR TO IDENTIFY, LOCATE, AND PROTECT ALL STRUCTURES ON OR ADJACENT TO THE PROJECT SITE.



211 21st Street Everett, WA 98201 Phone: 425.336.7200	
PROJECT NO. 17-01-001	SHEET NO. 17-01-001-001
DATE: 08/14/2017	SCALE: AS SHOWN
PROJECT: BRIDGE TO MOUTH - RB	LOCATION MAP
U.S. ARMY CORPS OF ENGINEERS CORPS OF ENGINEERS BRIDGE DIVISION WALL, WA	EXTRA TECH BRIDGE DIVISION
PROJECT INFORMATION SHEET PL. 17-01-001-001	BRIDGE TO MOUTH - RB LOCATION MAP 17-01-001-001
PLAN NUMBER: C1	SHEET 01 OF 02



GENERAL NOTES

1. CONTRACTOR SHALL OBTAIN, INDEMNIFY AND HOLD THE U.S. ARMY CORPS OF ENGINEERS (USACE) AND THE ARCHITECT/ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPT FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE ARCHITECT/ENGINEER.
2. THE PLANS AND TYPICAL CROSS SECTIONS SHOWN ON THESE DRAWINGS WERE DEVELOPED AT A PLANNING LEVEL FOR THE PURPOSES OF ESTIMATING THE APPROXIMATE QUANTITIES AND COSTS FOR RESTORING EXISTING WORK TO PRE-FLOOD CONDITIONS. THEY ARE NOT INTENDED FOR CONSTRUCTION WITHOUT DIRECTION AND SUPERVISION BY A QUALIFIED FIELD ENGINEER.
3. EXISTING CONDITIONS SHOWN ON THESE DRAWINGS ARE BASED ON AVAILABLE INFORMATION AND SUBJECT TO FIELD RECONNAISSANCE. SITE CONDITIONS WHICH MAY WITHIN THE SCOPE OF WORK FOR THIS PROJECT AND WERE NOT RECORDED, STABILIZED, OR TREATED, AND WHICH ARE APPROPRIATE AND SHOULD BE FIELD VERIFIED BY THE OWNER OR CONTRACTOR PRIOR TO CONSTRUCTION. GEOTECHNICAL INVESTIGATIONS AND DETAILED ANALYSIS FOR HYDRAULICS, SOIL MECHANICS, STABILITY, OR STRUCTURAL INTEGRITY WERE NOT WITHIN THE SCOPE OF WORK FOR THIS PROJECT AND WERE NOT PERFORMED.
4. THE EXISTENCE OR LOCATION OF UTILITIES INCLUDING GAS, ELECTRIC, WATER, SEWER, PHONE, CABLE, FIBER OPTIC, ETC., HAVE NOT BEEN INVESTIGATED. IT WILL BE THE RESPONSIBILITY OF THE OWNER OR THE CONTRACTOR TO IDENTIFY, LOCATE, AND PROTECT ALL UTILITIES.
5. EXISTING STRUCTURES INCLUDING HOUSES, GARAGES, SHEDS, BOAT DOCKS, ETC HAVE NOT BEEN LOCATED AND ARE NOT SHOWN ON THE DRAWINGS. IT WILL BE THE RESPONSIBILITY OF THE OWNER OR THE CONTRACTOR TO IDENTIFY, LOCATE, AND PROTECT ALL STRUCTURES ON OR ADJACENT TO THE PROJECT SITE.

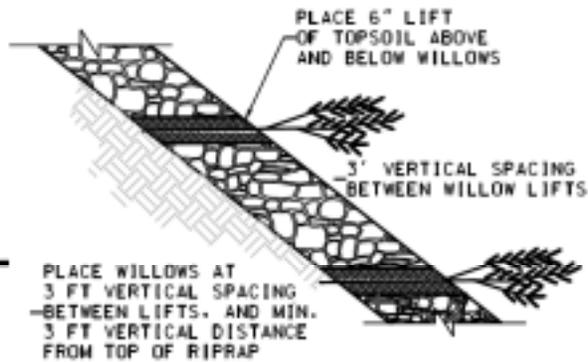


PROJECT NO.	17-17
DATE	10/20/17
DESIGNED BY	TECHNICAL STAFF
CHECKED BY	TECHNICAL STAFF
DATE	10/20/17
PROJECT NO.	17-17
DATE	10/20/17
DESIGNED BY	TECHNICAL STAFF
CHECKED BY	TECHNICAL STAFF
DATE	10/20/17

PROJECT NUMBER: 17-17
 PROJECT NAME: MASON THORSON ELLS LEVEE
 SHEET NO. OF 02

GENERAL NOTES

1. DIMENSIONS AND FOOTPRINT APPROXIMATE AND SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION.
2. BULK VOLUME OF CLASS V ALONG TOE BY A MINIMUM OF 50% IF UNDERWATER PLACEMENT IS ENCOUNTERED.
3. GRANULAR FILTER FOR RIPRAP BEDDING MAY BE NECESSARY IF IN-SITU MATERIALS ARE NOT ACCEPTABLE.
4. DISPOSE OF EARTHEN MATERIAL ALONG LANDWARD SLOPE. DEPTH NOT TO EXCEED 1 FOOT.
5. PRESERVE AND PROTECT EXISTING VEGETATION TO THE EXTENT PRACTICAL.

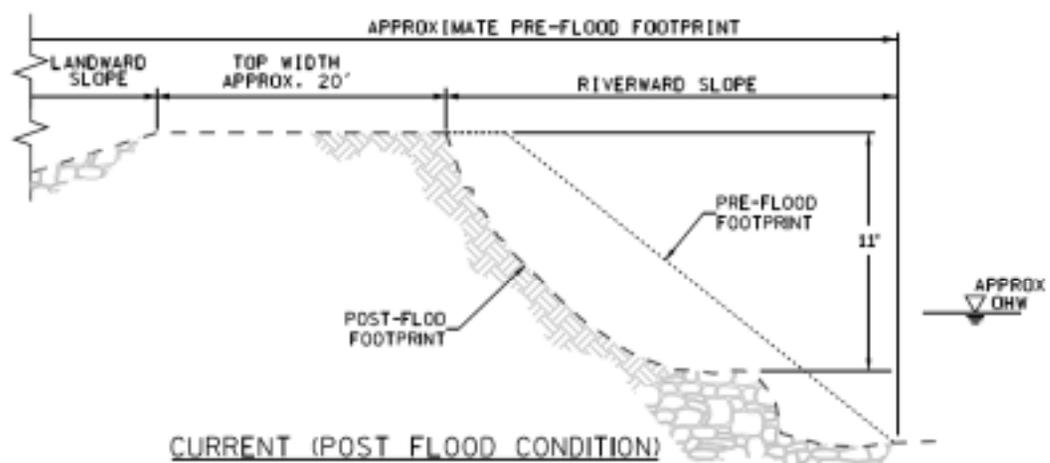


WILLOW LIFT PLANTING SECTION
NOT TO SCALE

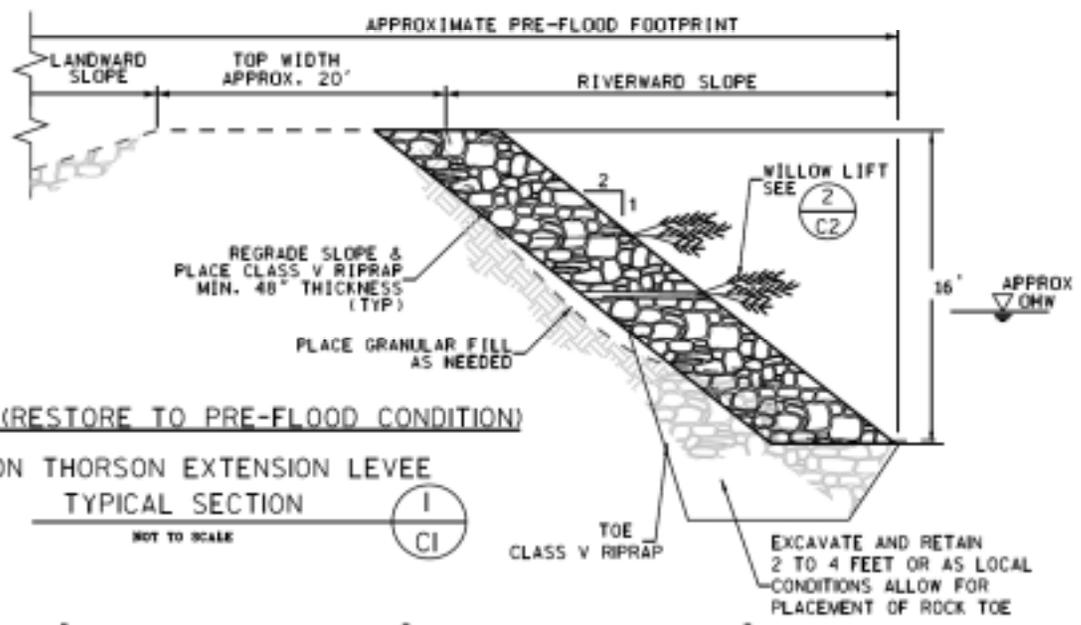
2
C2

CLASS V RIPRAP GRADATION
MIN. THICKNESS = 48"

PERCENT FINER	WEIGHT (LBS)
100	1800
50	750
10	25-350



CURRENT (POST FLOOD CONDITION)



PROPOSED (RESTORE TO PRE-FLOOD CONDITION)

MASON THORSON EXTENSION LEVEE TYPICAL SECTION
NOT TO SCALE

1
C1

STATE OF OREGON
 DEPARTMENT OF TRANSPORTATION
 PROJECT NUMBER: 2011-01-001
 DRAWING NUMBER: MTE-EXT-TYPICAL-SECTION
 SHEET NUMBER: C2
 DATE: 08/14/11
 DESIGNER: MASON THORSON
 CHECKER: MASON THORSON
 APPROVED: MASON THORSON
 TITLE: MASON THORSON EXTENSION LEVEE TYPICAL SECTIONS
 COUNTY: WASHINGTON

APPENDIX B: Coastal Zone Consistency Determination

COASTAL ZONE MANAGEMENT ACT CONSISTENCY DETERMINATION

Snoqualmie River Levee Rehabilitation Projects, 2008

The rehabilitation actions are activities undertaken by a Federal agency; the following constitutes a federal consistency determination with the enforceable provisions of the Washington Coastal Zone Management Program.

1. Introduction. The proposed Federal action applicable to this consistency determination is the rehabilitation activities on four levee segments along the Snoqualmie River, as described in the Environmental Assessment. This determination of consistency with the Washington Coastal Zone Management Act is based on review of applicable sections of the State of Washington Shoreline Management Program and policies and standards of the King County Shoreline Management Master Program.

The determination of consistency is further confirmed through analogy to the provisions of the regional conditions under Nationwide Permit 3 pursuant to the Corps of Engineers' Clean Water Act Sec. 404 permitting program. The regional conditions under NWP 3 provide that the State of Washington has predetermined its concurrence that a levee rehabilitation project meeting NWP 3 parameters is consistent with the State's coastal management program as long as individual review under CWA Section 401 is not triggered. Because the Snoqualmie River rehabilitation projects are either non-jurisdictional, or are exempt from the application of CWA Section 404 under 33 U.S. Code Section 1344(f)(1)(B), and because they fall within the parameters of NWP 3, the projects are not subject to State certification under Section 401. The consequent State predetermination of concurrence with a conclusion of consistency provides extrinsic validation for the Corps' analysis that follows.

2. State Of Washington Shoreline Management Program. Primary responsibility for implementation of the State of Washington Shoreline Management Act of 1971 has been assigned to local governments. The applicable local government office responsible for King County is the King County Department of Development and Environmental Services.

3. Description of King County Plan. The following outlines pertinent sections of the King County program. The Corps of Engineers consistency determination is indicated in bold italics. Designation criteria for rural, urban, conservancy and natural environments are reproduced at end.

The Corps of Engineers consistency determination is indicated in bold italics. Designation criteria for rural, urban, conservancy and natural environments are reproduced at end.

King County Code (KCC) 25.20.140 states: "**Excavation, dredging and filling.** Excavation, dredging and filling may be permitted in the rural environment subject to the provisions of K.C.C. 25.16.190 of the urban environment provided:

A. Excavation, dredging and filling below the ordinary high water mark shall be permitted only:

1. To serve a water dependent use or when necessary to:
2. Mitigate conditions which endanger public safety or fisheries resources, or..."

Consistent—the project will mitigate conditions which endanger public safety, by repairing levees to their state as of before the November 2006 floods, enabling them to provide the level of protection that they previously provided. Both urban and rural developments will be protected.

KCC 25.16.190 B. states: “Landfill may be permitted below the ordinary high water mark only when necessary for the operation of a water dependent or water related use, or when necessary to mitigate conditions which endanger public safety;

Consistent—the project will mitigate conditions which endanger public safety.

KCC 25.16.190 C. states: “Landfill or excavations shall be permitted only when technical information demonstrates water circulation, littoral drift, aquatic life and water quality will not be substantially impaired;”

Consistent—the effect of the project will not be to substantially impair any of these functions. Water circulation will not be impaired because work in the water will be within the existing footprint of the levee at two sites.(Mason Thorson Ells and Mason Thorson Extension); at the other two sites (McElhoe-Pearson, and Raging River Bridge to Mouth), there is no in-water work planned. Littoral drift will likewise not be impaired. Even with in-water work, clean rock will be individually placed, so no turbidity or suspended solids will result from rock placement; best management practices will be used so that sediment runoff from work areas will be minimized. Some trees will be removed at Mason Thorson Ells. Replanting of willows and red-osier dogwood will occur, but growth will not be fast enough to replace shade from mature trees that helps cool the channel. However, there are other mature trees behind the levee that will still provide some shade while regrowth occurs. And while it has been demonstrated (Svrjcek 2008) that warming of the Snoqualmie River is substantial even in its tributary forks, this project represents only one relatively minor component of that cumulative effect. Aquatic life will be impaired to some small and unmeasurable degree due to the temporary loss of vegetation (including its functions of input of organic matter, nutrients and insects) and shading; we do not consider the effect substantial.

KCC 25.16.190 D. states: “Landfill or disposal of dredged material shall be prohibited within the floodway;”

Consistent— No disposal of dredged material is to occur in a floodway. KCC 21A.06.505 defines Floodway, zero-rise: the channel of a stream and that portion of the adjoining floodplain that is necessary to contain and discharge the base flood flow without any measurable increase in base flood elevation.

A. For the purpose of this definition, "measurable increase in base flood elevation" means a calculated upward rise in the base flood elevation, equal to or greater than 0.01 foot, resulting from a comparison of existing conditions and changed conditions directly attributable to alterations of the topography or any other flow obstructions in the floodplain. "Zero-rise floodway" is broader than that of the FEMA floodway but always includes the FEMA floodway.

B. "Zero-rise floodway" includes the entire floodplain unless a critical areas report demonstrates otherwise. (Ord. 15051 § 55, 2004: Ord. 10870 § 141, 1993).

No disposal of dredged material is to occur in a floodway.

KCC 25.16.190 I. states: “Excavation or dredging below the ordinary high water mark shall be permitted only:

1. When necessary for the operation of a water dependent or water related use, or
2. When necessary to mitigate conditions which endanger public safety or fisheries resources, or...”

Consistent—the project will mitigate conditions which endanger public safety.

Per KCC 25.24.140, “**Excavation, dredging and filling.** Excavation, dredging and filling may be permitted in the conservancy environment, subject to the excavation, dredging and filling provisions in K.C.C. 25.16.190 of the urban environment, provided:

A. Excavation, dredging or filling below the ordinary high water mark shall be permitted only as follows:

1. To mitigate conditions which endanger public safety or fisheries resources;...”

Consistent—the project will mitigate conditions which endanger public safety.

Under KCC 25.28.140, “**Excavation, dredging and filling.** Excavation, dredging, and filling may be permitted in the natural environment subject to the provisions K.C.C. 25.16.190 of the urban environment, provided:

A. Excavation, dredging, or filling below the ordinary high water mark shall be permitted only to mitigate conditions which endanger public safety or fisheries resources;”

Consistent—the project will mitigate conditions which endanger public safety.

[Designation criteria include the following:

KCC 25.16.020, “Designation criteria. Designation criteria for the urban environment shall be:

- A. Shorelines of the state used or designated for high intensity commercial, industrial, or recreational use;
- B. Shorelines of the state of lower intensity use, where surrounding land use is urban and urban services are available;
- C. Shorelines of the state used or designated for multifamily residential development;
- D. Shorelines of the state used for port activities;
- E. Shorelines of the state developed for residential purposes and where surrounding land use is urban and urban services are available;
- F. Shorelines of the state to be designated urban environment shall not have biophysical limitations to development such as floodplains, steep slopes, slide hazard areas and/or marshes, bogs or swamps.

(Ord. 3688 § 402, 1978).”

The Mason Thorson Ells, Mason Thorson Extension, and Raging River Bridge to Mouth sites fall in or near the urban environment.

KCC 25.20.020, “Designation criteria. Designation criteria for the rural environment shall be:

- A. Shorelines of the state possessing high capability to support active agriculture purposes;
- B. Shorelines of the state used or designated for residential development at a density of three units per acre or less;

C. Shorelines of the state used or designated for light manufacturing or neighborhood business type uses;

D. Shorelines of the state developed for residential purposes where surrounding land use is residential in character without all urban services;

E. Shorelines of the state to be designated rural shall not have severe biophysical limitations to development such as floodplains,”

KCC 25.24.020, “Designation criteria. *Designation criteria for the conservancy environment shall be:*

A. Shoreline areas, regardless of the underlying zoning which has biophysical limitations to development which include but are not limited to:

1. Shoreline areas which are one hundred-year floodplains and areas which have flooding potential,

F. Shoreline areas used for low intensity agricultural uses such as range lands and pastures;

H. Areas which play an important part in maintaining the ecological balance of the region such as:

2. Areas important to the maintenance of the natural quality and flow of the water,”

KCC 25.28.020, “Designation criteria. *Designation criteria for the natural environment shall be:*

A. A shoreline area that provides food, water or cover and protection for any rare, endangered or diminishing species;”

Note that the project area includes critical habitat for threatened Puget Sound Chinook salmon, threatened Puget Sound steelhead, and threatened Coastal/Puget Sound bull trout.]

Based on the above evaluation, it is determined that the proposed rehabilitation activities comply with the policies, general conditions, and activities as specified in the King County Shoreline Master Program. The proposed action is considered to be consistent to the maximum extent practicable with the State of Washington Shoreline Management Program and policies and standards of the King County Shoreline Master Program.

APPENDIX C. Tribal and SHPO Coordination



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

Environmental Resources Section

JUN 13 2008

Allyson Brooks, Ph.D.
Director and State Historic Preservation Officer
Department of Archaeology and Historic Preservation
Post Office Box 48343
Olympia, Washington 98504-8343

SUBJECT: Request for Expedited Concurrence on a Determination of No Historic Properties Affected for the Snoqualmie River Levee Rehabilitation Projects

Dear Dr. Brooks:

Please find attached for your review and consideration a cultural resource investigation report for eight proposed U.S. Army Corps of Engineers, Seattle District (Corps) Public Law (PL) 84-99 (33 USCA 701n) Emergency Levee Rehabilitation projects to be constructed in 2008 along the banks of the Snoqualmie and Raging Rivers from the vicinity of North Bend downstream to Carnation, Snohomish County, Washington. King County is the public sponsor. These emergency levee repairs are necessary to correct damage caused by a November 2006 flood event with an estimated discharge greater than 8,910 cubic feet per second (cfs). The flooding was caused by intense rains that were the result of a high velocity jet stream from the southwest that brought warm pockets of moisture to the Northwest, a weather pattern that is often referred to as the Pineapple Express. The proposed repairs are limited to restoring the damaged levee segments to their pre-flood damage condition.

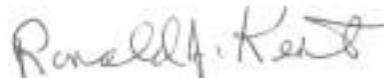
The Area of Potential Effects (APE) for the repairs was defined as the individual repair boundaries, access roads and staging areas. A search of the Washington Department of Archaeology and Historic Preservation (DAHP) Electronic Historic Sites Database, the King County Historic Sites Electronic Database, conducted other background and archival research, and has sent consultation letters to both the Snoqualmie Tribe and the Tulalip Tribes (copies attached to report). No sites listed in the National Register of Historic Places (NRHP) or the State Register or the King County database are located within any of the individual levee repair APEs. During the pedestrian surveys conducted on 10 December 2007, no evidence of prehistoric or early historic-period activities were observed, with the exception of one old cut stump with a spring board notch outside of a repair APE. The Corps' studies presented in the attached report provide documentation that the proposed 2008 repairs have little potential to cause effects to historic properties.

No archaeological monitoring is recommended, but the following inadvertent discovery clause will be incorporated into the construction contract or construction plan:

If during construction activities the Contractor observes items that might have historical or archaeological value, such observations shall be reported immediately to the Corps' Construction Supervisor 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.

Based on the Corps' negative findings we request your expedited concurrence with a determination of No Historic Properties Affected. Some of the individual levee repairs will begin construction on or about Monday 1st of July 2008. We apologize for any inconvenience the expedited review may cause you, but the unusually high number of emergency levee repairs that will be constructed this summer has caused us to fall behind schedule in our Section 106 compliance work. If you have questions concerning the project please contact Katherine Kelly (206) 764-6674 or via e-mail at katherine.m.kelly@usace.army.mil. Copy Furnished (With Enclosure): Mr. Richard Young, Environmental Director, The Tulalip Tribes, 6700 Totem Beach Road, Marysville, WA 98270-9694; Mr. Kelly Kvasniffkov, Snoqualmie Tribe, Cultural Resources, PO Box 280, Carnation, WA 98104.

Sincerely,



Ronald J. Kent
Acting Chief, Environmental Resources Section



STATE OF WASHINGTON

DEPARTMENT OF ARCHAEOLOGY & HISTORIC PRESERVATION

1063 S. Capitol Way, Suite 106 • Olympia, Washington 98501
Mailing address: PO Box 48343 • Olympia, Washington 98504-8343
(360) 586-3065 • Fax Number (360) 586-3067 • Website: www.dahp.wa.gov

June 16, 2008

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

Re: Snoqualmie River Levee Emergency Rehabilitation Project
Log No: 061608-11-COE-S

Dear Mr. Kent:

Thank you for contacting our department. We have reviewed the professional cultural resources survey report you provided for the proposed Snoqualmie River Levee Emergency Rehabilitation Project in King County, Washington.

We concur with your determination of No Historic Properties Affected.

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).

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 department notified.

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. 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



Note that as of the time that letters were sent to the Tribes, there were eight levee repair projects proposed in the Snoqualmie basin; the number has since been reduced to four.



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

Environmental Resource Services

FEB 25 2008

Snoqualmie Tribe
Cultural Resources
Mr. Kelly Kvasniffkov
PO Box 280
Carnation, WA 98104

SUBJECT: Initial Consultation Concerning Eight Levee Rehabilitation Projects on the Snoqualmie and Raging Rivers (Section 106 of the National Historic Preservation Act Compliance)

Dear Mr. Kvasniffkov:

The US Army Corps of Engineers, Seattle District, with King County as the public sponsor, is proposing to repair levee damages at eight sites along the Snoqualmie and Raging Rivers in King County (Figures 1 through 3 attached). The proposed work would begin in July 2008. These eight sites were damaged during flooding that occurred as a result of a "pineapple express" rain event in November 2006. The storm originated in the tropical Pacific Ocean, and included rainfall of 7-13 inches over a 36-hour period in parts of western Washington. A number of river basins and levees in western Washington were affected by flooding.

The Corps has determined that the proposed levee rehabilitations are Federal undertakings that have the potential to cause effects to historic properties and must therefore comply with the procedures set forth within the Seattle District's operating manual (NWSOM 500-1-1, Plans for Natural Disaster Procedures, Emergency Employment of Army and Other Resources, Natural Disaster activities under Public Law-99, Appendix D, Protection of Historic Properties) and Section 106 of the NHPA. The Area of Potential Effects (APE) for the rehabilitation sites consists of the levee segments to be repaired and access roads and staging areas. A search of the Washington State Department of Archaeology and Historic Preservation (DAHP) electronic Historic Sites Inventory Database indicated that there are no sites or structures located within or adjacent to any of the eight repair locations.

To further identify historic properties, Section 106 of the National Historic Preservation Act (NHPA or the Act) of 1966, as amended (36 CFR 800.4[a][3]), requires Federal agencies to seek information from tribes likely to have knowledge of, or concerns with, historic properties within the project's APEs. We are specifically seeking assistance in identifying properties that may be of religious or cultural significance and may be eligible for the National Register of Historic Places (NRHP), including Traditional Cultural Properties (TCP). Specific guidance concerning the Corps' obligation to contact your tribe regarding this issue is found at 36 CFR 800.4(a)(4), which states that the agency official shall:

(4) Gather information from any Indian tribe or Native Hawaiian organization identified pursuant to Sec. 800.3(f) to assist in identifying properties, including those located off tribal lands, which may be of religious and cultural significance to them and may be eligible for the National Register, recognizing that an Indian

tribe or Native Hawaiian organization may be reluctant to divulge specific information regarding the location, nature, and activities associated with such sites. The agency official should address concerns raised about confidentiality pursuant to Sec. 800.11(c).

We appreciate any assistance you can provide us in our efforts to comply with Section 106 of the National Historic Preservation Act. Please be assured that the Corps will treat any information you decide to share with us with the degree of confidentiality that is required in Section 800.11(c) of the Act, or with any other special restrictions you may require. If you have any questions or information concerning the 2008 Snoqualmie and Raging Rivers Levee rehabilitation projects, please contact me at (206) 764-3576, or e-mail me at: (ronald.j.kent@usace.army.mil).

Sincerely,



Ronald J. Kent
Acting Chief, Environmental Resources Section

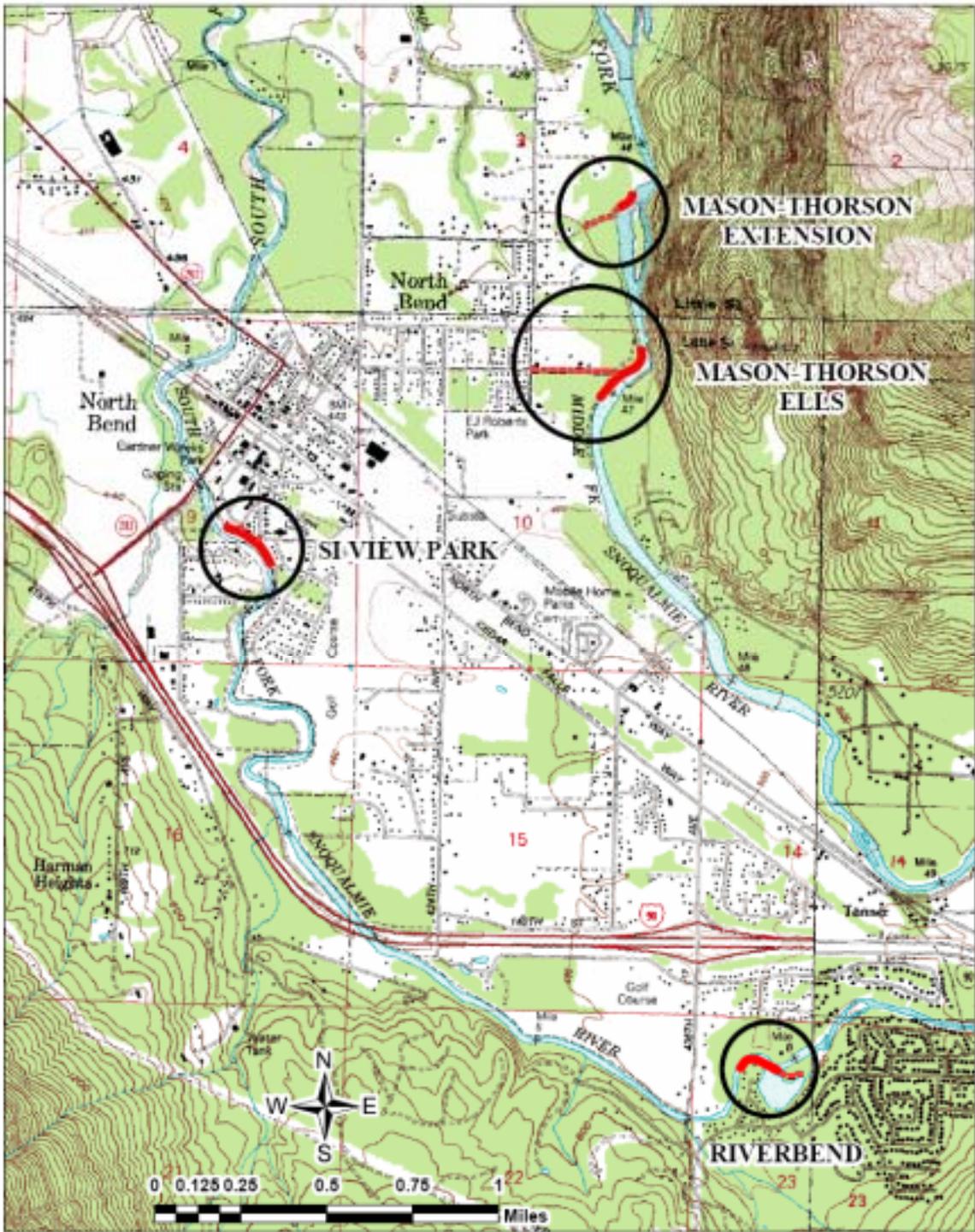


Figure 1. Topographic map showing the Middle Fork of the Snoqualmie River and North Bend area levee repair project locations.

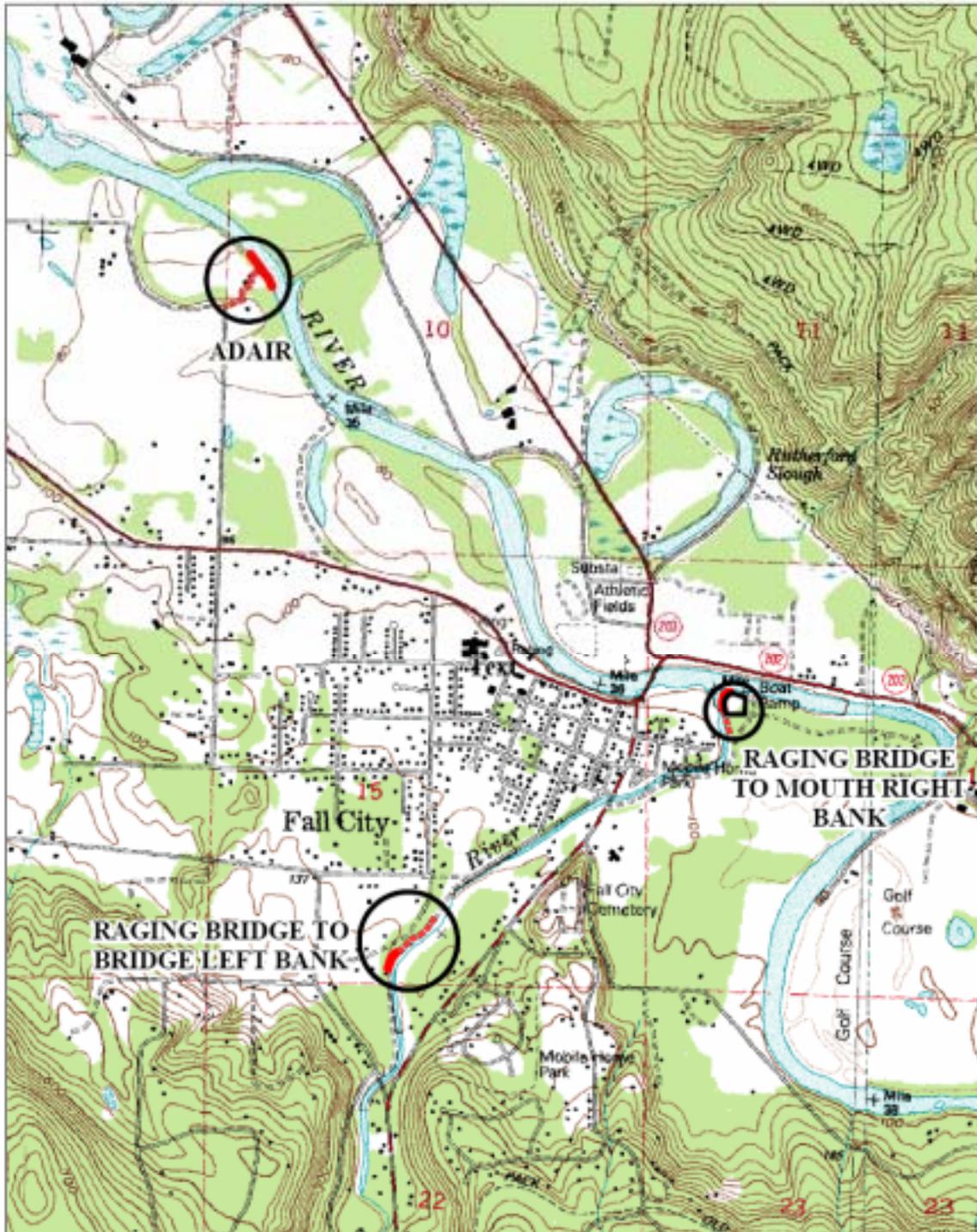


Figure 2. Topographic map showing the Snoqualmie River in the vicinity of Falls City and nearby levee repair project locations. Solid lines are repair sites and dashed are access routes.

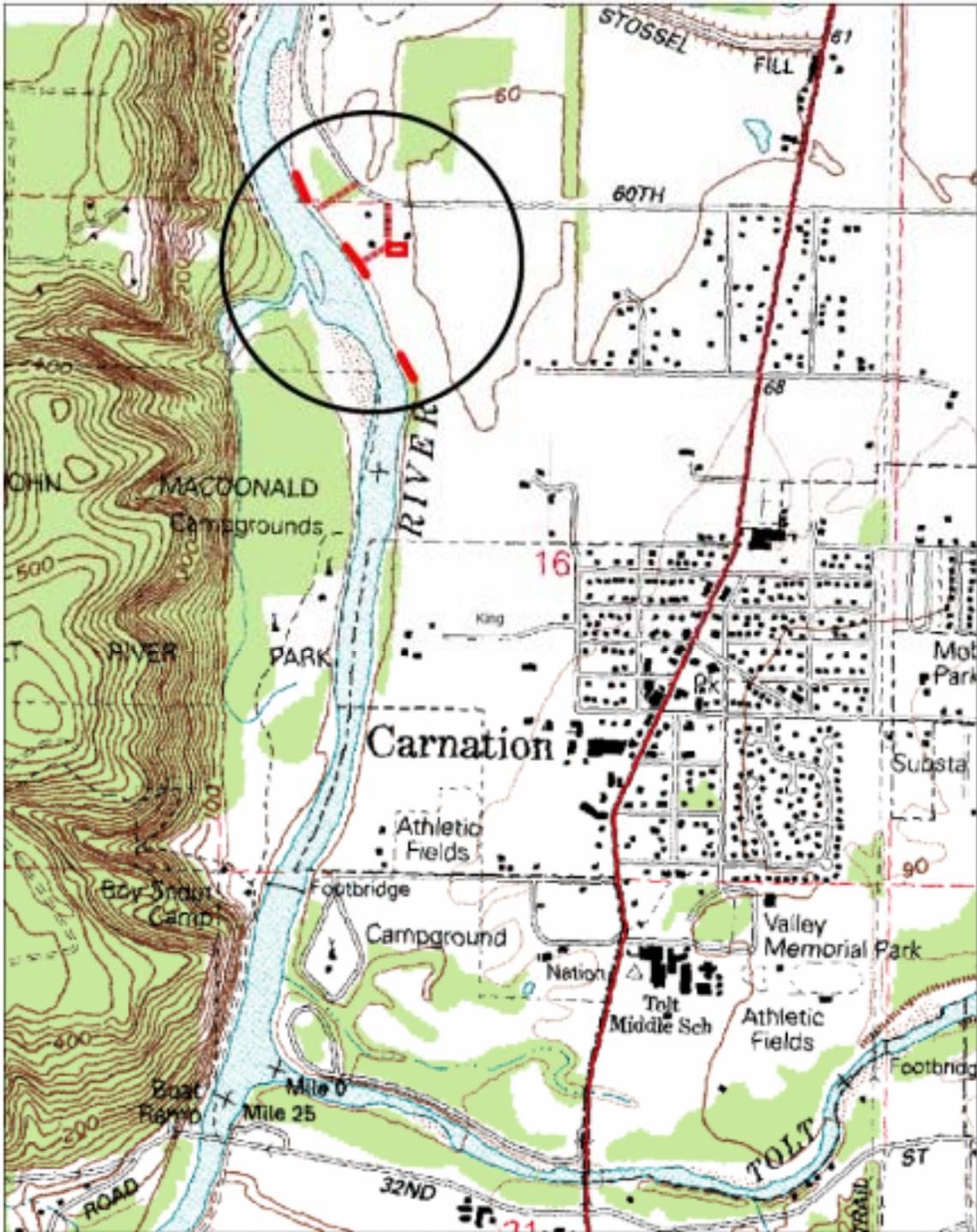


Figure 3. Topographic map showing the Snoqualmie River and Carnation area and the McElhoo Pearson Levee Repair Project location. Solid lines are repair sites, dashed are access routes and solid are staging areas.



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

Environmental Resource Services

Mr. Richard Young, Environmental Director
The Tulalip Tribes
6700 Totem Beach Road
Marysville, WA 98270-9694

FEB 25 2008

SUBJECT: Initial Consultation Concerning Eight Levee Rehabilitation Projects on the Snoqualmie and Raging Rivers (Section 106 of the National Historic Preservation Act Compliance)

Dear Mr. Young:

The US Army Corps of Engineers, Seattle District, with King County as the public sponsor, is proposing to repair levee damages at eight sites along the Snoqualmie and Raging Rivers in King County (Figures 1 through 3 attached). The proposed work would begin in July 2008. These eight sites were damaged during flooding that occurred as a result of a "pineapple express" rain event in November 2006. The storm originated in the tropical Pacific Ocean, and included rainfall of 7-13 inches over a 36-hour period in parts of western Washington. A number of river basins and levees in western Washington were affected by flooding.

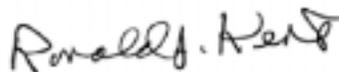
The Corps has determined that the proposed levee rehabilitations are Federal undertakings that have the potential to cause effects to historic properties and must therefore comply with the procedures set forth within the Seattle District's operating manual (NWSOM 500-1-1, Plans for Natural Disaster Procedures, Emergency Employment of Army and Other Resources, Natural Disaster activities under Public Law-99, Appendix D, Protection of Historic Properties) and Section 106 of the NHPA. The Area of Potential Effects (APE) for the rehabilitation sites consists of the levee segments to be repaired and access roads and staging areas. A search of the Washington State Department of Archaeology and Historic Preservation (DAHP) electronic Historic Sites Inventory Database indicated that there are no sites or structures located within or adjacent to any of the eight repair locations.

To further identify historic properties, Section 106 of the National Historic Preservation Act (NHPA or the Act) of 1966, as amended (36 CFR 800.4[a][3]), requires Federal agencies to seek information from tribes likely to have knowledge of, or concerns with, historic properties within the project's APEs. We are specifically seeking assistance in identifying properties that may be of religious or cultural significance and may be eligible for the National Register of Historic Places (NRHP), including Traditional Cultural Properties (TCP). Specific guidance concerning the Corps' obligation to contact your tribe regarding this issue is found at 36 CFR 800.4(a)(4), which states that the agency official shall:

- (4) Gather information from any Indian tribe or Native Hawaiian organization identified pursuant to Sec. 800.3(f) to assist in identifying properties, including those located off tribal lands, which may be of religious and cultural significance to them and may be eligible for the National Register, recognizing that an Indian tribe or Native Hawaiian organization may be reluctant to divulge specific information regarding the location, nature, and activities associated with such sites. The agency official should address concerns raised about confidentiality pursuant to Sec. 800.11(c).

We appreciate any assistance you can provide us in our efforts to comply with Section 106 of the National Historic Preservation Act. Please be assured that the Corps will treat any information you decide to share with us with the degree of confidentiality that is required in Section 800.11(c) of the Act, or with any other special restrictions you may require. If you have any questions or information concerning the 2008 Snoqualmie and Raging Rivers Levee rehabilitation projects, please contact me at (206) 764-3576, or e-mail me at: (ronald.j.kent@usace.army.mil).

Sincerely,



Ronald J. Kent
Acting Chief, Environmental Resources Section

For figures, see letter to Snoqualmie Tribe, above.

APPENDIX D: Consultation With USFWS and NMFS Under Endangered Species Act



DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

REPLY TO
ATTENTION OF

Planning Branch

Mr. Steve Landino, Washington State Habitat Director
Washington State Branch
Habitat Conservation Division
National Marine Fisheries Service
510 Desmond Dr. SE., Suite 103
Lacey, Washington 98503

JUN 17 2008

Mr. Ken Berg, Manager
Western Washington Fish and Wildlife Office
U.S. Fish and Wildlife Service
510 Desmond Dr., Suite 101
Lacey, Washington 98503-1273

Dear Messrs. Landino and Berg:

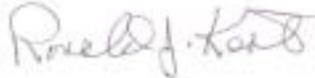
As you are aware, the U.S. Army Corps of Engineers, Seattle District (Corps), with King County, Washington, as its local sponsor, is proposing to undertake levee repairs at four sites in the Snoqualmie River basin, under its Public Law 84-99 emergency repair program. These sites were damaged in the heavy rain and flooding event that affected several western Washington drainages in November 2006. The damaged sites are McElhoe Pearson, on the Snoqualmie near Carnation; Raging River Bridge to Mouth, at the confluence of the Raging and the Snoqualmie at Fall City; and Mason Thorson Ells and Mason Thorson Extension, both on the Middle Fork of the Snoqualmie at North Bend. It is important to repair these levees to the same level of protection as they had before the November 2006 event, and to do so prior to the coming flood season which will start in November 2008.

Because of planned tree removal at Mason Thorson Ells, and incremental water temperature effects from that action, the Corps has determined that those projects are *likely to adversely affect* Coastal-Puget Sound bull trout (*Salvelinus confluentus*), Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*), and Puget Sound steelhead (*O. mykiss*), all listed as threatened under the Endangered Species Act. The project is also *likely to adversely affect designated critical habitat* for Chinook and bull trout. We are working with King County to find all possible mitigation means, including planting new trees at a ratio of 3:1 from those that are removed as a result of project construction. We recognize that vegetation mitigation will require several years to replace all of the habitat values from the lost trees. The Corps accordingly wishes to initiate formal consultation with both of your agencies pursuant to Sec. 7 of the Endangered Species Act, as amended. A Biological Assessment is enclosed, with details on the projects and on our evaluation of effects.

The Corps believes that work at the other three levee repair sites may affect, but is not likely to adversely affect, those species.

Mr. Jeff Laufle is the lead environmental coordinator for these projects, and as you know, Mr. Ken Brunner is Seattle District's ESA coordinator. I encourage you to contact them to discuss this consultation. They can be reached at the above address. Mr. Laufle can also be reached at (206) 764-6578, or jeffrey.c.laufle@usace.army.mil; Mr. Brunner is at (206) 764-3479, or kenneth.r.brunner@usace.army.mil.

Sincerely,



Ronald J. Kent
Acting Chief, Environmental Resources Sec.

Enclosure

cf:
Mr. Tom Bean, King County