



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
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Refer to NMFS No:
WCRO-2019-03487

April 23, 2020

Ms. Gina Owens
Forest Supervisor
Gifford Pinchot National Forest
501 E. 5th Street # 404
Vancouver, Washington 98661

Re: Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Kraus Ridge Vegetation Management and Restoration Project in the Cowlitz Valley Ranger District (Lewis County, Washington, Cispus River, HUC8: 17080004)

Dear Ms. Owens:

Thank you for your letter of November 14, 2019, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the Kraus Ridge Vegetation Management and Restoration Project. This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR 402, 84 FR 45016).

Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA)(16 U.S.C. 1855(b)) for this action.

In this opinion, we conclude that the proposed action is not likely to jeopardize the continued existence of Lower Columbia River (LCR) Chinook salmon (*Oncorhynchus tshawytscha*), LCR coho salmon (*O. keta*) or LCR steelhead (*O. mykiss*) or result in the destruction or adverse modification of their designated critical habitat.

As required by section 7 of the ESA, we are providing an incidental take statement with the opinion. The incidental take statement describes reasonable and prudent measures we consider necessary or appropriate to minimize incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions, including reporting requirements that the USFS and any person who performs the action must comply with to carry out the reasonable and prudent measures. Incidental take from actions that meet these terms and conditions will be exempt from the ESA take prohibition.

WCRO-2019-03487



Please contact Joshua Ashline of the NMFS Oregon Washington Coastal Office, located in Lacey, Washington, at 360-753-9456 or by email, Joshua.Ashline@noaa.gov, if you have any questions concerning this section 7 consultation or if you require additional information.

Sincerely,



Kim W. Kratz, Ph.D
Assistant Regional Administrator
Oregon Washington Coastal Office

cc: Greg Robertson
Ken Wieman
Dave Olson

TABLE OF CONTENTS

1.	Introduction.....	1
1.1	Background.....	1
1.2	Consultation History.....	1
1.3	Proposed Federal Action.....	2
2.	Endangered Species Act: Biological Opinion And Incidental Take Statement.....	17
2.1	Analytical Approach.....	17
2.2	Rangewide Status of the Species and Critical Habitat.....	18
2.2.1	Status of the Species.....	20
2.2.2	Status of the Critical Habitat.....	25
2.3	Action Area.....	28
2.4	Environmental Baseline.....	29
2.5	Effects of the Action.....	32
2.5.1	Effects on Critical Habitat.....	32
2.5.2	Effects on Listed Species.....	37
2.6	Cumulative Effects.....	41
2.7	Integration and Synthesis.....	41
2.8	Conclusion.....	44
2.9	Incidental Take Statement.....	44
2.9.1	Amount or Extent of Take.....	44
2.9.2	Effect of the Take.....	45
2.9.3	Reasonable and Prudent Measures.....	45
2.9.4	Terms and Conditions.....	45
2.10	Conservation Recommendations.....	46
2.11	Reinitiation of Consultation.....	46
2.12	“Not Likely to Adversely Affect” Determinations.....	47
3.	Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response.....	47
3.1	Essential Fish Habitat Affected by the Project.....	48
3.2	Adverse Effects on Essential Fish Habitat.....	48
3.3	Essential Fish Habitat Conservation Recommendations.....	48
3.4	Statutory Response Requirement.....	48
3.5	Supplemental Consultation.....	49
4.	Data Quality Act Documentation and Pre-Dissemination Review.....	49
5.	References.....	51

1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3, below.

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et. seq.), and implementing regulations at 50 CFR 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within two weeks at the NOAA Library Institutional Repository [<https://repository.library.noaa.gov/welcome>]. A complete record of this consultation is on file at the Portland, Oregon office.

1.2 Consultation History

The action agency for the proposed timber sale is the United States Forest Service (USFS), which manages the Gifford Pinchot National Forest (GPNF). The proposed action takes place in the Lower Cispus River (HUC8: 17080004) watershed located in Lewis County, Washington. The Lower Cispus Rivers and its tributaries are spawning, rearing and migration critical habitat for Lower Columbia River (LCR) Chinook salmon, LCR coho salmon, and LCR steelhead, and are Essential Fish Habitat (EFH) for Chinook and coho salmon.

- The USFS and NMFS conducted a site visit on November 2, 2018.
- The USFS prepared the Biological Assessment (BA) and provided NMFS with a draft BA to review on July 17, 2019.
- The USFS hosted a Level 1 meeting with NMFS and the USFWS to review the BA on July 31, 2019.
- The USFS addressed NMFS and USFWS comments and provided the final BA with a request to initiate consultation to NMFS on November 14, 2019.
- NMFS requested no other additional information about or modifications to the proposed action and initiated consultation on December 16, 2019.

NMFS used the following information sources and documents from the action agency to make its determination; the BA provided by USFS, Status of Species summaries prepared by NMFS from papers and reports listed in the References section of this Opinion, the Washington

Lower Columbia Salmon Recovery and Fish and Wildlife Sub-basin Plan (NMFS, 2013b) and other scientific books, papers and reports listed in the References section of this opinion.

1.3 Proposed Federal Action

“Action” means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). For the EFH response following this Opinion, Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal Agency (50 CFR 600.910).

The USFS proposes to award a contract under the Forest and Rangeland Renewable Resources Planning Act of 1974 (88 Stat 476) (16 U.S.C. 1600 et. seq.) to harvest timber within 120 units including: administratively withdrawn areas (AWA)¹; matrix²; and, late successional reserves³ (LSR) and private lands totaling 3,117 total acres in the Lower Cispus watershed and a small portion of the Middle Cispus watershed. Figure 1 represents the distribution of the harvest units relative to the major streams in these watersheds. The Kraus Ridge Vegetation and Restoration Project includes three primary project elements including: (1) Vegetation management (harvest), (2) Haul activities (transport from landing to mill) and (3) Transportation system management (construction and repair of roads for haul activities). Below each primary project element is described in detail, and includes a comprehensive list of Project Design Criteria (PDC) to minimize effects to ESA listed species and their designated critical habitats.

Vegetation Management

The commercial harvest contract includes three prescriptions including: (1) commercial thinning⁴ of 2,911 acres; (2) even age regeneration harvest of 118 acres, and; (3) huckleberry enhancement on 105 acres.

Commercial thinning of trees with the lowest canopy position, to promote densities which optimize stand volume growth, is proposed on 2,911 acres of matrix LSR and outer riparian reserve forest. Even age regeneration with green tree regeneration on 118 acres of matrix will remove all but nine trees per acre greater than 6 inch diameter (at breast height), and leave 15 percent of the stand area unharvested. Harvested areas of stands will be planted with approximately 435 trees per acre using a mixture of Douglas-fir, noble fir, western red cedar, and western white pine. Huckleberry enhancement will occur on 105 acres of AWA to encourage huckleberry growth. Trees will be thinned from the understory until approximately 15-30 percent residual canopy cover remains.

¹ Areas set aside from timber harvest production to protect fragile soils, watersheds, fish, wildlife, recreation or scenic values.

² Large, unfragmented patches of forest designated for timber production that represent all landscape types and that are resistant, resilient and persistent over time.

³ The network of existing old-growth forests that are retained in their natural condition with natural processes, such as fire, allowed to function to the extent possible

⁴ On Matrix, trees would be thinned from below, where the trees with the lowest canopy position are removed first; this would leave canopy cover over 40-60% of the stand. On LSR, trees would be thinned from below and utilize “skips”, areas where no harvest would occur, and “gaps”, areas where all trees are removed; this would leave canopy cover over 40-50% of the stand.



Figure 1. Location of harvest units in relation to streams for the Kraus Ridge Vegetation Management project (Figure produced by USFS).

Some commercial thinning units include outer riparian reserve buffers around streams and wetlands. The inner and outer riparian reserve widths for anadromous (Class I), resident fish bearing (Class II), perennial non fish bearing (Class III) and intermittent non fish bearing (Class IV) streams are shown in Table 1.

Table 1. Inner and outer riparian reserve widths for Class I, Class II, Class III and Class IV streams

Fish	Class	Limited by	Inner Riparian Reserve (feet)	Outer Riparian Reserve (feet)	Total Riparian Reserve (feet)
Anadromous	I		240	120	360
Resident	II		180	180	360
Permanent non fish bearing	III	Streambank Erosion	180	0	180
		High Temperature	90	90	180
		Lack of Large wood	120	60	180
Intermittent non fish bearing	IV	Erosion	180	0	180
		Large wood	120	60	180
		Connectivity	90	90	180
		Other	60	120	180

The inner riparian reserve of Class I and Class II streams will not be harvested. Skyline, ground based, and helicopter yarding methods will be used in outer riparian reserve selective thinning. Trees will be directionally felled to lead away from the stream. Ground based yarding equipment will only be allowed on predesignated skid roads at times when soils are not prone to compaction (see PDC below). Skid road soil productivity⁵ loss will be limited to 20 percent or less of the activity area. No skid roads are allowed in the inner Riparian Reserve. Skyline yarding systems will be used in areas inaccessible to ground based yarding or high risk of surface erosion or mass wasting. Twelve-foot-wide cable corridors with full suspension will be allowed across riparian reserves where necessary so that no trees will be dragged through streams. Prior harvest skyline corridors will be reused if possible. A full list of PDCs for vegetation management are as follows:

1. Ground-based machinery will not be operated where soil water content is high enough to cause detrimental puddling, defined as when the depth of ruts or imprints is six inches or deeper, for 10 feet or longer. The objective is to limit the degree of detrimental soil rutting and puddling as well as reduce the potential for sediment delivery to streams.
2. Mechanical harvesters, when traveling away from approved skid trails or roads will operate on a slash mat of limbs and tops as thick and continuous as practical, and plan to make as few trips as possible. This equipment shall not travel while bearing weight of trees (i.e., skidding), except minimal amounts at ends of skid trails to reduce soil disturbance by skidders. The objective is to limit soil compaction and displacement in productive soils, protect the topsoil for vegetative growth, and provide water infiltration.

⁵ The capacity of soil, in its normal environment, to support plant growth

3. Areas of gouging or soil displacement resulting from logging systems will be treated to prevent rill and gully erosion and potential sediment delivery to stream courses. Off road trails used for equipment fueling and servicing will be rehabilitated post use by moving soil back to natural hillslope contour (re-contour) and placing slash or vegetation on exposed mineral soils. Steep slopes will not be de-compacted to prevent further soil disturbance on steep slopes. Erosion control treatment may include, but is not limited to, repositioning displaced soil to restore the hillslope contour of disturbed sites, creating small ditches or diversions to redirect surface water movement, and scattering slash material to create flow disruption and surface soil stability. Erosion control measures will be implemented prior to onset of the wet season. The objective is to prevent surface soil erosion resulting from ground disturbance.
4. Forest Service will approve landings, skid trails, and skyline corridors prior to timber felling. Skid trails must be located outside of all no harvest buffers, unless otherwise specified in unit specific project design features, where resource specialists have approved and marked a crossing. Skid trails will be spaced approximately 150 feet apart. Skid trails will be re-established at previous road or trail locations, except where existing trails from prior entry would cause detrimental soil or hydrologic conditions that could be further avoided with alternative skid trail location. Skid trails will be re-compacted after use where compaction related to the project remains, with exceptions identified by the Forest Service. The soil profile will be shattered to the depth of soil compactions, the surface soil (topsoil) will not be mixed with deep soil layers, and available logging slash will be placed across the de-compacted surface. This measure will be accomplished immediately following logging activities.
5. Temporary roads will be located where past logging roads were located. If a new location would cause less resource effects than using an existing temporary road, then the newer road with less resource effects will be used to harvest the unit with line officer approval, who will work with an aquatic or soils resource specialist. Rock will be applied only where needed to reduce erosion, puddling, and compaction. Rock will be removed, and road will be de-compacted following harvest activities (see mitigation measure below which requires de-compaction). The objective is to promote well loosened substrate for vegetative growth and water infiltration following logging and harvest activities.
6. Landings will be located where past landings were located, unless a new location would cause fewer resource effects, or if no past landings were used to harvest the unit. New landings will be located outside of all no harvest buffers. Landings will be limited to the area needed for safe and efficient yarding and loading operations and have proper drainage. Certified weed free erosion control catchments or silt fences will be used to avert sediment transport in road ditches and streams. The catchments will be located to intercept runoff from the landing prior to reaching any stream.

7. Temporary roads and landings will be closed and restored after harvest and related activities are complete. Temporary roads and landings that were established for the timber sale will be de-compacted to the entire depth of compaction, for an uneven, rough surface without furrows, and be accomplished immediately following logging activities. De-compaction will encompass the entire landing and the sight distance (to discourage a bypass) from the beginning of the road, no less than 200 feet. The rest of the road will have drainage reestablished. Available logging slash will be placed across the de-compacted surface. No ground-based equipment will be operated on de-compacted portions of roads and landings completed to prevent re-compacting them. Post-harvest motorized access to temporary roads will be prevented. Closure to vehicles will prevent restored areas from being re-compacted, allow vegetation to develop, and curb erosion and sediment delivery. The objective is to rehabilitate areas compacted during management activities, accelerate recovery of compacted soils, and facilitate water infiltration and re-vegetation disturbed areas. These measures will also provide ground cover for exposed soils in order to reduce the potential for offsite erosion and maintain soil organic matter to prevent nutrient and carbon cycle deficits.
8. Forest Service will periodically monitor ground-based activity on steep slopes to prevent or rectify resource damage that may occur by mechanical cutting and harvesting machines. Resource damage includes forming of ponds, ruts, or rills; culvert blockages, stream channel instability, and the occurrence of scour or sediment transport and deposition downstream of cross drains. Project activities will be suspended, and corrective action taken before work resumes if resource damage is occurring. The objective is to minimize erosion and potential sediment delivery to streams.
9. Mechanical harvesters and feller benchers shall be allowed on slopes up to 35 percent and approved on a unit by unit basis on slopes up to 45 percent prior to start of operation. Mechanical cutting and harvesting machines will not operate over erosive soils on slopes greater than 35 percent. The objective is to limit soil compaction and displacement, to protect the topsoil for vegetative growth, and provide water infiltration. Mechanical cutting and harvesting machines will:
 - a. Not exceed limits on slope steepness, measured by percent slope (not grade of a trail/road). Slope maximum limit for harvesters is 45 percent, when approved on a unit by unit basis, including short steep pitches.
 - b. Equipment traveling on forest soils greater than 35 percent must avoid uphill and across the slope travel. Only travel downhill on steep slopes, when traveling off approved skid trails or roads, and reduce or eliminate turning and traveling across the slope to minimize soil gouging.
 - c. Operate on a slash mat of limbs and tops as thick and continuous as practical, as described above.
 - d. Avoid carrying logs (skidding) as described above, if traveling on forest soils greater than 30 percent (steepness).

- e. Do not enter riparian no harvest Riparian Management Zones (RMZ's) and unstable slopes.
10. Over the snow operations: Ground-based equipment can operate on snow which is at least 2 feet deep, or a combination of 3 to 4 inches of compacted snow and soil frozen to at least 6 inches in depth. Operations shall cease where snow or frozen conditions do not provide protection, for example, if it rains heavily and the soil and snow become saturated. As an indicator, overnight temperatures should be less than 25 F⁰; afternoon daytime temperatures should not exceed 35 F⁰. The objective is to limit the degree of detrimental soil rutting and puddling on wet soils as well as reduce the potential for sediment delivery to streams.
 11. Temporary road construction will avoid unstable slopes identified in soil specialist report, unless otherwise specified in unit-specific project design features. Consultation with a soil scientist or geologist will allow some timber harvest in low to moderate risk areas using sale design, light to regular thin prescriptions that retain greater than 50 percent canopy cover, and careful road location. No-cut buffers encompassing the entire NW Forest Plan Riparian Reserves will exclude highest risk areas from road building and vegetation management. The objective is to identify and avoid highly unstable areas and implement timber harvesting techniques least damaging to natural slope stability.
 12. Harvested trees will be felled away from streams, wetlands or other riparian reserve features. Exceptions would be trees which are leaning towards the creek, or when conditions would not allow safe felling. Any portion of a felled tree that lands in the no cut buffer will be left on the ground. The objective of this measure is to prevent damage to riparian vegetation and soils within Riparian Reserves.
 13. One-end log suspension will be required for ground-based and cable yarding systems except during winching or lateral yarding. No yarding is permitted over class I, II, III, or IV streams. This will reduce the risk of soil compaction and displacement from dragging entire logs along the ground. The objective of this measure is to minimize erosion and potential sedimentation.
 14. All ground-based equipment will be confined to pre-approved non-system roads, skid trails and landings during yarding and brush disposal operations. Non-system roads will not be constructed within the inner riparian reserves, and only on pre-approved skid trail in the outer riparian reserve. Skid trails will be spaced approximately of 150 feet apart for tractors and 400 feet apart for loaders. When possible, non-system roads and skid trails will be reestablished at previous skid trail locations rather than constructing new ones. Landings, non-system roads, skid trails and skyline corridors will be approved by the sale administrator prior to timber felling. The objective of this measure is to

minimize the extent and the degree of soil damage, displacement, and disturbance, and to allow sediment filtration.

15. Designated non-system roads and skid trails will not be permitted on slopes greater than 30 percent. Proposed exceptions to this restriction must be pre-approved by the sale administrator in consultation with the soil scientist or aquatic specialist and must be documented in project file. The objective of this measure is to limit the amount of erosion, soil compaction and displacement associated with use of equipment on steep slopes.
16. Upon completion of harvest, non-system roads will be treated with cross-drains (also called water bars), constructed to shed surface water and will be installed every 150 feet or more frequently where slopes exceed 5 percent, and installed every 100 feet when slopes exceed 15 percent. Available logging slash will be placed across the subsoiled road landing surface. (Acceptable seed mix; type of weed free mulch; and application rates will be specified by a qualified specialist). Post-harvest motorized access to non-system roads will be prevented by construction of an approved closure device (e.g., construction of a 4-foot high earth berm at the entrance to the road or landing and roughen road surface). Closure to vehicles is required to prevent treated areas from being re-compacted, reduce disturbance and to allow vegetative ground cover to develop. The objective of this measure is to facilitate water infiltration and revegetation on those disturbed areas.
17. Non-system road construction level will be kept to a minimum. Rock will be used only when necessary to reduce erosion, puddling and compaction on landings and non-system roads, and applied only where needed as “spot rocking”. Rock will be removed and/or be incorporated into the roadbed by ripping or scarification following harvest activities (see mitigation measure which requires subsoiling). The objectives are to reduce the extent of soil damage and to allow suitable substrate for vegetative growth and water infiltration following logging and harvest activities.
18. Temporary culvert and bridge installation (applies to structures in place a single summer or less) shall meet WDFW MOU design criteria including provisions as follows:
 - All road drainage structures (e.g. culverts) in fish bearing streams will provide fish passage.
 - Designed to pass all anticipated flows, sediment and wood if left in place only during the dry season (July 1-Oct 1). See criteria for permanent structures if left in place during winter flows (Oct 1-July 1)
 - Imported fill removed upon completion unless it mimics the natural substrate
 - Affected streambed and banks resorted to pre-project condition
 - Construction sites dewatered and isolated

Temporary structure to remain in place only during the MOU prescribed work window. The objective of this measure is to provide temporary transport function and channel longitudinal connectivity.

19. Permanent culvert installation culvert and bridge installation (applies to structures in place a more than one year) shall meet WDFW MOU design criteria including provisions as follows:
- All road drainage structures (e.g. culverts) in fish bearing streams will provide fish passage.
 - Designed and installed based on stream simulation standards which mimic natural channel characteristics.
 - Culverts designed to accommodate 100-year flood events (Q100).
 - Construction site dewatered and isolated
 - Culverts designed, installed and maintained to avoid negative channel changes (e.g. scour, and erosion)

The objective of this measure is to provide temporary transport function and channel longitudinal connectivity.

20. All currently closed system roads used for the Project will be closed and stabilized or decommissioned after sale activities have been completed. The roads will be left in a self-maintaining condition with features as follows: place a barrier at the junction with the existing road system adequate to prevent off road vehicle use, construct cross-ditching on steep-gradient sections and at culverts or other drainage locations. The objective of this measure is to prevent chronic ground disturbance, reduce compaction and help restore hydrologic and biological process.

21. In units with ongoing harvest activities roads will be treated prior to the wet season (typically Sept 30- July 1). Wet season road treatment shall include, cross drains and grade breaks which will be installed on all non-system roads, skid trails, landings, and skyline corridors. Erosion control planting and mulch may be required where necessary. The objective of this measure is to reduce risk of soil displacement through rill, gully and splash erosion processes.

22. Spill containment and prevention will follow contract language specified standard timber sale contract language specified in GT.3.4 Sanitation and Servicing, GT.3.4.1 Prevention of Oil Spills and summarized as follows. The contractor shall be responsible for the following:
- Take reasonable precautions to prevent pollution.
 - Restore any polluted site resulting from their operations Forest Service.
 - Maintain all equipment in good repair and free of abnormal leakage of lubricants, fuel, coolants, and hydraulic fluid.
 - Not service equipment where pollution to soil or water is likely.
 - Furnish oil-absorbing mats for use under all stationary equipment or equipment being serviced to prevent leaking or spilled petroleum-based products from contaminating soil and water resources.

- Remove from National Forest lands all contaminated soil, vegetation, debris, vehicle oil filters (drained of free-flowing oil), batteries, oily rags, and waste oil resulting from use, servicing, repair, or abandonment of equipment.
 - Notify the proper authorities for hazardous substances caused as a result of Contractor's Operations, in accordance with 40 CFR 302.
23. During extended periods of dry weather between September 30 and July 1, logging operations may proceed only with the written approval of the project contract sale administrator in consultation with an aquatic resource specialist and providing there is regular monitoring to evaluate implementation and effectiveness of the prescribed Best Management Practices (BMP). The objective is to evaluate if active wet weather vegetation management operations are meeting project design criteria and mitigation measures. All effected haul routes, landings and skid trails conditions must be documented as per TSA inspection report standards and meet minimum standards as per BMP and FSH manual direction (see A and-B below).
- A. Implementation and effectiveness BMP monitoring needs to be documented in Contracting Officer Representative / Timber Sale Administrator inspection reports to assess ongoing conditions of haul routes, landings, and skid trails.
 - B. Pre-approved activities occurring outside of the dry season, defined as July 1 to September 30, may proceed providing that the erosion control measures and road maintenance are in place, effective and adhered to as follows:
 - a. System Roads (BMP Road-4 Road Operation and Maintenance. FSH 7709.59)
 - i. No scour or sediment deposition evident and extending more than 10 feet below outlet of cross drain.
 - ii. No ponding present on road surface or road fill that may be causing fill subsidence or otherwise threatening integrity of fill.
 - i. No rills (greater than 2-inches deep and 10-feet in length) or sediment deposition has extended more than 10 feet off the road prism.
 - iii. No ruts formed that can channel water past erosion control structures (drain dips, water bars, cross drains).
 - iv. No turbidity visible in ditch lines leading to stream courses
 - v. The daily precipitation levels remain below the average daily maximum precipitation for the July1 through September 30 period as recorded at the nearest precipitation gauge; AND 2) two-week cumulative total precipitation of less than the average maximum two-week precipitation levels during the July 1 through September 30 period as measured at the nearest precipitation gauge. District Hydrologist will designate the gauge of record for this evaluation.
 - b. Culverts or drainage structure conditions (BMP Road-7 Stream Crossings FSM 7722 and FSH 7709.56b):
 - i. All drainage features are clear of obstructions and properly functioning as designed.

- ii. All culverts shall be at or near the elevation of the streambed to avoid erosion below the outlet.
- c. Skid Trails, Temporary Roads, and Harvest Areas (BMP Veg-4. Ground based Skidding and Yarding. FSH 2409.15.):
- i. No rills or gullies present that are over 2 inches deep and more than 10 feet in length (6-inches deep over 5-foot length).
 - ii. No rills, gullies or sediment deposition extending more than 10 feet below water bar or cross drains outlets on temporary roads.
 - iii. Drainage control structures are functional on temporary roads.
 - iv. No visible turbid water flowing from skid trail and temporary roads.
 - v. No ruts (erosional features greater than 4-inches deep and 6-inches wide and 5-foot long).
 - vi. The daily precipitation levels remain below the average daily maximum precipitation for the July 1 through September 30 period as recorded at the nearest precipitation gauge; and 2) two-week cumulative total precipitation of less than the average maximum two-week precipitation levels during the July 1 through September 30 period as measured at the nearest precipitation gauge. District Hydrologist will designate the gauge of record for this evaluation.
 - vii. Soil moisture is field measured at 20 percent of optimal compaction and soil displacement potential is low.
- d. Landings (BMP Veg-6. Landings. FSH 2409.15)
- i. Rills (greater than 2" deep and 10' in length) or sediment deposition has extended more than 10 feet beyond the landing.
 - ii. Functioning erosion control structures which are bypassed by any overland flow.
24. The silvicultural treatment in the riparian reserve will follow a prescription to maintain or restore slope stability, benefit water quality and old growth dependent fauna including native salmonids. The riparian reserve will be broken into two riparian management zones. For the purposes of this analysis, riparian silvicultural prescription and consequent effect from treatment of riparian reserves is distinguished fish presence and harvest prescription. This buffer uses a standardized buffer width prescribed on the Mt. Adams Ranger District and expanded across the Gifford Pinchot National Forest.
- a. **Inner Zone:** The inner zone is devoted solely to achieving ACS goals and buffer width vary by aquatic feature. Non-commercial treatment may be prescribed to actively promote or protect riparian features.
 - b. **Outer Zone:** The outer zone is managed to achieve ACS goals as well as other management goals. Selective thinning will be used in the outer portion of the riparian reserve with average relative density targeted at 20-30 along LFH. If currently below this target riparian reserve canopy closure will remain at existing condition. Outer riparian zones treatment widths vary by riparian reserve feature.

25. Monitoring of the Kraus Ridge Project will be a qualitative evaluation to determine if stated Riparian Reserve Desired Future Conditions are met. Five riparian reserve sites will be randomly selected to evaluate whether the treatment was consistent with the DFC. Monitoring will take place immediately following three years post-treatment and will evaluate the following objectives:
- a. Objective 1: Evaluate whether the development of late successional habitat conditions have been accelerated.
 - b. Objective 2: Determine whether instream conditions adjacent to and immediately downstream of timber sale units benefited from treatments including:
 - i. Is ground cover at least 90 percent? If not, did the project reduce ground cover?
 - ii. Is bank stability at least 90 percent? If not, is the prescribed no cut buffer observed?
 - iii. Is ground compaction present on less than 10 percent of the Riparian Reserve? If not, did the project increase compaction?
 - iv. Is sediment being delivered to streams from anthropogenic sources? If so, are management features the prescribed distance from the stream? The monitoring will occur during 5 storms after the crossing has been constructed and restored.
 - v. Are LW levels adequate to maintain or restore habitat elements? If not, was the source area for recruitment maintained?
 - vi. Were there any mass wasting events generated within the unit or from a road? If so, could they have been avoided?
 - vii. Were all isolated aquatic features protected as prescribed?

Haul Activities and Transportation System Management

Timber will be hauled from unit landings to the mill using conventional log trucks on asphalt, gravel and native surface Forest Service System Roads. The log haul route will bisect a total of 15 stream crossings with ESA listed fish within seven sub-watersheds. A majority (69 percent) of the log haul roads are paved the remaining are gravel. Sub-watershed with at least one stream crossing include: Kiona, Siler, Yellowjacket, Camp-Cispus, Greenhorn, Iron, and Woods. Haul will be timed to be concentrated during the dry field season months but winter haul may be allowed on designated haul routes.

The Kraus Ridge project will require the reconstruction and maintenance of previous roads, landings, and skid trails. Road reconstruction includes brushing, hazard tree removal, ditchline and culvert cleaning, cross drain installation, culvert replacement, road surface blading, road surface rock replacement, and pot hole patching on paved roads. No new permanent roads will be constructed for this action.

Approximately 42 miles of new temporary (non-system) roads will be constructed. These roads will be designed with USFS criteria to minimize sediment production and transport to streams. Temporary roads used for more than one season of log hauling will be weatherized prior to wet weather in the fall. When harvest is complete all temporary roads and skid trails will be blocked,

have their culverts removed and be out-sloped with cross drains and grade breaks for drainage. The road surface will be de-compacted, mulched and seeded with native plants.

Seven crossings within the Wood Creek sub-watershed will be constructed with temporary roads on geologically hazardous slopes (unstable soils), to access six harvest units. The geohazard crossings will only be constructed within streams not classified as anadromous (Class II – IV), using an estimated 2,071 cubic yards of road fill within the stream channels to stabilize the temporary crossings.

Reconstruction of approximately 44 miles of paved system roads will occur within three sub-watersheds including: Camp-Cispus (6 miles), Greenhorn (17 miles), and Woods (22 miles). Of which, 28 miles are within proximity to ESA listed streams. Additionally, 105 miles of system roads will receive maintenance including: ditch maintenance, structure maintenance, grading, and rocking and resurfacing. Only 25 miles (within the Woods Creek sub-watershed) of system roads requiring maintenance are within proximity to Class I anadromous streams. Four temporary stream crossings will be constructed, all within the Woods Creek sub-watershed, including one bridge and three culverts. The temporary bridge will require no in-water work, and the three culverts will require approximately 850 cubic yards of fill.

A full list of PDCs for haul activities and transportation system management are as follows:

1. Road segments treated within riparian affected areas should be recontoured to mimic natural floodplain contours and gradients to the greatest degree possible. The objective is to restore natural channel function and process.
2. For those road segments immediately adjacent to the stream or where the road fill is near the wetted perimeter or active channel, install sediment control barriers between the project and the stream. Examples include straw bales or erosion control matting, or silt fencing.
3. Drainage features (drain dips) should be spaced to hydrologically disconnect road surface runoff from stream channels. Project design should be reviewed with an aquatic specialist. The objective is to reduce road related sediment sources to live streams.
4. Dispose of excavated waste material in stable sites out of the flood prone area. Waste material other than hardened surface material may be used to restore natural or near-natural contours. The objective is to reduce source of sediment delivery.
5. Minimize disturbance of existing vegetation in ditches and at stream crossings to the greatest extent possible. The objective is to reduce sediment delivery.
6. Conduct activities during dry-field conditions – low to moderate soil moisture levels. For the Woods Creek and Greenhorn Creek drainages the allowable work period in, or near fish-bearing waters is August 1 to August 15. If a non-fish bearing stream is less than 0.25 miles from a fish-bearing stream, the allowable work period is July 1 to September 30. Non- fish bearing streams more than 0.25 miles from fish-bearing waters

are not required to adhere to these work periods unless a WDFW or USFS fish biologist determines they are likely to adversely affect aquatic life, channel processes, or function. High Risk Stability and Geo Hazards sites are included in this normal operating seasonal provision.

7. Evaluate channel incision risk (e.g. headcutting) and construct in-channel grade control structures in accordance with ARBO II and State MOU. The objective is to maintain channel connectivity, reduce sediment loads by reducing the risk of unwanted headcutting upstream of road work.
8. Road repairs associated with high risk stability stream segments which are within proximity to fish bearing streams should use special provisions to reduce risk of future failure including: headcut, debris slide, surface erosion or mass movement. Road repair design should incorporate Geo Technical solutions and Aquatic resources special provisions to reduce risk of sediment delivery. Special Provisions should include but not limited to one or more of the following: Grade Control (GC), Toe Slope Stabilization (TS) or Surface Drainage (SD). High risk road segments should receive a Level I Stability Assessment (LISA) or similar site stability assessment as per Gifford Pinchot Nation Forest Cumulative Effects Protocol.
9. When working in fish bearing streams the project should follow the Fish Isolation Plan. The objective is to protect fish including threatened and endangered species.
10. The Kraus Ridge Project stream crossing projects should restore natural drainage patterns (e.g. channel geometry, substrate and flow) and when possible promote passage of all fish species and life stages present in the area. The objective is to promote fish habitat including critical habitat for listed species.
11. All applicable Northwest Forest Plan Standards and Guidelines will be followed, as well as applicable administrative unit Best Management Practices and WA state findings and recommendations (Washington State Hydraulic Codes). The objective is to protect waterways and aquatic organisms.
12. Road stabilization and decommission will retain Large Woody Material (LWM) typically accumulated on culvert structures and channel margins. Material should be repositioned on-site or integrated into stream restoration projects as identified by a Forest Service Fish Biologist to the benefit of aquatic species. The objective is to maintain channel function and process.
13. Remove rip-rap or other hard structures currently used in culvert protection (e.g. rock armoring at the inlet and outlet of the culvert) on decommissioning and close / stabilize crossings. The objective is to maintain natural channel function and process.
14. Any streambank stabilization deemed necessary following culvert removal shall use bioengineered solutions (such as root wads, log toes, coir logs, woody and herbaceous plantings). The objective is to maintain natural channel function and process.

15. Use effective and appropriate erosion controls as necessary to ensure that the likelihood of sediment delivery to streams or other water bodies is negligible (See BMPs). The objective is to maintain water quality and aquatic habitat.
16. Develop and carry an approved spill containment plan that includes having spill containment kit on-site and previously identified containment locations. The objective is to maintain water quality and aquatic habitat.
17. The long-term parking or staging area for construction vehicles and heavy equipment should be located outside of the flood plain and a minimum of 100 feet from any streams bankfull channel to reduce risk of contamination. The objective is to maintain water quality and aquatic habitat
18. Refuel power equipment (or use absorbent pads for immobile equipment) at a location remote from water bodies (at least 150 feet distant) to prevent direct delivery of contaminants into a water body. The objective is to maintain water quality and aquatic habitat.

We considered whether or not the proposed action would cause any other activities and determined, based on the USFS's statements, that one associated activity would also occur.

The USFS identified one associated activity with road reconstruction for the proposed action: sourcing fill material from local quarries. Crushed aggregate to replace fill material and to provide road surface material will be processed from three local quarries including: Judd, Iron Mountain, and Ames. Aggregate production methods include explosive blasting. Ames quarry is within proximity to a Class I anadromous stream (770 feet). PDCs for quarry sourcing are as follows:

- 1) State and Federal guidelines
 - a. All applicable Northwest Forest Plan Standards & Guidelines will be followed as well as applicable administrative unit Best Management Practices related to quarry production.
 - b. Best Management Practices: State requirements shall be complied with in accordance with the Clean Water Act for protection of waters of the State of Washington (Washington Administrative Code [Chapter 173-201 and 202], Department of Ecology, which contains water quality requirements for protection of various classes of surface waters) through planning, application, and monitoring of Best Management Practices (BMPs) in conformance with the Clean Water Act, regulations, and Federal guidance issued thereto (Chapter 2, page 60 - Land and Resource Management Plan (Amendment Eleven).
- 2) Control sediment deliver and fine particulates
 - a. Minimize any displacement of fines, soil that may be transmitted offsite or outside of the active area of the quarry via surface runoffs during rainstorm events.
 - b. Minimize the displacement or transport of sediment from access road into drainage ditches. When necessary the installation of straw bales (weed free) in drain ditches will be required if excessive sedimentation of runoffs can be seen in the drainage ditches. The installation of straw bales into ditches will help mitigate/limit the amount of sediment into stream channels.

- 3) Control incidental hazardous spill associated with blasting activity
 - a. Develop and carry an approved spill containment plan that includes having a spill containment kit on-site and previously identified containment location.
 - b. Develop a spill plan for approval before operations begin. Carry approved spill containment plan. Containment plan should include but not limited to: possess a spill containment kit on-site, and pre- identified containment locations. Hydraulic/oil/fuel leaks will be repaired prior to operating on National Forest System lands. Equipment will be checked daily for leaks and any necessary repairs shall be completed prior to commencing work activities in or near stream channels. Equipment storage locations will need to be away from any live streams by at least 100 feet. Avoid using access road for storage locations if in close proximity (<100 feet) to waterbodies. Equipment will not be stored adjacent to or in stream channels when not in use to avoid/minimize any potential effects of vandals, accidents, or natural disasters. Any accidental spills of a hazardous material (e.g. oil, fuel, transmission fluid) from any operating equipment or in place of storage on land or in water must be immediately reported to the Gifford Pinchot National Forest.
 - c. Service and refueling areas need to be located at least 100 ft. away from any stream channels at a pre-designated location. Refueling or oil change for mechanized equipment and vehicles must be done at a designated service and refueling areas.

- 4) Moderate timing, intensity, duration and magnitude of explosive charges to control effects to local fish population including:
 - a. Cease all project operations, except efforts to minimize storm or high flow erosion, under unexpected high flow conditions that result accumulation of one (1) inch or more rain in a 24-hour period as measured at local USGS weather station (Randle, WA).
 - b. Shock wave transmission to fish bearing streams from blasting shall comply with safe operating levels as defined by Alaska Department of Fish and Game (1991). Overpressure transmission to the fish bearing streams shall not exceed 2.7 pound per square inch (psi) instantaneous hydroacoustic pressure change in LFH. As such, each explosive charge weight shall not exceed 400 pounds per blast to maintain prescribed fish-safe operating level.
 - c. Shock wave transmission to fish spawning sites from blasting shall comply with safe operating levels as defined by Alaska Department of Fish and Game. Overpressure transmission to the fish bearing streams shall not exceed 0.5 inches per second (ips) instantaneous hydroacoustic pressure change at spawning sites. Calculations of overpressures should be gauged to relative risk and consider physical character including: distance to fish, geologic material, and topography defined in Figure 2. As per Ames Creek setback (approx. 700 ft) a charge weight not to exceed 400 pounds should be used to maintain a safe operating transmission level of 0.5 inches per second.
 - d. Explosive blast will be confined within the bedrock material (drilled holes)
 - e. Explosive blasts will be detonated as a single shot. Multiple charge shots may be detonated if separated by an eight (8) millisecond (ms) or longer delay.
 - f. The blasting activity should not exceed ten (20) shots per day over a period of five (5) consecutive work days for a total of fifty (100) shots per quarry site to minimize cumulative effects of disturbance.
 - g. When high risk conditions are present, quarry blasting should be limited to a Safe Operating Season to ensure fish larva have reached a stage of development (eyed egg) to

In summary, it is unlikely that explosive activities will reach levels that significantly impair eggs, juveniles, or adults.

2.6 Cumulative Effects

“Cumulative effects” are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02 and 402.17(a)). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area’s future environmental conditions caused by global climate change that are properly part of the environmental baseline *vs.* cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the environmental baseline (Section 2.4).

The non-federal landscape in the action area and surrounding environment is dominated by commercial forestry on privately owned and managed timber lands. Less than 10 percent of the action area is in private ownership. Private land is also used for timber production. Harvests and roads in those acres contribute to the sediment effects to the anadromous river reaches within the Kraus Ridge Vegetation Management action area. Effects from commercial forestry on privately managed lands will include sedimentation from forest roads, sediment conveyance from timber lands recently harvested, potential use of pesticides, and the indirect effects of increased sedimentation on spawning, rearing and migratory habitat PCEs. These lands are managed under Washington State’s Forest Practices Rules, which are, in turn, subject to provisions adopted in the Washington State Forest Practices Rules HCP with the WDNR (WDNR, 2005). Implementation of this plan has carried forward improvements to fish passage and road management via Road Maintenance and Abandonment Plans (RMAPs) to properly abandon or stabilize existing forest roads, and improve standards on how new roads are to be built and existing roads maintained or abandoned to ensure fish passage and minimize sediment delivery to streams and rivers. These rules, and the HCP that provides incidental take coverage to private forestry operations that comply with them, also specify riparian buffers to minimize adverse effects from logging operations on stream sedimentation, water quality, and habitat. Thus, non-federal cumulative effects would be comparable with the effects described for the proposed action.

2.7 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency’s biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed

species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

LCR Chinook salmon, LCR coho, and LCR steelhead are each listed as threatened species. Their status is based on low abundance, productivity, and spatial structure, and this status is due in part to decreased and/or degraded habitat throughout their range. The proposed action will affect habitat in the Cispus River tributary watersheds and the Cispus River watershed below tributary confluences. Tributaries to the Cispus River and provide spawning and rearing habitat for the Cispus River populations of LCR Spring Chinook, LCR coho, and LCR steelhead.

There are nine populations of LCR Spring Chinook. Seven of these populations are in the Cascade strata. All populations except the Sandy River population currently have a very low probability of persistence. LCR Spring Chinook recovery is based on four Cascade strata populations, including the Cispus River populations, reaching a high probability of persistence. The limiting factors to recovery for the tributary phase of Spring Chinook life history are reduced access to spawning and rearing habitats, and hatchery (competition) effects. Both of these limiting factors pertain to Cispus River Spring Chinook. The number of natural spawners is limited by the fraction of outmigrating smolts collected at the Cowlitz Falls Dam and naturally produced Chinook juveniles compete with 300,000 hatchery Chinook subyearlings transported to the Upper Cowlitz each year under the reintroduction program.

There are 25 populations of LCR coho salmon. Fourteen of these populations are in the Cascade strata. All Cascade strata populations except the Clackamas River population have a very low probability of persistence. LCR coho recovery is based on nine Cascade populations, including the Upper Cowlitz and Cispus River populations, reaching a high probability of persistence. The limiting factors to recovery for the tributary phase of LCR coho are fish passage barriers, and hatchery related effects. Both of these limiting factors pertain to Cispus River coho. The number of returning natural spawners is limited by the fraction of outmigrating smolts collected at the Cowlitz Falls Dam and naturally produced juveniles compete with offspring from adult hatchery coho transported to the Upper Cowlitz each year to spawn under the reintroduction program.

There are 17 populations of LCR winter run steelhead. Fourteen of these populations are in the Cascade strata. Eleven of these populations, including the Cispus River population, have a low or very low probability of persistence. LCR coho recovery is based on nine populations, including the Cispus River population, reaching a high probability of persistence. Limiting factors to recovery for the tributary phase of their life history are access to spawning and rearing habitats, and hatchery related effects. Both of these limiting factors apply to Cispus River steelhead. The number of returning natural spawners is limited by the fraction of outmigrating smolts collected at the Cowlitz Falls Dam and naturally produced juveniles compete with 287,500 hatchery produced juveniles planted in the Upper Cowlitz as part of the reintroduction program.

Greenhorn and Woods Creek have about 1.8 and 4.6 miles of accessible coho and steelhead spawning habitat respectively. These lower reaches of both Greenhorn and Woods Creek have been classified as Tier 4 critical habitat with a low priority for restoration. The habitat quality of the anadromous reaches of Greenhorn and Woods Creeks is fair and EDT analysis predicts a less

than 1 percent increase in ESA listed species abundance and productivity if restored to historical condition (template), indicating these reaches didn't contribute significantly to Cispus River historical abundances, and are unlikely to contribute significantly to the recovery of the species within the Cispus River recovery domain.

The most important reach in the action area for Spring Chinook is Cispus 1C, a short 0.2 mile reach between Woods Creek and Crystal Creek with Chinook spawning habitat, however both Greenhorn Creek and Woods Creek deliver sediment into this reach. EDT predicts a 5 percent increase in Chinook productivity if Cispus River reach 1C is restored to historical conditions.

The existing Forest Service road network and associated traffic delivers sediment to Greenhorn and Woods Creeks, especially as the storm-water drainage system ages and degrades. Sediment fills pools and causes the channel to widen which causes additional streambank erosion and widening during bankfull flows. Wide, shallow channels are less completely shaded by riparian trees and intercept more solar radiation per unit flow than narrow, deep channel flows. Permanent roads through the riparian buffer eliminate trees that would provide shade and, ultimately, LWD for the stream. The fine sediment fraction in the channel substrate reduces the substrate suitability for redd construction. The uplands road network also intercepts overland and subsurface water runoff and delivers it directly to tributaries, increasing the frequency and magnitude of peak flows relative to a roadless watershed. Peak flows move bedload and scour redds so more frequent peak flows decrease salmon and steelhead fry production.

From the 1940s to the 1970s, trees were harvested right up to the edge of the channel. Both Greenhorn and Woods Creek are Class I streams with wide riparian buffers but the trees are relatively young and small with a high fraction of hardwoods and do not completely shade the widened channel. Woods Creek water temperature exceeds State standards during the summer. The proposed action will not affect either of the limiting factors for the Cispus population of steelhead, coho, or Chinook salmon. The proposed action is reasonably certain to increase the supply of sediment from the roads to Greenhorn Creek, Woods Creek and ultimately the Cispus River channels, sustaining the degraded water, channel and substrate conditions from the existing road network. This additional supply of sediment will be offset by contemporaneous improvements in road drainage designs since the original road network was constructed, and construction PDCs that will upgrade to the water drainage systems in the baseline road. Most of the road extensions constructed for the project will be closed and stabilized when the project is complete so sediment delivery from these sources to Greenhorn Creek, Woods Creek and the Cispus River are expected to cease.

Wide riparian buffers around Greenhorn and Woods Creek sub-watershed Class II tributaries will prevent the proposed outer buffer thinning from affecting stream shade and water temperature. Commercial thinning in the outer riparian buffer of Class III and Class IV tributaries to both sub-watershed could result in increased solar heating and increased temperature of water ultimately delivered to the already warm summer water in Woods Creek but NMFS does not expect this to measurably increase water temperature in either creek because Class III stream summer flows are low and Class IV stream summer flows are intermittent. Water quality impairment from sediment input is likely to occur intermittently, rather than chronically, coinciding with large rainfall events when stream conditions would have naturally

high levels of sediment. Water quality is likely to return to baseline conditions between large rainfall events, and the habitat will maintain its overall low conservation value despite episodes of increased turbidity due to the proposed action.

ESA listed salmon and steelhead in Greenhorn Creek, Woods Creek and the Cispus River will be exposed to suspended sediment that originates from the baseline road system and the proposed action's temporary road extensions, landings, and yarding corridors. The effects of suspended sediment on fish depend on concentration and the duration of exposure. Both are highly unpredictable given the stochastic nature of erosion and the complex delivery pathway, but as described above, we expect the PDCs to avoid intense delivery. Although turbidity effects associated with the proposed action may temporarily affect the critical habitat PBF, water quality, and harm individual salmonids from ESA listed populations. NMFS analysis did not identify turbidity effects with intensities or durations that would result in a reduction of the conservation value of designated critical habitats or reductions in abundance and productivity of exposed populations, thus the survival and recovery of ESA listed salmonid species are also not reduced. As such, the proposed action should not reduce the recovery potential of ESA-listed salmonids within the Cispus River recovery domain.

2.8 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of LCR Chinook salmon, LCR coho salmon and LCR steelhead or destroy or adversely modify their designated critical habitat.

2.9 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1 Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

Take in the form of harm is likely to occur when timber practices increase sediment in stream reaches. Harm is often difficult to quantify as a number of fish to be injured or killed because the abundance of fish present to experience detrimental habitat-based conditions is highly variable, so we cannot predict their presence when short term effects are likely. The ability to anticipate the number becomes even more difficult when effects are long term, because over time presence can range significantly, and is influenced by multiple factors that cannot be predicted, such as ocean survival and weather conditions. In such circumstance we use a surrogate, called an extent of take, which is causally related to the type of harm.

We expect take among the Cispus populations of LCR Chinook salmon, LCR coho, and LCR winter steelhead from 34 harvest sites along 9.6 miles of road. These sites and the amount of road are causal to the harm because these are the source of water quality effects (turbidity) that can smother redds or injure juvenile salmonids.

2.9.2 Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.9.3 Reasonable and Prudent Measures

“Reasonable and prudent measures” are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02). The USFS shall:

1. Minimize take associated with sediment delivery to streams within the Kraus Ridge Vegetation Management project action area from road surface erosion.
2. Minimize take associated with sediment delivery to Kraus Ridge Vegetation Management project action area from road subsurface flow interception/concentration.
3. Minimize take associated with sediment delivery where roads cross streams.
4. Monitor sediment delivery during periods of high precipitation or prolonged precipitation to ensure take is not exceeded.

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the USFS or any applicant must comply with them in order to implement the RPMs (50 CFR 402.14). The USFS or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

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