BIOLOGICAL ASSESSMENT
FOR SALMONIDS
INTERSTATE 84 RIVERBANK STABILIZATION
MILEPOST 32.7, MULTNOMAH COUNTY, OREGON

1.0 – INTRODUCTION

1.1 – Background

A slide repair is proposed along the north side of Interstate 84 (I-84) along the Columbia River at Mile Post (MP) 32.7. The Oregon Department of Transportation (ODOT) constructed I-84 in 1957. At time of construction, the bank was protected with 12-inch or less diameter riprap. This material has severely eroded away in some areas. The proposed repair of the slide will incorporate both traditional engineering and bioengineering techniques into the repair. The repair of the slide area will require excavations along the face of the slide to achieve a stable face, the placement of riprap, installation of live willows at the toe, and installation of additional native plantings on the toe and upper slope and placement of in-water large woody debris. Work at the toe of the slope will take place immediately adjacent to the main channel of the Columbia River. This project will be accomplished through funding from the Federal Highway Administration (FHA) that was obtained by ODOT.

This BA is prepared in compliance with Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended. Section 7 of the ESA assures that, through consultation (or conferencing for proposed species) with NOAA Fisheries and the U.S. Fish and Wildlife Service (USFWS), federal actions do not jeopardize the continued existence of any threatened, endangered or proposed species, or result in the destruction or adverse modification of designated critical habitat.

A “No Effect” determination was made by the Corps for listed wildlife species (bald eagle and northern spotted owl) and a plant (Howellia).

1.2 – Location

The slide repair site is located on the north side of the westbound lanes of I-84 along the Columbia River at River Mile 137.4 within the Columbia River Gorge in Multnomah County, Oregon (see Vicinity Map). I-84 is a major arterial highway linking the City of Portland with eastern Oregon and Salt Lake City. Construction activities to repair the slide will require closing the shoulder and the right lane of I-84 in the vicinity of the repair site.

1.3 – Purpose and Need

The purpose of this project is to repair a slide to improve highway safety along the I-84 embankment facing the main channel of the Columbia River. The existing face of the slide is encroaching from within several feet to 15 feet of the highway guardrail that delineates the useable limit of the roadway for vehicles. Nearly vertical slopes are present along the failure planes of the slide. Additional slope failure at the slide site would likely undermine the existing shoulder and right lane of the highway and possibly result in a catastrophic failure of the roadway. To ensure public safety, appropriate repair and reconstruction of the highway embankment with adequate slope protection at the slide site is required.

2.0 – EVALUATION METHODS AND COORDINATION

The information presented in this BA is based on site visits to the project area, literature review, and communication with biologists from Oregon Department of Fish and Wildlife (ODFW) and NOAA Fisheries and ODOT staff.

Factors considered included the potential for species presence in the proposed project vicinity, species dependence on specific habitat components that would be removed or modified, the abundance and distribution of habitat, the degree of impact to habitat, and the potential to mitigate adverse effects. The methods outlined in "Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale" (NMFS 1996) were used to analyze the potential for project impacts on listed salmonids. The strategy outlined in this document is to determine the environmental baseline for the watershed, discuss how the proposed action would affect the environmental baseline, and then use that information in a dichotomous key to arrive at a determination of effect.

3.0 – PROJECT DESCRIPTION

3.1 – General

In a meeting on February 7, 2003 involving the Corps, NOAA Fisheries, and ODFW it was agreed that the energy environment at this and other erosion areas along Columbia River is such that bioengineering will not provide adequate erosion protection but that the protection should incorporate as much "bio-engineering like" components as possible. The proposed riverbank stabilization will incorporate bioengineering as much as possible. The bioengineering features of the proposed project are as follows: (1) construction of planting mounds at the base of the bank protected slope which will be planted with willows, (2) large trees with root wads will be incorporated into these mounds in order to provide in-water fish habitat, (3) placing willow wattles (bundles) approximately 1 m riverward of the toe of the bank protection riprap slope, (4) planting of a single layer of willow/red osier dogwood cuttings within the riprap slope between the mounds at approximate Elevation 6 m, and (5) planting of rooted cuttings of upland native shrubs on the slope. The purpose of all the planting described is to provide shade for improved fish habitat and to provide wildlife habitat.

3.2 – Construction Timing

A 144-m segment of riverbank will be stabilized on the Columbia River side of I-84 at this site. Construction is scheduled for August 7, 2003 through September 10, 2003 but may be delayed to September 2, 2003 through October 10, 2003 in order to avoid negative impacts to nearby nesting Ospreys. The ODFW-defined In-water Work Period for this region is November 1 through February 28 (Oregon Department of Fish and Wildlife 1997). All work that will occur outside the In-water Work Period is planned to occur “in the dry” during summer and fall when river levels will be low.

3.3 – Construction Methods

A one lane temporary access road for heavy equipment will be constructed adjacent to construction sites and not substantially impact native vegetation.

Construction will occur from the flat ground between the existing toe of slope and the water line (at time of construction). No construction equipment will enter the water and no construction will occur in the water. Construction will involve use of excavators and bulldozers. Rock will be placed to form the toe and lower embankment first and continue upslope. The profile of the lower embankment’s riprap blanket will match the undulating profile of the toe to elevation 6.5 m National Geodetic Vertical Datum (NGVD). The elevation of the toe of the undulations is approximately 4.5 m NGVD. There will be no undulation of the slope above 6.5 m NGVD. Placement of fill to form the lower embankments underlying slope will take place where needed to provide growth medium for willow and native species cuttings. Temporary stockpiling of materials will occur near the toe of the existing slope.

3.4 – Excavation and Fill Quantities

The Ordinary High Water (OHW) elevation is 8.26 m NGVD. A total of 1,970 m^3 of fill will be placed below the OHW elevation, including 1,080 m^3 of riprap stone and 890 m^3 of quarry waste with fines. Also, 6 rootwads and 12 achor blocks will be placed below OHW elevation. Excavation below OHW elevation will total 80 m^3.

Fill to be placed above and below OHW elevation totals 3,930 m^3, including 2,190 m^3 of riprap stone and 1,740 m^3 quarry waste with fines. Total excavation below OHW elevation will be 340 m^3.

Surface area to be filled below the OHW elevation will total about 1,710 m^2 (0.42 acre).

3.5 – Rip-rap

Stone used for riprap protection will vary in size between 20 and 1000 kilograms to the piece, placed in a 0.9 m thick layer on a 1 vertical to 2 horizontal slope from the low shoreline bench to elevation 12.5 m NGVD near the top of the bank. The finished slope above elevation 12.5 m NGVD will consist of quarry waste overlain with soil blanket in which upland rooting cuttings will be established. Riprap diameter will vary from 0.1 to 0.9 m. Riprap at the base of the slope will undulate to avoid a “wall effect” and provide areas for fish habitat (see site plan diagrams). Due to these constructed undulations, the shoreline over the entire 130-m bottom length of the work area will have a post-construction shoreline length of approximately 156 m, an increase of 26 m over the pre-construction shoreline length.

3.6 – Large Woody Debris

Bioengineering will include placement of woody debris (large coniferous trees) at the toe of the slope such that the root wads of these trees will provide in-water habitat for fish (see site plan diagrams and site cross section diagrams). These trees will be anchored to the shore by buried concrete blocks and have minimum diameters at breast height of 0.6 m (2 ft) and will be obtained from local timber companies. Root wads will be clean of large soil clumps, be a minimum of 2.4 m (8 ft.) in diameter, and have a dense mat of fibrous roots. These trees will be angled upstream so that wave action will be perpendicular to the length of the trees and not place stress on the trunks, thereby having no effects on the structural integrity of the rip-rapped slope. Two root wads will be placed at the apex of every other undulation mound at a resultant interval of about 50 m (see site plan diagrams).

3.7 – Plantings

Cuttings of Hooker Willow, Piper's Willow, Sitka Willow, and Creek (Red osier) Dogwood will be planted along the lower portion of the project as hereinafter described. Wattles will be installed in a backfilled trench located approximately 1 m riverward of the toe of the riprap protection. The wattles will consist of 2.5 to 4.6 m (8 to15 ft) long willow cuttings laid in alternate directions to form bundles. The bundles will be compressed tightly to a diameter of 200 to 300 millimeters (8 to 12 inches), firmly tied with binder twine every 300 to 400 millimeters (12 to 16 inches). Wattles will be placed along the entire length of the bank protection project, between planted mounds, in the excavated trench and staked in place using rebar. Plantings and cuttings will also be established on the undulating mounds. Willow plantings, 0.5 m (1.5 ft) in length, will be installed on the top surface of the mounds at a 1.5 m on-center (5 ft), triangular spacing. Short willow cuttings, 0.15 to 0.2 m in length, will be mixed into the top 0.3 m (1 ft) of the quarry waste embankment core of the mounds. Individual cuttings, 1.0 m in length, will be driven into the voids around the perimeter of the mounds approximately 1.0 m apart. These cuttings will be hammered into the existing ground with no more than 0.15 m exposed beyond the face of the riprap. Willow cuttings will also be planted on the lower riprap slope at elevation 6 m NGVD. The cuttings will be placed in a single layer 0.1 m to 0.15 m (4 to 6 inches) apart, between two 0.15 m (6-inch) layers of protective quarry waste/polymer additive material. The entire mound fill (planting layer) will be placed in a double layer of jute burlap The upper portion of the project above the riprap protection (elevation 12.5 m to the shoulder of the highway embankment) will be planted with two rows of rooted cuttings of upland shrubs at a spacing of 1.5 m-on-center, triangular spacing. With the exception of the wattle bundle cuttings, all live stakes and rooted cuttings, will be dipped in a slurry mix consisting of polymer fine granules and rooting compound. Approximately 0.67 m (2 ft) of the lower end of each willow cutting and all roots of the rooted cuttings will be dipped in this slurry. The polymers will coat the cuttings, protecting them from drying out. The polymers will soften and swell as water is added and absorbed. When the soil dries, the polymer will release water to the plants. Larger size granules will be mixed in with the quarry waste to be used in the willow cutting layer and in the mound area fill. These granules will work in a similar way to retain moisture in the ground and slowly release it into the soil as the ground dries out.

3.8 – Hydroseeding

In order to provide erosion control and native habitat, the upper slopes, above the 100-year flood level, will be covered with a soil blanket and hydroseeded with native grass and upland shrub species that will survive well in dryer situations.

4.0 – NATURAL HISTORY AND SPECIES OCCURRENCE

4.1 – Listed Fish Populations

Ten Federally listed populations of fish may occur in the vicinity of the proposed project site:

Chum salmon (Lower Columbia River) (*Ohcorhynchus keta*), Threatened
Steelhead (Middle Columbia River) (*Ohcorhynchus mykiss*), Threatened
Steelhead (Lower Columbia River) (*Ohcorhynchus mykiss*), Threatened
Steelhead (Upper Columbia River) (*Ohcorhynchus mykiss*), Endangered
Steelhead (Snake River Basin) (*Ohcorhynchus mykiss*), Threatened
Sockeye salmon (Salmon River tributary to the Snake River, Idaho) (*Ohcorhynchus nerka*) Endangered, Critical habitat designated
Chinook salmon (Fall runs in the Snake River) (*Ohcorhynchus tshawytscha*), Threatened, Critical habitat designated
Chinook salmon (Spring/summer runs in the Snake River) (*Ohcorhynchus tshawytscha*), Threatened, Critical habitat designated
Chinook salmon (Lower Columbia River) (*Ohcorhynchus tshawytscha*), Threatened
Chinook salmon (Upper Columbia River) (*Ohcorhynchus tshawytscha*), Endangered

4.2 – Occurrence

Chum salmon (Lower Columbia River) Chum salmon are distributed from Bonneville Dam to the mouth of the Columbia River. Adults migrate from early October through November and spawning occurs in November and December. Spawning habitat includes lower portions of rivers just above tidewater and in the side channel near Hamilton Island below Bonneville Dam. Spawning occurs in the mainstem Columbia River in areas where substrate (gravel) is 2-4 cm in diameter but spawning in gravels up to greater than 15 cm is know. Juveniles outmigrate during spring. Most juveniles spend little time in freshwater and rear extensively in estuaries.

Steelhead (Middle Columbia River) This population of steelhead is distributed from Wind River, Washington and Hood River, Oregon upstream to the Yakima River, Washington. This population migrates in fall/winter and spring/summer and spawning occurs in February and March. Spawning habitat includes upper reaches of tributaries. Juveniles spend from 1-7 years (average 2) in freshwater and outmigrate during spring and early summer.

Steelhead (Lower Columbia River) This population of steelhead is distributed from Wind River, Washington and Hood River, Oregon downstream to the mouth of the Columbia River. This population migrates in fall/winter and spring/summer and spawning occurs in February and March. Spawning habitat includes upper reaches of tributaries. Juveniles spend from 1-7 years (average 2) in freshwater and outmigrate during spring and early summer.

Steelhead (Upper Columbia River) This population of steelhead is distributed from the Yakima River upstream to the U.S./Canadian border. This population migrates in fall/winter and spring/summer and spawning occurs in February and March. Spawning habitat includes upper reaches of tributaries. Juveniles spend from 1-7 years (average 2) in freshwater and outmigrate during spring and early summer.

Steelhead (Snake River Basin) This population of steelhead occur in all accessible tributaries of the Snake River. This population migrates in spring and spawning occurs in February and March. Spawning habitat includes upper reaches of tributaries. Juveniles spend from 1-7 years (average 2) in freshwater and outmigrate during spring and early summer.

Sockeye salmon (Salmon River tributary to the Snake River, Idaho) This population occurs in the Salmon River, a tributary to the Snake River. This population migrates in spring and summer and spawning occurs in February and March. Spawning occurs in inlets or outlets of lakes or in river systems. Juveniles rear in freshwater and outmigrate in spring and early summer.

Chinook salmon (Fall runs in the Snake River) This population of chinook salmon occur in the mainstem Snake River and sub-basins including the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River. Adults migrate from mid-August to October and spawn from late August to November. Spawning occurs in the Snake River and lower reaches of tributaries to the Snake River. Juveniles outmigrate from early spring to summer as ocean-type sub-yearlings.

Chinook salmon (Spring/summer runs in the Snake River) This population of chinook salmon occur in the mainstem Snake River and sub-basins including the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River. Adults migrate in late winter to spring and spawn from late August to November. Spawning occurs in tributaries to the Snake River. Juveniles remain in freshwater from 1-3 years and outmigrate from early spring to summer as stream-type yearlings.

Chinook salmon (Lower Columbia River) This population of chinook salmon occur from the mouth of the Columbia River upstream to Little White Salmon River, Washington and Hood River, Oregon including the Willamette River up to Willamette Falls. Adults migrate in mid-August through October (fall run) and late winter to spring (spring run). Spawning occurs from late August to November. Spawning occurs in the mainstem Columbia River to upper reaches of tributaries in areas where substrate (gravel) is 6.5-13 cm in diameter and flows sufficient to percolate water into gravel are adequate. Juveniles outmigrate from early spring to fall depending upon run type.

Chinook salmon (Upper Columbia River) This population of chinook salmon occur in Columbia River tributaries upstream of the Rock Island Dam and downstream of Chief Joseph Dam in Washington, excluding the Okanogan River. Adults migrate from late winter to spring and spawn from late August to November. Spawning occurs in the mainstem

Columbia River to upper reaches of tributaries. Juveniles outmigrate from early spring to summer.

General. In general, adults use the lower river principally as a migration corridor to spawning areas in the upper basin and tributaries. They are actively migrating and normally do not spend any time in the lower river resting or feeding. Chum salmon (Lower Columbia River) and steelhead (Lower Columbia River) population spawn in tributaries to the Columbia River and chinook salmon (Lower Columbia River) spawn in the mainstem Columbia River in gravels of appropriate size. No spawning is expected in the vicinity of the proposed project area because of lack of tributaries and appropriate gravels.

Juveniles occur in the lower river during their out-migration to the ocean. Juveniles that have already become smolts are present in the lower river for only a short time period.

Juveniles that have not become smolts such as fall chinook sub-yearlings spend extended periods of time rearing in the lower river. They normally remain in the lower river or estuary until fall or the following spring when they become smolts and then migrate to the ocean. Rearing occurs primarily in the shallow backwater areas.

4.3 – Critical Habitat

Critical habitat was designated for Snake River sockeye salmon, Snake River spring/summer chinook salmon, and Snake River fall chinook salmon on December 28, 1993 (58 FR 68543), effective on January 27, 1994. The designation of critical habitat provides notice to Federal agencies and the public that these areas and features are vital to the conservation of listed Snake River salmon.

The essential features of the critical habitat of Snake River salmon have been further defined to include four components: (1) spawning and juvenile rearing areas, (2) juvenile migration corridors, (3) areas for growth and development to adulthood, and (4) adult migration corridors. Growth and development to adulthood occurs in the Pacific Ocean. Critical habitat on-site would include adult and juvenile migration corridors.

4.4 – Essential Fish Habitat (EFH)

The Sustainable Fisheries Act of 1996 amended the Magnuson-Stevens Act establishing requirements for EFH. For the salmonids covered in this Biological Assessment, the chinook salmon has designated EFH (Pacific Fisheries Management Council 1999). The coho salmon (*Ohcorhynchus kisutch*), which may use the area during adult migration but is not a listed population, also has designated EFH.

Freshwater EFH for chinook salmon consist of 4 major components: (1) spawning and incubation; (2) juvenile rearing; (3) juvenile migration corridors; (4) adult migration corridors and adult holding habitat. Important features of EFH for spawning, rearing, and migration include adequate (1) substrate composition; (2) water quality (dissolved oxygen, nutrients, temperature, etc.); (3) water quantity, depth, and velocity; (4) channel gradient and stability; (5) food; (6) cover and habitat complexity (large woody debris, pools, channel complexity, aquatic vegetation, etc.); (7) space; (8) access and passage; and (9) flood plain and habitat connectivity. The geographic extent of chinook salmon EFH includes all waters currently and historically used by chinook salmon.

Habitat along the existing shore, proposed to be filled totals approximately 0.42 acre. This habitat is of poor quality, as cover and habitat complexity is low, and is seasonally dry. Only sparse woody debris is present. Areas that are benthic habitat during high flows become shoreline habitat during low flows. Of the salmonids discussed in this BA, the chinook salmon (Lower Columbia River) and chum salmon (Lower Columbia River) are known to spawn in the mainstem Columbia River in the vicinity of the proposed project site. Erosion of the former embankments has resulted in deposition of quarried angular material unsuitable for spawning. The current substrate does not provide spawning habitat for salmonids but fish would likely be found in the area during high flows.

Although a net loss of habitat area, including designated critical habitat and EFH will occur with building of the project, habitat quality will be improved by employing compensatory mitigation measures outlined below in Section 10.0; shoreline length will be increased by 26 m, large woody debris will be placed at regular intervals, planting of willows and other natives will occur at the toe of the slope and on the slope, and upper slopes will be hydroseeded.

5.0 – BASELINE CONDITIONS

5.1 – General

The Columbia River drains an area of 259,000 square miles and flows 1,243 miles from its headwaters in the Canadian Rockies of British Columbia, across the State of Washington, and along the border of Washington and Oregon to its mouth on the Pacific Ocean near Astoria, Oregon. Within the United States, there are 11 major dams along the main reach of the river. In addition, there are 162 smaller dams that form reservoirs with capacities greater than 5,000 acre-feet in the Canadian and United States portions of the basin (Fuhrer et al.1996).

The Lower Columbia River Basin drains an area from Bonneville Dam to the mouth of the Columbia River, a distance of 146 mi along the river. The basin drains an area of about 18,000 square mi, all to the west of the crest of the Cascade Range (Fuhrer et al.1996). The ODFW-defined In-water Work Period for the Lower Columbia River Basin is November 1 to February 28 (Oregon Department of Fish and Wildlife 1997).

Stream flow along the main stream of the lower Columbia River is affected by spring snowmelt, winter rainstorms and flow regulation by the dams located upstream of the proposed project site. Although winter streamflows are high because of winter rains, they are generally not as high during the snowmelt season. Daily flood-control regulation is generally required during the spring snowmelt season. Streamflow peaks generally occur during April, May and June. Outflows from the dams located within the Columbia River system are regulated by the Corps between May and June in order to provide storage capacity to ameliorate peak flows. For example, during the 1993 Water Year, the regulated peak flow at The Dalles during the snowmelt season was 382,000 cubic feet per second (ft^3/sec.), while the unregulated peak flow would have been 602,000 ft^3/sec. Local flooding in the Lower Columbia River begins when streamflow reaches about 450,000 ft^3/sec (Fuhrer et al.1996). Releases from the dams that are conducted during the summer and fall are conducted to satisfy requirements for fisheries, irrigation, navigation and pollution abatement (Fuhrer et al. 1996). Low streamflow volumes are generally realized from August through October; the majority of work will occur during this time period.

Fish passage has been a large concern along the Lower Columbia River for many years. The dams located along the Columbia River are considered obstacles for migrating fish. All of these dams have a step-pool fishway bypassing the dam structure for adult fish passage. There are no dams located downstream of the proposed project site.

The site to be improved is vegetated mainly with grasses and sword fern. Willow shrubs are also present but sparsely distributed. Existing riparian habitat is of low quality.

6.0 – ANALYSIS OF EFFECT

As all work will occur in the dry and with employment of conservation measures outlined below in Section 7.0, no take of individual fish will occur and no equipment or material will be allowed to enter the water.

Loss of habitat area will occur as fill below the OHW elevation and will total approximately 0.42 acre.

This habitat is of poor quality, as cover and habitat complexity is low, and is seasonally dry. Only sparse woody debris is present. Areas that are benthic habitat during high flows become shoreline habitat during low flows. Of the salmonids discussed in this BA, the chinook salmon (Lower Columbia River) and chum salmon (Lower Columbia River) would spawn in the mainstem Columbia River in the vicinity of the proposed project site. Due to erosion of the former embankments and resultant deposition of quarried angular material, the current substrate does not provide spawning habitat for salmonids but fish would likely be found in the area during high flows.

Although a net loss of habitat area, including designated critical habitat and EFH will occur with building of the project, habitat quality will be improved by employing compensatory mitigation measures outlined below in Section 10.0; shoreline length will be increased by approximately 26 m, large woody debris will be placed at regular intervals, plantings will occur at the toe of the slope and on the slope, and upper slopes will be hydroseeded.

7.0 – CONSERVATION MEASURES

The following measures will be incorporated into the proposed actions to avoid impacts to listed salmonids:

- Installation and maintenance of silt fences between the construction area and the water line to prevent stormwater runoff and capture sediments before entering the Columbia River.
- Grading and shaping the existing faces of each slide repair site will be conducted in such a manner as to provide adequate guarantees that rock, sediment or other materials will not enter the Columbia River.
- Material removed during excavation will only be placed in locations where it cannot enter the Columbia River.
- Boundaries of the construction/grading limits will be flagged in the field and ground will not be disturbed beyond the flagged areas.
- No equipment will be allowed to work within the Columbia River. The period of construction is expected to occur during late summer to early fall to take advantage of low flow periods.
- All fueling shall be done with a hose from a fuel truck for equipment operated below the pavement edge. Refueling operation will be fully described in detail in the Contractor's Environmental Protection Plan. Refueling of equipment shall be done at the beginning of each shift to minimize the amount of fuel remaining in the tank between shifts. All refueling operations shall be accomplished in a manner to prevent any leakage and in a manner approved by the Project Engineer.
- The Contractor shall submit and implement an Environmental Protection Plan that includes complete details of the containment system for construction equipment storage areas prior to any overnight storage of heavy equipment within 150 feet horizontal distance from any waterway.
- Large amounts of caked mud will be removed from equipment prior to operation. If equipment is rinsed, untreated rinse water will not be discharged into waterways. Equipment with fluid leaks will not be permitted to operate near waterways.
- Three years of plant monitoring and consultation between ODOT and NOAA Fisheries as to appropriate measure if 80% vegetation cover of brush mattresses is not achieved.
- Disturbed sites will be monitored and measures will be taken to prevent erosion such as placement of straw mulch or erosion control mats and be approved by the Project Engineer.
- In the event of rising water, no work would be conducted in flowing water outside of the in-water work period (November 1 through February 28). Work areas would be isolated in the dry and design of same be approved by the Project Engineer prior to work area isolation.
- If storage and refueling of equipment is to occur on-site, two 200-foot long (minimum) oil containment booms (one of which is to be a floating boom and one of which is to be on land in front of straw bales) be present on site and design for placement of each be included in the Environmental Protection Plan and approved by the Project Engineer prior to construction.

8.0 – INTERRELATED AND INTERDEPENDENT EFFECTS

Interrelated actions include actions that are part of a larger action and depend on the larger action for justification. Interdependent actions are defined as actions with no independent utility apart from the proposed action. The actions described above do not represent a new level of service, or require new roads. The proposed action requires temporary roads to move construction equipment up and down the slopes. The proposed project is expected to have long-term benefits to native fishes by increasing shoreline length, improving in-water habitat by placement of large woody debris, and improving riparian habitat by planting on the lower slope and hydroseeding with native species on the upper slope.

9.0 – CUMULATIVE EFFECTS

Cumulative effects are defined as the effects of future state, local, or private activities that are reasonably certain to occur. No projects are known in the foreseeable future in the vicinity of the proposed project area. The proposed project is expected to have long-term benefits to native fishes by increasing shoreline length, improving in-water habitat by placement of large woody debris, and improving riparian habitat by planting on the lower slope and hydroseeding with native species on the upper slope.

10.0 – COMPENSATORY MITIGATION

The following mitigation measures will be incorporated into the proposed actions to improve habitat for listed salmonids:

- Mounds will be added at the base of the slopes to add undulations to avoid a “wall effect” and to provide more fish habitat. Because of these undulations, the shoreline over the entire length of the work area will have a post-construction shoreline length of approximately 26 m more than before.
- Bioengineering will include placement of woody debris (large coniferous trees) at the toe of the slope such that the root wads of these trees will provide in-water habitat for fish. These trees will be placed in pairs and embedded into the mounds by buried concrete dead-man anchors, have minimum diameters at breast height of 2 ft (0.6 m), and will be obtained from local timber companies. These trees will be angled upstream so that wave action will be perpendicular to the length of the trees and not place stress on the trunks.
- Extensive site revegetation (see Sections 3.7 and 3.8).

11.0 – FINDING OF EFFECT

After evaluating the potential effects, we conclude that the actions described for the proposed project would result in negligible probability of “take” for the listed salmonids addressed in this BA and would result in loss of fish habitat area, including critical habitat. Our conclusions, therefore, while employing the dichotomous key presented in National Marine Fisheries Service (1996) for making effect determinations, are that the proposed project **may affect and is likely to adversely affect** the listed populations of fish that may occur in the vicinity of the proposed project. This finding is based entirely on loss of fish habitat area, albeit low quality habitat, including designated critical habitat.

The proposed project **may affect and is likely to adversely affect** EFH for chinook salmon and coho salmon. For chinook salmon, components of EFH affected would include juvenile migration corridors, adult migration corridors, and adult holding habitat. For coho salmon, componenets of EFH affected would include only adult migration corridors. This finding is based entirely on loss of fish habitat area, albeit low quality habitat.

However, the proposed conservation measures would limit any potential project related effects to the project vicinity, and proposed compensatory mitigation measures would result in and increase in shoreline length and improvement of riparian habitat quality and in-water habitat quality for salmonids.

12.0 – LITERATURE CITED

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