UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
1201 NE Lloyd Boulevard, Suite 1100
PORTLAND, OR 97232-1274

Refer to NMFS Consultation No.:
WCRO-2018-00046

May 16, 2019

Elizabeth Burghard
District Manager
Medford District Office
Bureau of Land Management
3040 Biddle Road
Medford, Oregon 97504

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for Approving the 4 Apples Association Mining Plan of Operations, Whitehorse Creek-Cow Creek (6th field HUC No.: 171003020701), Douglas County, Oregon (DOI-BLM-ORWA-M070-2018-0007 EA)

Dear Ms. Burghard:

Thank you for your letter of September 14, 2018, 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 Bureau of Land Management's (BLM) approval of the 4 Apples Association Mining Plan of Operations. In this biological opinion, NMFS concluded that the proposed action is not likely to jeopardize the continued existence of Oregon Coast (OC) coho salmon *(Oncorhynchus kisutch)* or result in the destruction or adverse modification of its designated critical habitat.

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. This document also includes the results of our analysis of the action's likely effects on EFH.

As required by section 7 of the ESA, NMFS provided an incidental take statement with the opinion. The incidental take statement describes reasonable and prudent measures NMFS considers 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 BLM 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.

We have also included two conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. Section 305(b) (4) (B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving this recommendation. If the response is inconsistent with the EFH conservation recommendation, the BLM must explain why the recommendations will not be followed, including the scientific justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH response and how many are adopted by the action agency. Therefore, we request that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

Additionally, we request that BLM provide the applicant, Mr. Jerry Applegarth, a copy of the final biological opinion because BLM has been in direct contact with him previously. Alternatively, if BLM arranges for a meeting we would deliver the biological opinion to the applicant in person. However, BLM has responsibility for all ESA section 7 obligations (Unless otherwise noted) and the EFH response.

Please contact Michelle McMullin in the Oregon Coast Branch of the Oregon Washington Coastal Area Office, at 541-957-3378 or Michelle.McMullin@noaa.gov, if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

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

cc: Jim Billings, ODEQ
Aaron Donnell, BLM
Beth Moore, ODEQ
Jon Raybourn, BLM

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion
and
Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Response

for

Approving the 4 Apples Association Mining Plan of Operations
Whitehorse Creek-Cow Creek (6th field HUC No.: 171003020701)
Douglas County, Oregon
(DOI-BLM-ORWA-M070-2018-0007 EA)

NMFS Consultation Number: WCRO-2018-00046

Action Agency: Bureau of Land Management, Medford District

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely To Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Oregon Coast coho salmon *(Oncorhynchus kistuch)*	Threatened	Yes	No	Yes	No

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service
West Coast Region

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

Date: May 16, 2019

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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 USC 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). A complete record of this consultation is on file at the Oregon Coast Branch in Roseburg, Oregon.

1.2 Consultation History

The Bureau of Land Management (BLM) is responsible for administering mining on certain Federal lands as authorized by the General Mining Law of 1872, as amended (30 USC 22 et seq.), the Federal Land Policy Management Act of 1976 (FLPMA), and surface management regulations at 43 CFR 3809 et seq. The General Mining Law of 1872 grants citizens the right to locate and mine certain minerals on public lands. A claimant's statutory rights, consistent with other laws, include entry on open public lands for the purpose of mineral prospecting, exploration, development, and extraction. Section 302 of FLPMA directs the Secretary of the Interior to manage public lands under the principle of multiple-use; minerals are specifically identified as one of these multiple-uses in the FLPMA. The BLM has an obligation to prevent Unnecessary and Undue Degradation (UUD) of the public lands (43 CFR §3809.5).

Technical assistance/pre-consultation activities began on June 7, 2013, when BLM shared the 4 Apples Association Mining Plan of Operations (POO) with NMFS in preparation of a site visit. On June 17, 2013, NMFS received a letter from BLM identifying Jerry Applegarth as an applicant for the purpose of anticipated consultation. The site visit occurred on February 21, 2014. Attendees included BLM, the applicant, and one additional mining proponent. During the site visit, the applicant and BLM described the proposed action. NMFS asked questions for clarification, identified issues of potential concern, recommended actions to minimize effects, recommended information to include in the biological assessment (BA) for sufficiency, and discussed topics for effects analysis.

On February 7, 2018, BLM provided a draft chapter of their Environmental Analysis (EA) with a description of the proposed action. The NMFS responded on February 9, 2018, with questions, recommendations on effects analysis topics for inclusion in the BA, and suggestions for additional best management practices and approval conditions. The NMFS received a notification from BLM regarding their completion of the EA (BLM 2018a) and draft Finding of No Significant Impact for the 4 Apples Association Mining POO on May 24, 2018.

BLM shared a draft BA with NMFS on July 30, 2018. NMFS reviewed the draft BA and provided comments on August 14, 2018. BLM provided an informal response on August 29, 2018; however, BLM did not modify the BA. Formal consultation was initiated on September 27, 2018, when NMFS received the final BA (BLM 2018b) with a letter requesting consultation. In the final BA, BLM determined that approving the 4 Apples Association Mining POO May Affect, Likely to Adversely Affect (LAA) Oregon Coast (OC) coho salmon *(Oncorhynchus kisutch)* and its designated critical habitat. The BLM also determined the proposed action would adversely affect EFH for Pacific Coast salmon.

On October 1, 2018, NMFS notified BLM that formal consultation was proceeding and requested extension of the consultation time frame up to 60 days to conclude formal consultation. NMFS did request that BLM share a copy of the letter with the applicant. On October 25, 2018, NMFS received a letter from BLM indicating that they did not object to the extension request and acknowledging the delivery of the biological opinion by April 10, 2019. A second site visit was held on November 1, 2018 with BLM so a NMFS fish passage engineer could view the diversion pool; BLM invited the applicant but the applicant did not attend. In December 2018, consultation was held in abeyance for 38 days due to a lapse in appropriations and resulting partial government shutdown. Consultation resumed on January 28, 2019.

NMFS and BLM met on May 9, 2019, to discuss the draft biological opinion, including proposed terms and conditions, prior to completion; BLM invited the applicant who was unable to attend. On the same date, BLM requested a copy of the preliminary terms and conditions, draft ESA conservation recommendations, and draft EFH conservation recommendations for review and NMFS provided them, also on May 9, 2019. BLM then coordinated with the applicant to obtain any input on the draft provisions. Feedback from BLM was provided on May 14 and 15, 2019, and some non-substantial revisions were made as a result.

This opinion is based on information provided in the BA, the EA, the site visits and meetings, and any information collected during phone calls and e-mails between June 7, 2013, and finalization of the biological opinion. A complete record of this consultation is on file at the Oregon Coast Branch in Roseburg, Oregon.

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). "Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration (50 CFR 402.02). The NMFS did not identify any interdependent or interrelated actions, due to the comprehensive manner in which activities were included in the proposed action as described by the BLM (BLM 2018b). The EFH definition of a 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 BLM proposes to approve and authorize the 4 Apples Association Mining POO under the Mining Law of 1872 and FLPMA for proposed production gold mining activities on Oregon Mining Claim Serial Number 158749 at approximate River Mile (RM) 4.6 on an unnamed tributary (Tributary A) to Starveout Creek and the subsequent action of implementing the proposed POO by the applicant. The proposed mining activities will occur on BLM-administered lands that are open to mineral entry. The applicant submitted a POO in compliance with 43 CFR 3809 and 43 CFR 3715. The BLM has a statutory obligation under FLPMA to authorize mining activities if those activities would be done without unnecessary and undue degradation (43 CFR 3809.5), follow general performance standards (43 CFR 3809.420), and are reasonably incident (43 CFR 3715.0-5) to the mining operation.

According to the BA (BLM 2018b), BLM prepared a description of the applicant's proposal using the submitted POO in coordination with the applicant. In that description, BLM included best management practices, project design features, and conditions of approval.

- **Best Management Practices** (BMPs) are defined by BLM as being required by the Federal Clean Water Act and are methods, measures, or practices established in the following: (1) Appendix C of the 2016 Record of Decision/Resource Management Plan (BLM 2016), (2) Oregon Department of Environmental Quality (ODEQ) Erosion and Sediment Control Manual (ODEQ 2005), and (3) the Medford District Plan Maintenance (BLM 2012).

- **Project Design Features** (PDFs) are defined by BLM as measures included in the site-specific design of the project to meet the performance standards of the mining regulations which are to prevent unnecessary and undue degradation of the public lands; these are reiterated from the 4 Apples Association Mining POO submitted by the applicant and/or required by statute.

- **Conditions of Approval** (CoAs) are stipulations added by BLM that must be followed by the applicant to prevent unnecessary and undue degradation of the public lands. BLM did not provide any CoAs for stream or aquatic resources (BLM 2018b).

The applicant proposes to mine approximately 0.5 acre between Starveout Creek and Tributary A (Figure 1). The applicant will clear vegetation off the land prior to excavation. The area to be excavated is located adjacent to Tributary A for a distance of approximately 300 feet. Additionally, the applicant proposes to use a previously established area of approximately four acres for mineral processing and occupancy, which includes cleared areas, several natural surface and rocked roads/trails, a shed, two settling ponds, a stationary wash plant (i.e., trommel), an excavated pit from previous mining activity, a fueling area, an occupancy area, and a general activity area (Figure 1). Access to the project area is controlled by a locked gate on Old Starveout Creek (32-4-29.0) Road which is located directly off the public access Starveout Creek (32-4-20.0) Road. The gravel access road crosses Tributary A over an existing culvert made from the barrel of an ore processing trommel. No new roads would be constructed and alterations to the existing roads are not proposed. The only in-stream activities will be at the gravity-fed water diversion on Starveout Creek, upstream of the mining location (Figure 1). All other mining activities will be set back from the ordinary high water elevation (OHW) of Tributary A by at least 20 feet.

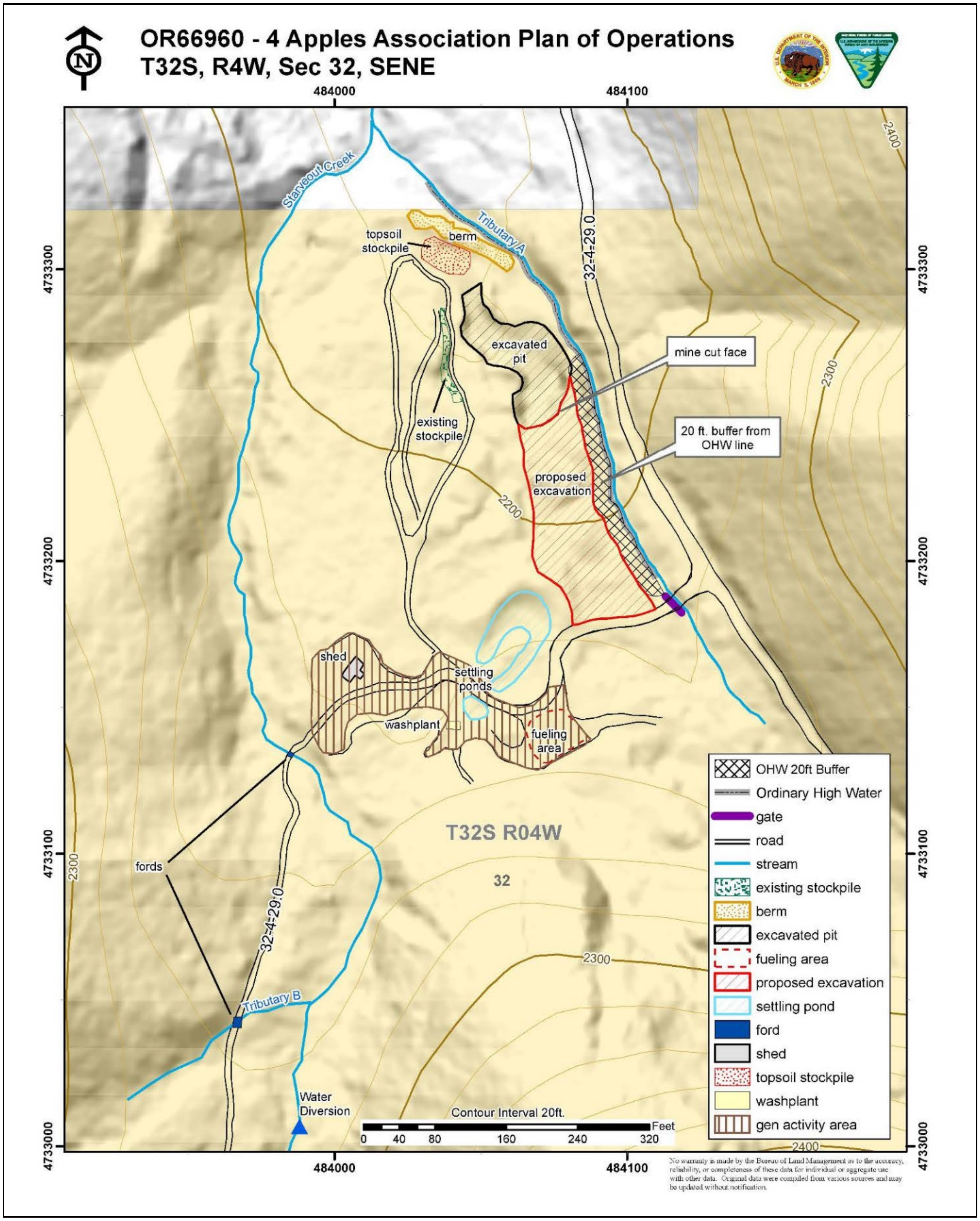

Figure 1. Map of the 4 Apples Association Mining POO including the area proposed for excavation, Starveout Creek, existing roads, existing settling ponds, shed, wash plant, fueling area, and the existing pit (BLM 2018b).

The applicant proposes to conduct mining activities from the end of May to the beginning of September, primarily on weekends and holidays and occasionally during the week. Excavation, material processing, and water source use and maintenance are all proposed during this time frame. Site occupancy may occur throughout the entire year. The applicant proposes approximately five years of mining for approximately 50 feet of excavation each year (approximately 0.1 acre per year).

Mining will be a typical cut and fill mining method, using heavy equipment, a trommel (i.e., a stationary wash plant used to process ore from the excavated gravels), and two existing settling ponds. The applicant proposes to withdraw water from Starveout Creek using a gravity diversion and approximately 650 feet of 4-inch pipe will convey the water to fill the existing large, horse-shoe shaped settling pond, located approximately 130 feet from Tributary A. The applicant will cross two existing fords on foot to access the diversion (Figure 1). No vegetation would be cleared from the pipeline path. The applicant will use hand tools to maintain the diversion and pool (i.e., substrate removal, debris removal, and screen cleaning). According to BLM (2018a), the diversion would be screened to Oregon Department of Fish and Wildlife (ODFW) and NOAA Fisheries screening criteria, but designs or screen model were not submitted with the consultation request and there is not a process in place where the applicant is required to submit screening criteria to BLM or NMFS for verification.

According to BLM, the maximum allowed water withdrawal is limited to two cubic feet per second by the water right certificate, however the diversion system proposed is physically limited to no more than 1.45 cubic feet per second (cfs) or 650 gallons per minute (BLM 2018b). The existing settling pond has a capacity of about 125,000 gallons, which could be filled in less than 3.5 hours at the 1.45 cfs withdrawal rate (BLM 2018b). The applicant will observe the settling pond during filling for any seepage of water from the pond and will stop any observed seepage using fine sediment or hay. The settling pond was constructed during previous mining activities, is lined with fine sediment, is well-sealed, and is ringed by a berm with no outflow. The pond is located on stable, level ground, and there is no indication of and no records indicating leaking since its creation (BLM 2018b). The applicant will divert water every mining season for five years. According to BLM, the primary filling of the settling pond is likely to occur early in the proposed mining season (BLM 2018b). The pond is located approximately 130 feet from Tributary A.

The applicant will first remove trees and other vegetation from the area proposed for excavation. Per a BLM PDF, the area between Tributary A and the proposed excavation would have a silt fence or other sediment control devices such as logs or hay bales (weed free straw) installed. The applicant will stockpile topsoil (Figure 1) and root wads from the excavated area. Gold-bearing material will be removed from the excavation area and transported to the trommel using a Case 580B backhoe or similar equipment. The transport route consists of existing haul roads. Use of the haul roads is limited to the general activity area including between the proposed excavation area and the trommel, fueling areas, and occupancy areas.

From the large settling pond, the applicant will use a pump to cycle the water to the stationary trommel. When water and non-gold materials and other sediment exit the trommel they will flow into the small settling pond which allows the coarse sediment to be captured. Water and fine sediments will continue into the large settling pond where fine sediments will drop to the bottom.

Clean water from the large pond is pumped back to the trommel such that the applicant will only need to divert additional water during the mining season to account for evaporation and infiltration. BLM did not provide any information pertaining to the frequency or amount of diverted water needed later in the mining season to account for loss due to evaporation or infiltration. Coarse sediment from the first settling pond and gravels from the trommel are periodically cleaned out and used to backfill the excavated pit for concurrent reclamation.

The applicant will not remove vegetation in the setback areas described above. However, vegetation will be cleared from the project area to allow excavation. The BLM identified approximately 48 trees that will be removed by the applicant from the proposed excavation area. Approximately 39 of these trees are greater than or equal to 10 inches in diameter at breast height (DBH).

The applicant will bring self-contained travel trailers to the project area for occupancy. The occupancy area is flat, is approximately 0.25 acre, and has a locked shed used to store mining supplies and equipment, including fuels and lubricants for heavy equipment. The shed is located approximately 100 feet from Starveout Creek and 150 feet from Tributary A (Figure 1). Travel trailers will be at least 50 feet away from either stream. The applicant will haul all garbage and sanitation waste from the project area for legal disposal. A fueling area approximately 150 feet from the creeks will be used for heavy equipment and fueling needed for occupancy will be in the area identified for general activity (Figure 1). Per a BLM PDF, fuel, lubricants, or other potentially hazardous materials would not be stored on-site during non-operational periods.

The applicant proposes concurrent reclamation meaning that reclamation will occur as mining occurs. The starting point of reclamation is the existing pit; the existing pit would be the first area to be filled with non-gold material separated out by the trommel and wash plant. The priority of reclamation here is to maintain stable slopes. Then the processed non-gold material will be backfilled into the newly excavated area. The applicant will also distribute the stockpiled topsoil and root wads throughout the reclamation area which includes the proposed excavation area, the existing pit, and north through the topsoil stockpile and berm (Figure 1). The applicant will then seed, mulch, and plant conifer trees throughout the reclamation area. The area to be planted is approximately 0.86 acre. The BLM will monitor the planted trees for survival and when completed, the planted area will have at least 150 well-spaced conifer trees per acre. At the conclusion of mining and reclamation, the applicant will also remove the existing shed, trommel, and items used for occupancy. Approximately 0.2 mile of road between the settling pond and the proposed excavation area will be decommissioned during reclamation.

BLM will conduct regular inspections of the project area for compliance. This will include regular inspections of the project area in response to rain and other environmental events or as needed to ensure unnecessary and undue degradation is not occurring. BLM enforcement of performance standards would be in accordance with the regulations found at 43 CFR § 3809.600 through § 3809.605. Other Federal or State agencies may inspect the site for compliance with their regulations at any time. Failure to comply with Federal or State regulations may also cause BLM enforcement actions. Any BLM employee may perform informal site investigations.

The following proposed **best management practices** are taken directly from BLM's BA:

- The proponent [applicant] must prepare a Spill Prevention, Control, and Countermeasure Plan for all hazardous substances to be used in the mining areas of operation that comply with the State of Oregon DEQ OAR 340-142, Oil and Hazardous Materials Emergency Response Requirements.

- Hydraulic fluid and fuel lines on heavy mechanized equipment would be in proper working condition to minimize potential for leakage into streams. Refueling would occur in the designated fueling area, which is greater than 150 feet from Tributary A and greater than 200 feet from Starveout Creek. Spill kit, as required by law would be available for immediate containment of accidental spills.

- Disposal of fuel, oil or other contaminants would be in accordance with State requirements and Federal law. The BLM would be notified as soon as practical following any fuel or oil spill in accordance with State requirements and Federal law.

- To prevent the potential spread of noxious weeds within the Medford District BLM and surrounding landowners, the operator would be required to clean all equipment prior to entry on BLM lands. Cleaning is the removal of dirt, grease, plant parts, and material that may carry noxious weed seeds onto BLM lands. Cleaning prior to entry onto BLM lands may be accomplished by using a pressure hose.

- Mining and reclamation would be conducted so that any water flowing into the Project Area would be diverted so the site would not contribute sediment to the adjacent waterbodies.

The following proposed **project design features** are taken directly from BLM's BA:

- All Federal and State permits needed for operations would be obtained prior to mining activities on the site.

- All subsequent move-ins of equipment to the Project Area shall be treated the same as the initial move-in, as described above in BMP #4.

- During periods of non-operation, winterization of haul routes would occur to prevent off-site movement of sediment.

- Only approved containers and truck bed fuel tanks shall be used for storage and handling of flammable and combustible liquids. Approved safety cans or Department of Transportation approved containers shall be used for the handling and use of flammable liquids in quantities of five gallons or less (29 CFR § 1926.152(a)(1)). A safety can is an approved, closed container, of not more than five gallons capacity, having a flash arresting screen, spring closing lid and spout cover and so designed that it would safely relieve internal pressure when subjected to fire exposure (29 CFR § 1926.155(1)).

- All fuels, lubricants, petroleum products, and hazardous chemicals would be stored within the shed which is ≥ 100 feet away from the OHW mark in impermeable and spill-proof containers that minimize the potential for accidental spillage. A chemical containment system must be used if storage within 150 feet of the OHW mark is otherwise unavoidable. The containment system must be sufficient in size to completely accommodate the full volume of all fuel, lubricant, petroleum product, and hazardous chemicals without overtopping or leaking.

- Fuel, lubricants, or other potentially hazardous materials would not be stored on-site during non-operational periods.

- The area between Tributary A and the proposed excavation would have a silt fence or other sediment control devices such as logs or hay bales (weed free straw) installed at all locations. All sediment control devices shall be installed per the guidance of the manufacturer. Upon completion of reclamation, sediment control devices would be assessed by the BLM and removed when the site is deemed to be at a low risk for sedimentation.

- If additional seeps, springs, or streams are encountered and develop during operations and migrate towards either Starveout Creek or Tributary A, sediment control devices may be required to be installed as determined by the BLM.

- The creation of a dam, weir, or other fish passage barriers which may cause concentrated stream flow or a reduction of the total wetted width of the stream is prohibited.

- All timber outside of the proposed excavation area boundary shall be reserved from cutting and removal unless specifically authorized.

- Prior to cutting and use of timber on the claim, proponent shall apply for and adhere to the stipulations required in a free-use permit from the Grants Pass BLM. This permit shall include the following:

- All trees shall be directionally felled away from streams.

- Any trees felled during mining operations and not put to immediate mining use would be decked in an identified location. Trees would be separated from the root wad and root wad would be stored on-site at an identified location which may differ from the area identified to deck logs.

- Felled trees may be used in the following manner: 1) Utilization during mining operations to prevent unnecessary and undue degradation by the proponent, 2) off-site in-stream restoration project utilized by BLM, 3) if not utilized by September 1st of the same year the trees were cut, they would be made available for purchase. All trees cut and not immediately used for mining during operations would adhere to the following standards.

- All conifer trees eight inches or greater at DBH in area designated for cutting that are cut shall be yarded and decked at a pre-designated staging area within one week of being harvested. All logs shall be decked in the same staging area. Yarding shall be done with tracked equipment that has the ability to fully suspend the log while transporting it to the landing without damaging the log. Logs shall be decked in a manner so that a loader can access the logs in the future.

- Prior to the commencement of timber harvest operations, the proponent [applicant] shall obtain from the BLM written approval of a written operations and logging plan commensurate with the terms and conditions of the environmental analysis which shall include measures needed to assure protection of the environment and watershed. A pre-work conference between the proponent and the Authorized Officer's representative must be held before the logging plan would be approved. All logging shall be done in accordance with the plan developed by this provision.

- Reclamation activities shall not occur within the 20-foot no-touch buffer. This area should have no signs of disturbance, which includes soil used during the reclamation process.

- The top 1-2 feet of the soil profile, (where roots are present) would be stored for reclamation purposes. The stockpile (as indicated on the map in [Figure 1]) would be placed in a BLM identified location, seeded, and mulched by the proponent [applicant]. Any addition to the topsoil stockpile would be subsequently seeded and mulched.

- Any root wads or non-merchantable material cut during operations should be preserved for reclamations activities. At the culmination of mining activities, tree boles, limbs, tops, or root wads would remain on site, they would be distributed across the disturbed areas.

- The existing haul roads and the general activity area (shown on the map in [Figure 1]) would be decompacted 6-10 inches in depth and the areas would be seeded and mulched. This does not include the Old Starveout Creek (32-4-29.0) Road. Decompaction would not be required across the entire area if bedrock and boulders impedes decompaction.

- At the conclusion of all mining activities, the northeast corner of the settling pond would be notched so that no more than two-feet of water could continue to be retained in the pond. The notch would have slopes of 2:1.

- Conifer seedlings shall be Douglas-fir that are appropriate to the site (correct seed zone and elevation). Planting shall be done in a manner so that when finished, planted areas are stocked with 150+ well-spaced healthy conifers per acre. Planting shall be done during the wet season and shall be completed prior to April 15th. Established conifer regeneration growing on the existing stockpile is to remain in place.

- Trees planted during reclamation activities would be monitored until deemed established by the BLM. The goal is to meet or exceed pre-mining trees per acre conditions. The area to be planted is approximately 0.86 acres. A portion of the proponents bond may be withheld until the BLM deems conifers established.

- Retain the crescent-shaped tailing pile, which has trees established on it. See map in Appendix A for the location.

- For reclamation, BLM would supply native seed mix and certified weed free mulch to ensure that appropriate locally sourced native species and weed free certification standards are met. Rates for seed and mulch: grass seed at 20 lbs. per acre (cumulative, all species); forb seed at 0.5 to 1 lb. per acre (cumulative, all species); straw mulch at 1000 lbs. per acre.

We relied on the foregoing description of the proposed action, including all BMPs and PDFs identified to reduce adverse effects, to complete this consultation. To ensure that this opinion remains valid, BLM must keep NMFS informed of any changes to the proposed action.

The applicant is required to obtain all necessary State and Federal permits as a condition of BLM authorization of the 4 Apples Association Mining POO (BLM 2018b). Operations cannot begin until the financial guarantee for reclamation is adjudicated.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provides an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and/or an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of" a listed species, which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion relies on the definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features (PBFs) essential to the conservation of a species or that preclude or significantly delay development of such features" (81 FR 7214).

The designation of critical habitat for OC coho salmon uses the term primary constituent element (PCE). The new critical habitat regulations (81 FR 7414) replace this term with PBFs. The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.

- Describe the environmental baseline in the action area.

- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.

- Describe any cumulative effects in the action area.

- Integrate and synthesize the above factors by: (1) Reviewing the status of the species and critical habitat; and (2) adding the effects of the action, the environmental baseline, and cumulative effects to assess the risk that the proposed action poses to species and critical habitat.

- Reach a conclusion about whether species are jeopardized or critical habitat is adversely modified.

- If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential PBFs that help to form that conservation value.

One factor affecting the status of OC coho salmon considered in this opinion, and aquatic habitat at large, is climate change. Likely changes in temperature, precipitation, wind patterns, and sea-level height due to climate change could affect survival and productivity of OC coho salmon in their freshwater, estuarine, and marine habitats (Table 1). OC coho salmon rely on these three habitat types for growth and survival, making them particularly vulnerable to environmental variation (Morrison *et al.* 2016). While all habitats used by OC coho salmon will be affected by climate change, the impacts and certainty of the change vary by the habitat type. Some effects (e.g., increasing temperature) affect salmon at all life stages, while others are habitat specific, such as flow variation in freshwater, sea-level rise in estuaries, and upwelling in the ocean. In addition, terrestrial forest habitats are also essential to OC coho salmon because they determine the quality of freshwater habitats by influencing the types of sediments in spawning habitats and the abundance and structure of pools in juvenile rearing habitats (Cederholm and Reid 1987).

Table 1. Summary of effects of physical climate changes of Oregon Coast coho salmon by habitat type. Strength and direction of effects are rated strongly (++) through neutral to strongly negative (--). (Table 14 in Stout *et al.* 2012, modified from Wainwright and Weitkamp 2013).

Physical change	Certainty of change	Processes affecting salmon	Effect on salmon	Certainty of effect
Terrestrial				
Warmer, drier summers	Moderate	Increased number and intensity of fires, increased tree stress and disease affecting large wood recruitment, sediment supplies, riparian zone structure	0 to --	Low
Reduced snowpack	High	Increased growth of higher elevation forests affecting large woody debris, sediment supplies, riparian zone structure	+ to 0	Low
Freshwater				
Reduced summer flow	High	Less accessible summer rearing habitat	-	Moderate
Earlier peak flow	High	Potential migration timing mismatch	0 to – (Umpqua: 0 to -)	Moderate
Increased floods	Moderate	Redd disruption, juvenile displacement, upstream migration	0 to – (Umpqua: - to -)	Moderate
Higher water temperature	Moderate	Thermal stress, restricted habitat availability, increased susceptibility to disease and parasites	- to --	Low
Estuarine				
Higher sea level	Moderate	Reduced availability of wetland habitats	- to --	High
Higher water temperature	High	Thermal stress, susceptibility to disease and parasites	- to --	Moderate
Combined effects		Changing estuarine ecosystem composition and structure	+ to --	Low
Ocean				
Higher ocean temperature	High	Thermal stress, shifts in migrations, range shifts, susceptibility to disease and parasites	- to --	Moderate
Intensified upwelling	Moderate	Increased nutrients (food supply), coastal cooling, ecosystem shifts, increased offshore transport	++ to 0	Low
Delayed spring transition	Low	Food timing mismatch with outmigrants, ecosystem shifts	0 to -	Low
Intensified stratification	Moderate	Reduced upwelling and mixing leading to reduced coastal production and food supply	0 to --	Low
Increased acidity	High	Disruption of food supply, ecosystem shifts	- to --	Moderate
Combined effects		Changing composition and structure of ecosystem, changing food supply and predation	+ to --	Low

On the individual level, the aforementioned effects of climate change on the habitat will alter the growth, survival, and fitness and, consequently, the productivity of populations. The impacts of climate change on the productivity of OC coho salmon populations within the evolutionarily significant unit (ESU) will vary by watershed condition and habitat type. The ESU remains particularly vulnerable to near-term and long-term climate effects because of the long-term loss of high quality rearing habitat. In the short-term, the ESU could rapidly decline to the low abundance seen in the mid-1990s when ocean conditions cycled back to a period of poor survival for OC coho salmon. In the long-term, climate change could lead to a downward trend in freshwater and marine habitat compared to current conditions. While considerable uncertainty exists about the magnitude that most of the specific effects of climate change will have on OC coho salmon habitat, NMFS and the NWFSC (2015) remain concerned that most changes associated with climate change could result in poorer and more variable habitat conditions for OC coho salmon in freshwater, estuarine, and marine environments (Table 1). Given this uncertainty, NMFS and the NWFSC stress that it is critical that the species is resilient enough to survive catastrophic changes in the environment, including events such as climate change and decreases in ocean productivity (NWFSC 2015).

2.2.1 Status of the Critical Habitat

Designation-wide, critical habitat for OC coho salmon encompasses 13 sub-basins in Oregon (73 FR 7816). The long-term decline in OC coho salmon productivity reflects deteriorating conditions in freshwater habitat as well as extensive loss of access to habitats in estuaries and tidal freshwater. Many of the habitat changes resulting from land use practices over the last 150 years that contributed to the ESA-listing of OC coho salmon continue to hinder recovery of the populations; changes in the watersheds due to land use practices have weakened natural watershed processes and functions, including loss of connectivity to historical floodplains, wetlands and side channels; reduced riparian area functions (stream temperature regulation, wood recruitment, sediment and nutrient retention); and altered flow and sediment regimes (NMFS 2016a). Several historical and ongoing land uses have reduced stream capacity and complexity in Oregon coastal streams and lakes through disturbance, road building, splash damming, stream cleaning, and other activities. Beaver removal, combined with loss of large wood in streams, has also led to degraded stream habitat conditions for OC coho salmon (Stout et al. 2012).

Physical and biological features for OC coho salmon are presented in Table 2. These PBFs are essential to the conservation of OC coho salmon because they support one or more of the species' life stages (e.g., sites with conditions that support spawning, rearing, migration, and foraging). The proposed action takes place in the Middle Cow Creek 5th field watershed (HUC No.: 1710030207) critical habitat unit. Middle Cow Creek is a tributary to the South Umpqua River.

Table 2. PBFs of critical habitat designated for OC coho salmon with corresponding species life history events.

Physical or Biological Features		Species Life History Event
Site Type	**Site Attribute**	
Freshwater spawning	Substrate Water quality Water quantity	Adult spawning Embryo incubation Alevin growth and development
Freshwater rearing	Floodplain connectivity Forage Natural cover Water quality Water quantity	Fry emergence from gravel Fry/parr/smolt growth and development
Freshwater migration	Free of artificial obstruction Natural cover Water quality Water quantity	Adult sexual maturation Adult upstream migration and holding Fry/parr/smolt growth, development, and seaward migration
Estuarine areas	Forage Free of artificial obstruction Natural cover Salinity Water quality Water quantity	Adult sexual maturation and "reverse smoltification" Adult upstream migration and holding Fry/parr/smolt growth, development, and seaward migration
Nearshore marine areas	Forage Free of artificial obstruction Natural cover Water quantity Water quality	Adult growth and sexual maturation Adult spawning migration Nearshore juvenile rearing

For most salmon and steelhead, NMFS's critical habitat analytical review teams (CHARTs) ranked watersheds within designated critical habitat at the scale of the 5th field hydrologic unit code (HUC5) in terms of the conservation value they provide to each ESA-listed species that they support (NMFS 2005, 2007).[1] The rankings were high, medium, or low. To determine the conservation value of each watershed to species viability, the CHARTs evaluated the quantity and quality of habitat features, the relationship of the area compared to other areas within the species' range, and the significance to the species of the population occupying that area. Even if a location had poor habitat quality, it could be ranked with a high conservation value if it were essential due to factors such as limited availability, a unique contribution of the population it served, or is serving another important role.

NMFS rated the Middle Cow Creek watershed conservation value as high (NMFS 2007). The key management activities affecting PBFs in the critical habitat unit are agriculture, forestry, and urbanization. The site potential tree height (SPTH) for the watershed is 195 feet. Mining is another management activity impacting habitat in the watershed (BLM 2004). There are 66.1 miles of coho spawning/rearing habitat, 24.7 miles of coho rearing/migration habitat, and 2.6 miles of coho migration-only habitat in the critical habitat unit, for a total of approximately 93.4 miles of critical habitat (NMFS 2007). The critical habitat unit contains seven 6th field

[1] The conservation value of a site depends upon the importance of the populations associated with a site to the ESU conservation.

subwatersheds (Wittenberg *et al.* 1999). The PBFs present in the critical habitat unit are substrate, water quality, water quantity, floodplain connectivity, forage, natural cover, and fish passage free of obstruction. Total watershed area is approximately 113,023 acres; approximately 40% of the watershed is managed by BLM (Wittenberg *et al.* 1999). However, nearly 80% of anadromous fish habitat occurs on private lands. Roads are adjacent to almost every fish stream in the watershed and there are a high number of stream crossings. Bedrock is a major component of the substrate. Many stream segments are dry during summer months and minimum flow can be as low as 1.0 cubic foot per second, although flows in the mainstem river are augmented in summer by releases from the Galesville Reservoir and dam (BLM 2004). Riparian vegetation has been removed as a result of mining and past logging practices. Water quality monitoring throughout Middle Cow Creek has resulted in 303d listings by the ODEQ for approximately 90 miles of streams that have failed to meet established criteria for water temperature. Overall, the condition of the PBFs is likely limiting the conservation role of this critical habitat unit.

2.2.2 Status of the Species

Table 3, below provides a summary of listing and recovery plan information, status summary and limiting factors for OC coho salmon. More detailed information, which informs this summary, can be found in the recovery plans and status reviews for this species and is incorporated here by reference. These documents are available online at the NMFS West Coast Region website (http://www.westcoast.fisheries.noaa.gov/) and are incorporated here by reference. The NMFS recently determined that the listing status remains appropriate (NMFS 2016b).

Table 3. Summarized listing, recovery plan, status review, and limiting factor information for the Oregon Coast coho salmon evolutionarily significant unit.

Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Threatened 6/20/11; Reaffirmed 4/14/2014	NMFS 2016a	NWFSC 2015	This ESU comprises 56 populations including 21 independent and 35 dependent populations. The last status review indicated a moderate risk of extinction. Significant improvements in hatchery and harvest practices have been made for this ESU. Most recently, spatial structure conditions have improved in terms of spawner and juvenile distribution in watersheds; none of the geographic area or strata within the ESU appear to have considerably lower abundance or productivity. The ability of the ESU to survive another prolonged period of poor marine survival remains in question. In terms of risk, the recent trend for the ESU is considered to be improving (NWFSC 2015).	• Reduced amount and complexity of habitat including connected floodplain habitat • Degraded water quality • Blocked/impaired fish passage • Inadequate long-term habitat protection • Changes in ocean conditions

Individuals in the action area are part of the South Umpqua River population, which is a functionally independent population.[2]

South Umpqua River population. The sub-basin contains thirteen watersheds, of which twelve are occupied by the species, encompassing approximately 1,727 square miles. Fish distribution and habitat use data from ODFW identified approximately 677 miles of riverine habitat in the sub-basin occupied by OC coho salmon.[3] A major contributor to the production of OC coho salmon in the South Umpqua River basin is Cow Creek. Annual population abundances have shown a high degree of fluctuation over the last 10 years (Figure 1). Coho salmon in the South Umpqua basin have declined over the years due to a number of factors including over-fishing, habitat degradation, and hatchery releases. Primary limiting factors for the population are water quantity and water quality (NMFS 2016a). Coho populations have suffered from loss of headwater holding, spawning and rearing habitat, loss of side channel overwintering habitat, habitat simplification, loss of large wood, and elevated water temperatures in the main stem due to over-widened stream channels, valley bottom roads, and water withdrawals (USDA 2004). However, there is high certainty that the South Umpqua River population will persist for the next 100 years (NWFSC 2015).

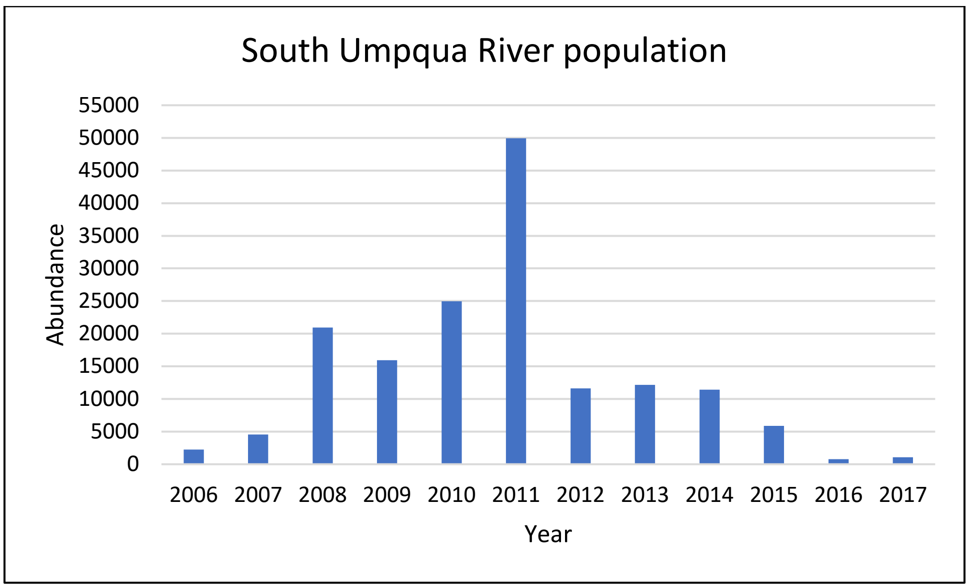

Figure 2. Estimated abundances of natural-origin adult OC coho salmon spawners in the South Umpqua River population from 2006-2017.[4]

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[2] A functionally-independent population is a population with a likelihood of persisting in isolation over a 100-year period and is not substantially altered by exchanges of individuals of other populations.

[3] E-mail from Holly Truemper, Oregon Department of Fish and Wildlife, to Jeff Young, NMFS (January 21, 2009) (reporting on mileage of coho salmon use in South Umpqua River basin).

[4] ODFW data available online.

2.3 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

The proposed mining operation is in Township 32 South, Range 4 West, Section 32 in Douglas County, Oregon. The action area for approving the 4 Apples Association Mining POO is defined from the location of the water diversion on Starveout Creek downstream to the confluence with Middle Cow Creek, approximately 4.8 miles (Figure 3). Approximately 645 feet (0.12 mile) on Tributary A from the road just above the excavation area downstream to the confluence of Starveout Creek (Figure 1) are also included in the action area. Total stream miles in the action area are approximately 4.94 miles. The action area also includes the footprint of the 0.5-acre excavation area and the 4-acre mineral processing and occupancy area. The extent of the action area was determined based on the overall extent of downstream effects associated riparian vegetation removal. Only approximately 4.46 stream miles of the action area are designated as critical habitat for OC coho salmon (approximately 4.8% of the critical habitat unit), beginning approximately 0.14 mile (750 feet) downstream from the confluence of Tributary A.

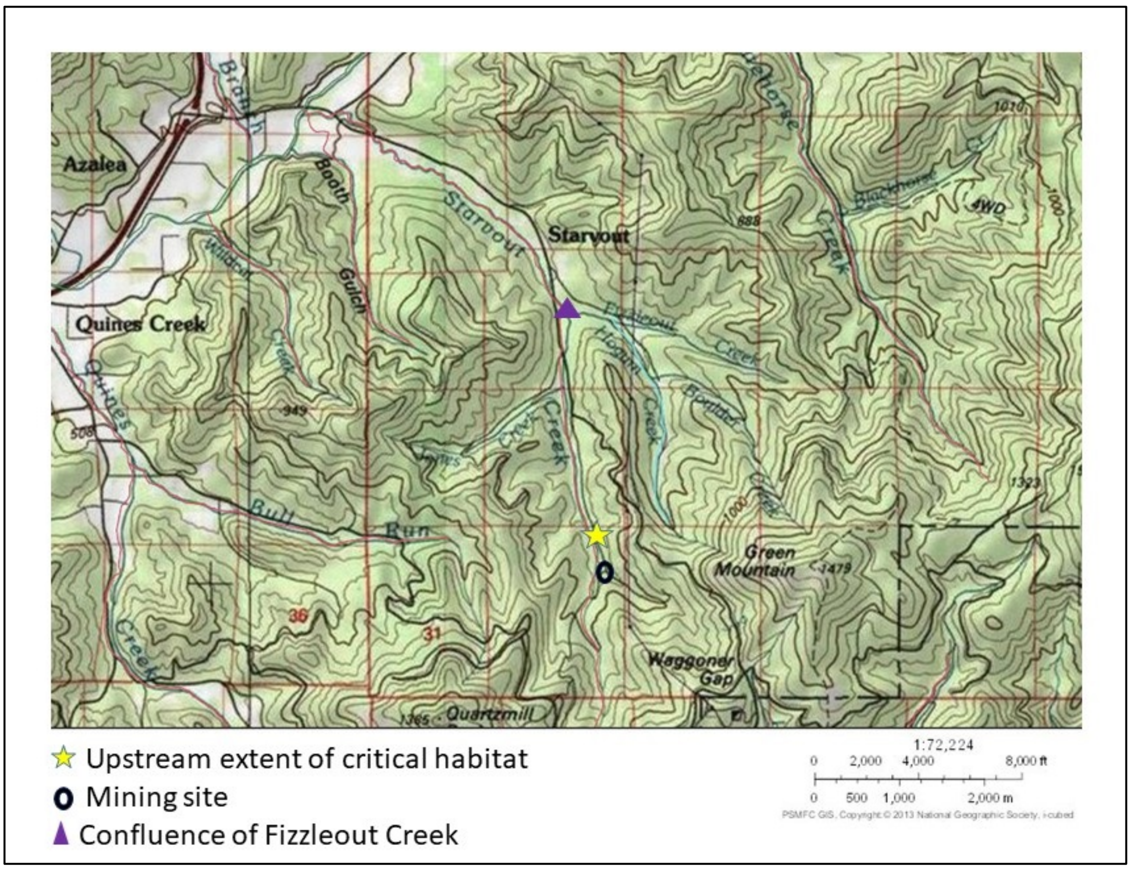

Figure 3. Approximate locations of the project area, the upstream extent of critical habitat on Starveout Creek, and the confluence of Fizzleout Creek.

2.4 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

OC coho salmon use the action area for spawning, rearing, and freshwater migration. Juveniles rear in the action area year-round and downstream juvenile migration is from March through June (ODFW 2003). Adult migration begins in September and continues through the end of January. Adult spawning begins in October and typically continues through January. Fry typically have emerged from redds by the end of March (ODFW 2003). Downstream juvenile migration occurs from March through June (ODFW 2003).

As described in Section 2.2 above, primary limiting factors for the South Umpqua River population are reduced water quality and reduced water quantity. Reduced water quantity applies to the environmental baseline of the action area but streams in the action area are not on the ODEQ 303(d) list as water quality limited (ODEQ 2012). According to BLM, there are at least eight water rights filed with the Oregon Department of Water Resources upstream of Jones Creek (BLM 2018a). There are approximately 22 water right certificates in the action area for irrigation, domestic, storage, industrial/manufacturing, and mining uses, according to the Oregon Water Resources Department water rights mapping tool (available online https://apps.wrd.state.or.us).

Furthermore, the discussion in Section 2.2 describing the reduced condition of PBFs due to past and present impacts of human activities also applies to the environmental baseline in the action area, with the exception of water quality, as does the description of climate change effects. Past logging in riparian areas caused a loss of large wood resulting in diminished recruitment of large wood to streams. Historic mining also removed timber and placed large volumes of mine tailings on streambanks which reduced or eliminated floodplain connectivity. The project area also contains several natural surface and rocked roads/trails, cleared areas, a wood shed/cabin, settling ponds, and an excavated pit from previous mining activity.

The 4.5 acres proposed for mining, mineral processing, and occupancy were mined historically. More recently, smaller portions of the area were mined at the Notice of Operation level (as determined by BLM). These areas are partially filled in and historically mined areas now contain second-growth Douglas-fir trees. However, the action area lacks late seral or high quality riparian characteristics (BLM 2018b) although some sites contain dense stands of conifers and hardwoods (BLM 2018a).

BLM conducted cross-section profiles and substrate analysis at 4 locations in the action area on August 31, 2016 and on March 7, 2018. Starveout Creek and Tributary A are perennial streams with moderate gradients (Table 4). Although Tributary A typically lacks surface flow between May 1 and October 1, BLM still considers it a perennial stream through the action area because several pools remain and are fed by hyporheic flow (BLM 2018a). Tributary B is also a perennial stream, located approximately 140 feet downstream from the water diversion on Starveout Creek (Figure 1).

Table 4. Stream habitat information at four locations within the project area.

Site	Entrench-ment Ratio	Stream Gradient (%)	Width-to-Depth Ratio	Rosgen Channel Classification	Dominant Substrate Class (mm)	Channel Width (feet)	Channel Depth (feet)
Starveout Creek water diversion	2.4	4	1.2	A4	Gravel (8-12)	10	2.5
Starveout Creek, low water ford	2.4	5	13.6	B5a	Sand (2-4)	No data	No data
Tributary A, photo site #1	2.6	5	4.2	B4	Gravel (12-16)	6	0.7
Tributary B	No data	No data	No data	No data	No data	6	0.3

Starveout Creek is the largest of the three streams at the project area (Table 4) and has moderate levels of large wood and high levels of key pieces of large wood (BLM 2018a). However, pool characteristics are all lacking or limiting and the channel is constrained by hillslopes. BLM considers floodplain function of Starveout Creek in the action area to be moderately degraded. Tributary A also lacks functional pool characteristics and lacks large wood; it has been channelized between the road and historic mining fill and is incised approximately 10-15 feet (BLM 2018b). There are no areas of off-channel habitat, refugia, or functional floodplain in the action area.

In planning for the POO, BLM also measured 2016 baseline shade conditions using fish-eye hemispherical digital photographs and analysis software at stations along Tributary A and at two locations on Starveout Creek (Table 4); average existing effective shade along Tributary A adjacent to the proposed excavation area (i.e., stations 6-12) is approximately 88.1%. For all stations along Tributary A, average existing shade is 89.1%. Each station for measuring shade was located at 50-foot intervals beginning approximately 280 feet downstream of the proposed excavation area and proceeding upstream to approximately 100 feet past the road crossing above the excavation area (BLM 2018a). In their assessment, BLM assumes that all riparian vegetation plays an equal role in shading the stream regardless of its distance from the stream and that the possibilities for solar radiation are equal regardless of stream aspect; they also tended to overestimate open sky.

Table 5. Baseline and post-mining effective shade on Tributary A and Starveout Creek (BLM 2018b).

Stream	Station	Existing Effective Shade (%)	Post-mining Disposition	Post-mining Minimum Effective Shade (%)
Tributary A, downstream end	1	90.2	Outside of Mining Area	90.2
Tributary A	2	91.6	Outside of Mining Area	91.6
Tributary A	3	91.2	Outside of Mining Area	91.2
Tributary A	4	90.9	Outside of Mining Area	90.9
Tributary A	5	92.6	Outside of Mining Area	92.6
Tributary A	6	90.1	5% canopy cover reduction	85.1
Tributary A	7	89.1	7% canopy cover reduction	82.1
Tributary A	8	90.4	9% canopy cover reduction	81.4
Tributary A	9	88.2	22% canopy cover reduction	66.2
Tributary A	10	92.8	6% canopy cover reduction	86.8
Tributary A	11	90.1	9% canopy cover reduction	81.1
Tributary A	12	75.9	7% canopy cover reduction	68.9
Tributary A	13	83.2	Outside of Mining Area	83.2
Tributary A, approximately 100 feet upstream of mining area	14	91.7	Outside of Mining Area	91.7
Starveout Creek, low water ford	15	88.9	Outside of Mining Area	88.9
Starveout Creek, water diversion	16	92.1	Outside of Mining Area	92.1

The Umpqua Basin Total Maximum Daily Load was approved by ODEQ in 2007 (Turner *et al.* 2006) and ODEQ also approved BLM's Middle Cow Creek watershed water quality restoration plan (BLM 2004). BLM was monitoring stream temperature in Starveout Creek and Tributary A but flashy stream flows in fall 2016 washed out the data loggers. However, the BLM did monitor stream temperatures in Jones Creek and Fizzleout Creek between 1994 and 2002; these streams are both tributaries to Starveout Creek, are similar in size to Starveout Creek, are approximately 1.5 miles [and 2.2 miles] downstream of the mining area, and have experienced similar past riparian management (BLM 2018a). During monitoring, the average 7-day maximum temperatures ranged from 14.0ºC to 17.2ºC. Using these measurements, BLM assumes the average 7-day maximum temperatures in Starveout Creek to be 15.6ºC (BLM 2018a). This is also the best estimate of water temperature available for Tributary A. The BLM believes groundwater contributes to the stream network in the action area due to cool stream temperatures and the relatively constant flow of water (BLM 2018a). The incised streambanks of Tributary A also partially shade the stream. Additionally, there is not a stream gauge on Starveout Creek but BLM provided one measurement of stream flow (0.2 cfs on September 8, 2016) at the proposed water diversion on Starveout Creek (Figure 4).

Figure 4. Starveout Creek at the proposed water diversion on September 8, 2016 (BLM 2018a). BLM measured a stream discharge of 0.2 cfs.

Using U.S. Geological Survey StreamStats v. 4 (USGS 2017) we were able to delineate an approximate basin and estimate monthly low flows (Risley *et al.* 2008). We first attempted to delineate the basin above the endpoint of critical habitat (but downstream of the proposed excavation area) but the size of the basin (approximately 2.94 square miles) was smaller than the range suggested by USGS and monthly low flow estimates were extrapolated with unknown errors. We then estimated the basin above the confluence of Fizzleout Creek with Starveout Creek, which is approximately two miles downstream of the proposed excavation area. Fizzleout Creek is similar in size to Starveout Creek and BLM used it as a surrogate for stream temperature information (BLM 2018b). This basin is larger than the one delineated from the upstream endpoint of critical habitat and did not have the issue of unknown errors. Considering that this basin is larger (8.83 square miles) and contains Tributary A and Fizzleout Creek in addition to Starveout Creek, the flow estimates are likely greater than the actual flow conditions at the water diversion point, which is upstream of these tributaries.

Low flow estimates for the proposed mining season are reported in Table 6. The 7-day, 2-year (7Q2) and 7-day, 10-year (7Q10) annual low-flow statistics are based on an annual series of the smallest values of mean discharge computed over any seven consecutive days during the annual period (Risley *et al.* 2008). A probability distribution is fit to the annual series of 7-day minimums, and the 7Q2 statistic is the annual 7-day minimum flow with a 2-year recurrence interval (nonexceedance probability of 50%), although the 7Q10 statistic is the annual 7-day minimum flow with a 10-year recurrence interval (nonexceedance probability of 10%). Monthly low-flow frequencies are computed by fitting a probability distribution using just the daily mean flows of each month. For ungaged sites like Starveout Creek, low-flow estimates are calculated using regression equation methods. Discharges throughout the dry season are difficult to predict for ungaged sites, and can often overestimate dry season discharges in smaller drainages (ODOT 2014). This is because gages are typically installed on larger streams. Streamflows exceed the monthly duration statistic either 50% of the time (i.e., 50% duration) or 95% of the time (i.e., 95% duration; Table 6). The estimates in Table 6 are predictions and the true values are unknown (Risley *et al.* 2008). The prediction intervals are a measure of the uncertainty; a prediction interval at the 90% confidence level means there is a 90% chance the true value will be within the margin of error.

Although the estimates indicate that stream flow dissipates in July (Table 6), BLM has stated, that the stream does not normally dry up during the summer. Therefore, we assume that the predictions in Table 6 are not entirely correct, however, these estimates are the best information we were able to acquire.

Table 6. Low-flow statistics generated by StreamStats for the 8.83 square mile basin above the confluence of Fizzleout Creek with Starveout Creek.

Month	7 Day 2 year Low Flow (cfs); 90% prediction interval	7 Day 10 Year Low Flow (cfs); 90% prediction interval	50% Duration (cfs); 90% prediction interval	95% Duration (cfs); 90% prediction interval
May	3.23; 1.61-5.57	1.5; 0.69-2.7	9.35; 4.26-17.7	3.03; 1.16-6.47
June	1.45; 0.693-2.57	0.696; 0.23-1.5	5.22; 2.19-10.4	0.681; 0.277-1.38
July	0	0	2.15; 0.756-4.82	0.446; 0.162-0.974
August	0	0	1.27; 0.341-3.32	0
September	0	0	0.868; 0.229-2.33	0

The stream sizes and these degraded environmental baseline conditions are likely to limit the abundance of OC coho salmon in the action area. However, the condition of individual juvenile and adult OC coho salmon in the action area exposed to these slightly modified environmental baseline conditions are likely to be healthy because the habitat does provide functional support.

Because Tributary A dries up until only isolated pools remain during the summer, any individuals rearing in the isolated pools of Tributary A during summer could be slightly stressed and slightly less efficient metabolically and physiologically compared to individuals in areas with continuous surface flows, but most juveniles are likely to move downstream or into other tributaries when the water levels begin to recede.

2.5 Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

2.5.1 Effects on Designated Critical Habitat

The effects of the proposed action will occur in the Middle Cow Creek 5th field watershed (HUC No.: 1710030207), which is designated critical habitat for OC coho salmon. However, it is important to note that designated critical habitat begins downstream of the proposed excavation area. Nonetheless, designated critical habitat is part of the action area. For this reason, in the summary we will clearly articulate the effects which will occur on critical habitat.

The conservation role of critical habitat in the action area is to provide habitat that supports successful juvenile and adult migration, juvenile rearing, and spawning. The action area is used for freshwater rearing, spawning, and migration. The PBFs of OC coho salmon critical habitat present in the action area are substrate, water quality, water quantity, floodplain connectivity, forage, natural cover, and free of artificial obstruction (i.e., safe passage; Table 2).

Potential habitat effects in the action area from approving the proposed mining POO are reasonably certain to include: (1) temporary reductions in water quantity; (2) temporary and localized reductions in safe passage (3) a long-term reduction in natural cover and forage; (4) a minor and non-permanent increase in water temperature/decrease in water quality; (5) localized and minor decreases in water quality from increased suspended sediment; and (6) localized and minor sediment effects on substrate. These effects are described in greater detail below. The proposed action will not affect the quality and function of floodplain connectivity.

Water Quantity

The applicant will withdraw water for mining operations, reducing the amount of water in Starveout Creek. Rapid removal of water can quickly decrease the amount of available space and habitat for rearing and migration in the action area. Water quantity for spawning is highly unlikely to be affected due to the timing of water withdrawals, beginning in mid-May through the mid-September.[5] This is because spawning typically begins in October and continues through

[5] Although specific dates for mining activities were not provided by BLM (i.e., from the end of May to the beginning of September), NMFS chose to analyze the activities as occurring from mid-May through mid-September given the occurrence of holidays at the end of May and at the beginning of September. This is because BLM does

January; although adult migration may begin in September it is unlikely adults will reach the site in early September. The BLM estimated that water volume and time needed to fill the large settling pond will be approximately 125,000 gallons and less than 3.5 hours. Therefore, when the pond is filled, the flow in Starveout Creek will decrease by approximately 1.45 cfs for approximately 3.5 hours. Because BLM assumes that filling will occur early in the season (BLM 2018b), we anticipate the primary filling of the settling pond is likely to occur during the last half of May. It is also reasonable to anticipate the applicant will fill the pond every mining season of the proposed action or for five years. Water withdrawal events will be separated in time annually, throughout the mining season, and over the 5 years of proposed operation.

During the mining season, water quantity in the form of flows in Starveout Creek would normally decrease from May to September with the highest flows expected in May (Table 6). The predictions in Table 6 have large uncertainties and are not realized amounts. However, they are indicative of a small stream with limited available water, especially during the mining season. Although the first annual water withdrawal will likely occur when the greatest amount of water is available during the mining season (i.e., May), withdrawal of 1.45 cfs would measurably and temporarily reduce water quantity in Starveout Creek for rearing and migrating by approximately 44-97% compared to the May 7Q2 and 7Q10 statistics. However, the reduction would be temporary and only for approximately 3.5 hours for the water withdrawal event.

Reduction in water quantity would occur at the point of water diversion and downstream. There is one small perennial tributary (Figure 1, Tributary B) approximately 140 feet downstream from the point of diversion. While the contribution from this tributary would begin to offset the water removed from Starveout Creek, it is likely too small to fully replenish the amount of water proposed for withdrawal. The next tributary downstream is Tributary A, which typically lacks surface flow between May 1 and October 1. Fizzleout Creek is the most immediate substantial tributary to Starveout Creek, approximately 2.2 miles (11,428 feet) downstream of the water diversion (Figure 3). Fizzleout Creek has a basin of approximately 3.57 square miles and BLM also used it as a surrogate for stream temperatures for Starveout Creek. Therefore, with contribution of water from Fizzleout Creek, we expect that reductions in water quantity would become immeasurable at this point. There are approximately 1.8 miles (9,264 feet) of designated critical habitat upstream of Fizzleout Creek on Starveout Creek that will have a temporary measurable reduction of the water quantity PBF. However, immeasurable effects are likely to continue downstream until the confluence with Middle Cow Creek.

Additional, smaller water withdrawals are also likely to occur to replace lost volume in the settling pond due to evaporation or infiltration. However, BLM was unable to provide the number, frequency, or amount withdrawn for these additional small water withdrawals. We estimate one additional withdrawal per month is reasonable, for four months during each year (i.e., June, July, August, and September). These withdrawals will occur at the same rate of 1.45 cfs but will be of much smaller duration (i.e., less than 3.5 hours). Therefore, we anticipate that the water quantity in Starveout Creek will be reduced an additional four times per year by approximately 100%, such that Starveout Creek above the confluence of Tributary B would be dry, and measurably reduced below Tributary B. Therefore, these additional withdrawals will

state that the applicant intends to work weekends and holidays with only occasional work during the week (BLM 2018b).

also temporarily reduce the water quantity PBF. It is also reasonable to anticipate the applicant will conduct these smaller water withdrawals four times a year for every mining season of the proposed action or for five years. Therefore, we anticipate that there will be a total of 25 water withdrawal events for the 5 year plan (i.e., one main water withdrawal event and 4 smaller water withdrawal events annually). Water withdrawal events will be separated in time annually, throughout the mining season, and over the 5 years of proposed operation.

Safe Passage

Water withdrawal will not occur in designated critical habitat; the diversion site is approximately 0.4 mile upstream of critical habitat. Although the water withdrawal will alter water flows and water depth in the pool at the proposed diversion site and the applicant will use hand tools to initially clear the pool of debris and substrate in preparation for diversion, the safe passage PBF will not be affected by the proposed action.

Natural Cover

Natural cover provides OC coho salmon, especially juveniles, with refuge from high velocity water and with cover for predator avoidance. Cover is frequently the product of increased habitat complexity provided by large wood and established functional riparian zones. Juvenile coho salmon abundance is positively correlated with the amount of wood cover in stream bank habitat (Beamer and Henderson 1998), suggesting that wood is an important element of juvenile rearing habitat. The complexity of wood is also correlated with juvenile fish abundance, as juvenile abundance is greater in root wad cover than in single logs (Beamer and Henderson 1998). Wood helps create pools and new channels (Foster *et al.* 2001). Water depth is also a positive variable associated with natural cover for coho salmon. In-stream wood creates rearing pools for OC coho salmon and pools are areas with maximum food exposure yet require minimal energy output (Bisson *et al.* 1987). Wood and pools provide an important source of cover/shelter for OC coho salmon including rearing and holding areas. Channel-forming processes including pool development, velocity and stream flow diversity, and substrate sorting all result from the presence of in-stream wood and are important for all life history stages of OC coho salmon.

In the scientific literature and in terms of geomorphologic function, large wood is frequently defined as greater than four inches in diameter and longer than 3.3 feet (Lisle 1986, Murphy and Koski 1989, McDade *et al.* 1990, Montgomery *et al.* 1995, Jackson and Sturm 2002, Naiman *et al.* 2002, Welty et al. 2002, Chen et al. 2006, Chen *et al.* 2008, Warren *et al.* 2009), although other studies define large wood as having larger dimensions (i.e., approximately eight inches in diameter and longer than 6.5 or 9.8 feet). The short-term presence of smaller in-stream wood is meaningful to OC coho salmon, especially in smaller tributary streams (because the influence of large wood on channel morphology is relative to channel size) and in systems with an absence of in-stream cover and shelter such as Tributary A and in Starveout Creek downstream of the proposed excavation. All wood and other organic material, whether large or small, is important to the proper functioning of streams, and these functions vary with size of both streams and wood (Bilby and Likens 1980, Beechie and Sibley 1997, Gurnell *et al.* 2002).

Removal of trees within a distance equal to one site potential tree height from streams has the greatest potential of affecting wood recruitment into the streams from riparian stands (FEMAT

1993). However, the majority of the wood recruited to a stream channel from adjacent riparian areas comes from within approximately 98 feet of the channel, with some variation depending on stand conditions (McDade *et al.* 1990, Van Sickle and Gregory 1990, Meleason *et al.* 2003, Spies *et al.* 2013). The proposed mining operation includes clearing the land of vegetation prior to excavation along approximately 300 feet on the west side of Tributary A. The width of vegetation removal in the excavation area is approximately 75 feet. The applicant will not remove vegetation in the setback area (i.e., a 20-foot buffer along Tributary A beginning at OHW; Figure 1), although it is likely that excavation along the outer edge of this area will damage roots and cause some tree death within the setback area. However, the proposed excavation area is within the area adjacent to the stream that contributes the majority of in-stream wood (i.e., 75 + 20 =95 feet < 98 feet). The BLM identified approximately 39 trees of at least 10 inches DBH that will be removed by the applicant from the proposed excavation area and an additional nine smaller trees. The typical height is approximately 130 feet with a typical age of 100 years. The 39 trees could fall into Tributary A to serve as in-stream cover or shelter based on their existing size. The proposed action will prevent the opportunity for these trees to fall into the stream. Rather they will be cut and removed for mining and placed on site for reclamation or used off site. The proposed action will also prevent the nine smaller trees from growing and falling into the streams in the future. Therefore, all 48 trees identified by BLM could contribute to in-stream cover/ shelter and channel geomorphologic processes, either now or in the future, based on their existing size. Thus, future wood recruitment opportunities will be lost through their removal, although we recognize that not all 48 trees would fall toward the stream.

The project area lacks seral or high quality riparian characteristics. The reduction of near-term in-stream cover/shelter is meaningful because of the reduced baseline condition of riparian vegetation and lack of existing in-stream cover/shelter. The delay of future wood recruitment is also meaningful because trees must typically grow for at least 50 years prior to recruitment of wood greater than four inches in diameter (Andrus *et al.* 1988); although for channels less than 33 feet wide, wood recruitment from deciduous second-growth stands may begin after 25 years and recruitment from second-growth conifer stands can begin within 50 years (Grette 1985, Beechie and Sibley 1997). Thus the proposed action will prevent in-stream recruitment of large wood from the excavated area for in-stream cover/shelter for up to 50 years and longer, because only conifer trees will be planted as part of reclamation. Due to the uncertainty associated with such far-reaching timeframes, we are unable to precisely predict the exact amount of time these adverse effects will occur. At a minimum, these effects would persist for several decades.

As part of reclamation in the proposed action, the applicant will plant conifer trees in approximately 0.86 acre which includes the excavation area and other locations that are currently unvegetated. These trees will provide future wood recruitment opportunities and future increases in in-stream cover and shelter, but they will not offset the loss caused by the proposed action due to the time required for their growth. However, the undisturbed 20-foot setback between the excavation area and Tributary A will contribute some in-stream wood during the 50+ years required for growth of planted trees. Tree sizes in the setback area range from 10-inches DBH to 30-inches DBH.[6] Although there are trees present on the opposite side of Tributary A,

[6] E-mail from Jon Raybourn, BLM, to Michelle McMullin, NMFS (August 29, 2018)(clarifying details of the project area).

recruitment opportunities from there are limited by the presence of the main access road (BLM 2018b).

Overall, riparian vegetation will be removed in the excavation area and there will be a loss of near-term and future in-stream cover and shelter from the trees that will be cut. In the longer term, tree planting will contribute sources of naturally-recruitable wood. Therefore, reduced riparian vegetation and in-stream cover/shelter will be non-permanent but of long duration, lasting until the planted trees grow, mature, and recruit into the stream. Although there is no designated critical habitat in Tributary A, designated critical habitat does begin approximately 1,100 feet downstream of the proposed excavation area.[6] Because in-stream wood affects downstream processes, because wood is transported downstream during high water flows, and because designated critical habitat is in close proximity, it is reasonably certain that the quality and function of the natural cover PBF will be reduced long-term in Starveout Creek. However, it is unlikely that effects will measurably extend past the confluence of Fizzleout Creek, located approximately 2.0 miles downstream of the proposed excavation area because it likely transports wood to Starveout Creek from its headwaters. Therefore, measurable effects are only likely to occur for 1.8 miles of designated critical habitat.

Forage

Terrestrial and aquatic insects are the primary food sources for juvenile coho salmon. Abundant food is particularly important to coho salmon during warm summer months, when water temperatures and metabolisms are high. Low summer growth rates in juvenile coho salmon often result from insufficient food consumption and the ensuing inability to meet metabolic demands associated with higher stream temperatures (Willey 2004).

Removing deciduous and coniferous riparian vegetation also reduces food sources for juvenile coho salmon because aquatic food webs are reliant on nutrient input from riparian zones and because riparian trees and vegetation also provide habitat for terrestrial insects. Additionally, similar to coho salmon, stream temperature also influences the aquatic insect community (Materna *et al.* 2001). Leaves, twigs, and branches provide nutrients and habitat for many different aquatic organisms; in-stream large wood also enhances aquatic insect production and abundance due to the complex range of habitats available for colonization and the retention of fine organic debris (Gurnell *et al.* 1995). In-stream wood also creates an energy source for the food chain as it decomposes (Foster et al. 2001). Although the 20-foot strip of vegetation directly along Tributary A adjacent to the proposed excavation area will remain intact, adjacent vegetation within 0.5 acre will be removed. This adjacent riparian vegetation also produces and supports terrestrial insects; therefore, removal of riparian vegetation will also decrease terrestrial-based food for juvenile coho salmon. Removal of the riparian vegetation and a reduction of wood recruitment into Tributary A will also decrease riparian nutrients to the stream, thereby resulting in a lower biomass of aquatic invertebrates and a reduction of habitat for aquatic insects. Thus, the proposed action is reasonably certain to negatively affect the quality and function of the forage PBF in the action area. Because effects on the forage PBF are a result of reduced riparian vegetation, this will be a long-term effect (i.e., many years) until the planted trees grow and mature and the extent of the effect is the same as that described for the natural cover PBF (see Natural Cover above). However, because only conifers will be planted as proposed reclamation, future riparian species diversity will be reduced with effects on stream productivity and aquatic invertebrate diversity, potentially changing the forage species available for coho salmon.

Water Quality—Temperature

Temperature determines many chemical, physiological, and biological processes in rivers and streams (McCullough *et al.* 2009). Summer stream temperature is a critical characteristic of habitat and water quality in the Pacific Northwest and increasing summer temperatures have contributed to the decline of native salmonid populations (Poole *et al.* 2001). Water temperature in a stream is a function of both external factors, such as solar radiation, air temperature, precipitation, flow, and internal factors such as width-to-depth ratios, groundwater inputs, and hyporheic exchange (Poole and Berman 2001, Poole *et al.* 2001, Moore *et al.* 2005). However, solar radiation is generally the dominant component of the energy budget in terms of heat gain (Johnson 2004, Moore and Wondzell 2005, Caissie 2006). Shade prevents stream warming by reducing inputs of heat energy from solar radiation. Summer stream temperature influences coho salmon growth and feeding, partly through metabolism (McCullough 1999). Increased summer stream temperature can be detrimental to the survival of most life-history stages of coho salmon, but for coho salmon, summer rearing juveniles are the most likely to be affected by elevated water temperature (NMFS 2014).

As described above, riparian vegetation will be removed in the excavation area along Tributary A. Removing trees in riparian areas reduces the amount of shade which leads to increases in thermal loading to the stream (Moore and Wondzell 2005). The BLM estimated average existing effective shade along Tributary A adjacent to the proposed mining operation (i.e., stations 6-12) to be approximate 88.1%. (Table 4). They further estimated that shade would be reduced to approximately 78.8% along the proposed excavation area (i.e., approximately 300 feet) for a reduction of approximately 9.3%. The reduction in shade at individual stations would range from 5% up to 22%; effective shade at all sites would remain above 70% (Figure 5; BLM 2018b). Although shade is just one variable that contributes to stream temperature, Groom *et al.* (2011) found that shade was critical in explaining temperature changes in western Oregon Coast Range streams; they also observed that sites with a 6% or greater change in shade had an increase in maximum water temperatures (i.e., a reduction from 91% to 85%). To add a margin of safety to address the variability observed in the study above, the Environmental Protection Agency (EPA) proposed using a maximum of 3% shade loss for the western Oregon shade loss assimilative capacity (i.e., the maximum amount of shade loss that will not result in increases in stream temperature) for use in modeling efforts on forested streams (EPA 2013).

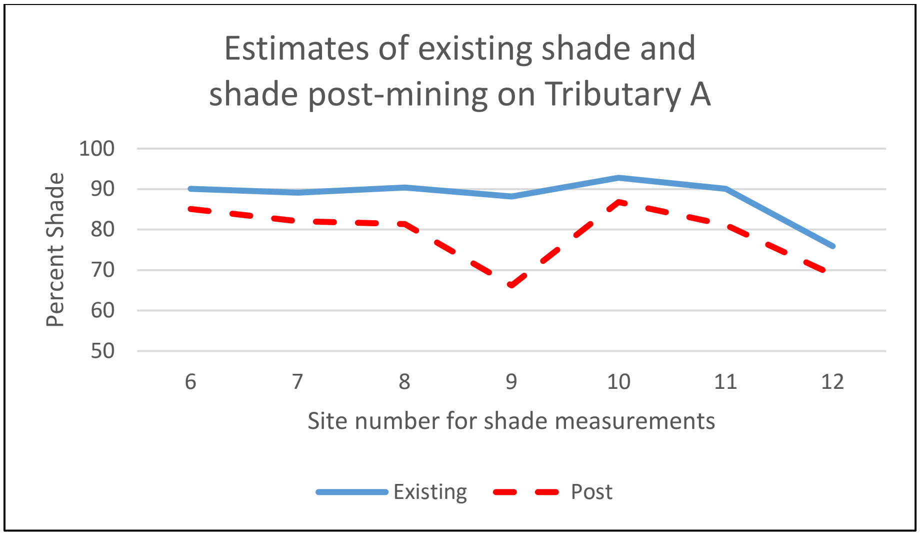

Figure 5. Estimated percent existing shade and shade post-mining adjacent to proposed excavation area on Tributary A. Based on data provided by BLM (2018b). See also Table 5.

The EPA, expanding on the data collected by Groom *et al.* (2011) and Bayesian models developed by Oregon Department of Forestry, also developed a relationship between stream shade loss and expected stream temperature increase; when stream shade is reduced by 10% stream temperatures are expected to increase by an average of 0.64°C (with a 97.5% credibility interval range of 0.43°C to 0.88°C) (Figure 6; EPA 2016). Using this information, a 9.3% shade reduction along Tributary A from the proposed action would likely increase stream temperature by approximately 0.6°C or slightly less (Figure 6). The credibility interval range of this estimate is from > 0.3°C to <0.9°C (Figure 6). However, this method may overestimate shade loss by not considering topographic shade. Additionally, Groom *et al.* (2011) also observed that temperature increases were smaller in steeper reaches, potentially due to the more frequent hyporheic exchange in step-pool morphology stream types.

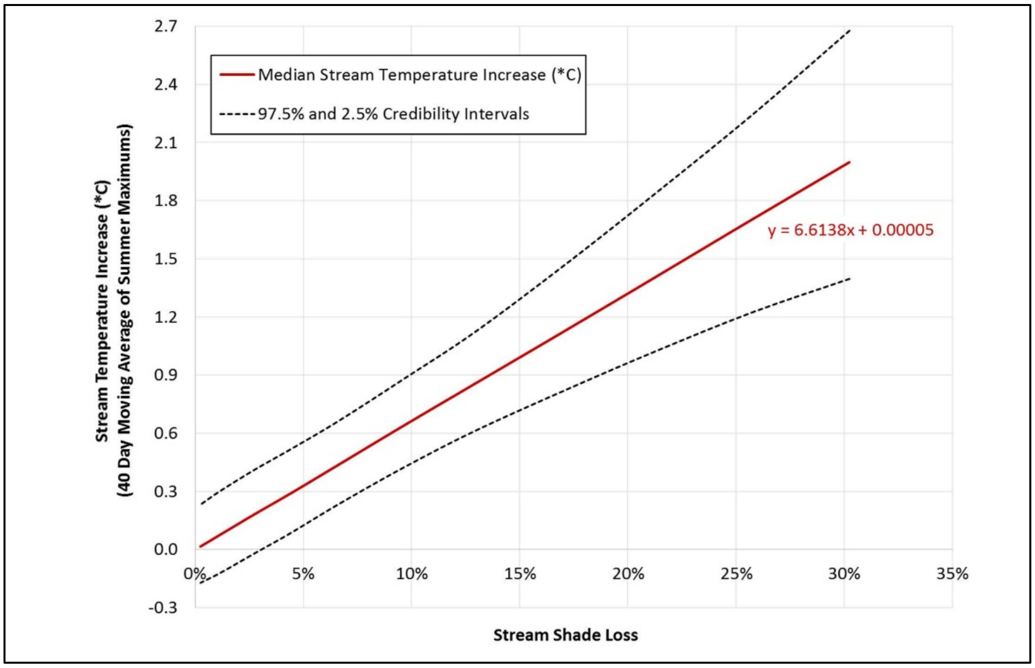

Figure 6. Predicted stream temperature increase resulting from stream shade loss (EPA 2016).

BLM (2018b) contends that use of the western Oregon shade loss assimilative capacity is only valid over a minimum of 0.25 mile (i.e., the 3% estimate does not apply to stream reaches less than 0.25 mile). BLM determined that the overall 0.25 mile reach including the proposed excavation area would only have a 2.3% reduction in shade (BLM 2018a) which is less than the reduction adjacent to the excavation area. However, NMFS was unable to find any mention of minimal stream distance in EPA comment documents or memos (EPA 2013, 2015, and 2016), although minimum treatment reaches for the above field study were approximately 0.19 mile (Groom *et al.* 2018). BLM also asserts that any water remaining in isolated pools in Tributary A during the summer is a result of hyporheic flow and these pools would maintain a cool temperature similar to that of groundwater. Yet we do not know what the groundwater temperatures are so we cannot assess the ability to maintain cooler temperatures. Therefore, measurable increases in stream temperature in Tributary A are reasonably certain to occur from a reduction in shade from the proposed action.

However, because surface flow in Tributary A is low or nonexistent during May through September of a given year, during which time the sun is high enough in the sky for solar radiation to streams to be significantly affected by riparian vegetation characteristics, surface water in Tributary A is unlikely to be transported to Starveout Creek. Additionally, it is very improbable that solar radiation on dry stones in the stream bed would transfer sufficient heat to groundwater to cause measurable increases in groundwater. Therefore, it is highly unlikely that water temperature in designated critical habitat will be measurably reduced by the removal of canopy or that the water quality PBF downstream in Starveout Creek will be measurably affected by changes in water temperature.

Because the applicant will divert water from Starveout Creek to fill the settling pond, water quantity will be temporarily reduced by 1.45 cfs for 3.5 hours in May and for smaller durations in the remaining months of the mining season. This reduction in water volume can result in increased summer water temperatures because a shallower stream will heat up faster than a deeper stream. The BLM estimated an approximate increase in water temperature of 0.02°C over a distance of 500 feet from the diversion and an increase of 0.05°C over a distance of 1,500 feet (Cristea and Janisch 2007). Although this will happen once, and likely up to five times total, during the warmest months, this increase would be of short duration and would not change the average 7-day maximum temperature in Starveout Creek. These temporary increases in water temperature related to water withdrawal are reasonably certain to be very short duration (i.e., hours), small, and immeasurable (i.e., <0.3°C). It is very improbable that these localized effects would be measureable downstream in designated critical habitat.

Substrate & Water Quality –suspended sediment

Washing the gold-bearing material will result in accumulation of sediments in the permanent settling ponds. However, the permanent ponds are located approximately 130 feet from Tributary A and is not elevated above the stream. There are no records indicating the ponds have ever leaked. For the proposed excavation, the applicant will install sediment control devices between Tributary A and the proposed excavation and there will be no soil disturbance within 20 feet of Tributary A. Heavy equipment will not be operated in streams. Per a BLM BMP, the applicant will also winterize the haul routes at the project area. Furthermore, BLM will conduct regular inspections of the project area including in response to rain or other environmental events. For these reasons, it is highly unlikely that any seepage from the pond will occur or that any measurable sediment will be transported to the streams at the project area. Maintenance of the pool for diversion will only be done with hand tools to initially clear the pool of debris and substrate in preparation for diversion and all suspended sediment will be localized to the immediate area and reasonably expected to be minor. Similarly, the two existing low-water fords will only be infrequently crossed by foot which will not produce detectable suspended sediment or substrate effects. Therefore, no measurable increases in suspended sediment in the streams or sedimentation of substrate is likely to occur. There will not be any measurable effects on the water quality or substrate PBFs from suspended sediment or sedimentation as a result of the proposed action.

Summary of Effects on Designated Critical Habitat

The only adverse effects reasonably certain to occur in designated critical habitat include temporary reduction of the water quantity PBF and long-term but non-permanent reductions of the natural cover and forage PBFs. Effects on water quality and substrate are localized to the project area and with a remote possibility of being measureable downstream in designated critical habitat. Therefore, the quality and function of the water quality and substrate PBFs will not be meaningfully changed in the action area.

Water withdrawal will measurably reduce the quality and function of the water quantity PBF in Starveout Creek, for approximately 1.8 miles. However, these effects will only last for a couple of hours with each event (approximately five events annually) or less, although events will occur for each year of mining. Mining operations will also measurably reduce the quality and function of the natural cover and forage PBFs from the removal of riparian vegetation and the loss of wood recruitment for approximately 1.8 miles. Although small effects, they are meaningful to critical habitat in the action area, and will be long-term negative effects; these are non-permanent effects because the proposed riparian plantings will mature over time. The proposed action will not affect the quality and function of floodplain connectivity or safe passage PBFs.

In Section 2.2.1, we determined that the condition of all of the PBFs were limiting the conservation role of critical habitat in the Middle Cow Creek watershed. The proposed action would measurably and negatively affect the water quantity, natural cover, and forage PBFs in the action area. But, because of the small component of critical habitat adversely affected within the overall critical habitat unit (approximately 1.9%), these effects are unlikely to adversely affect OC coho salmon critical habitat at the 5th field watershed level or its conservation role. None of the anticipated PBF effects will be permanent. Although the current condition of critical habitat is not fully functional for the conservation of the species the proposed action will not preclude of significantly delay the natural trajectory of PBF development for critical habitat in the overall Middle Cow Creek unit.

2.5.2 Effects on OC coho salmon

Exposure to the Effects of the Proposed Action

Most of the activities included in the proposed action will occur from mid-May through mid-September, with the exception of occupancy (i.e., continued presence of a locked building for storage and use of self-contained travel trailers – see Section 1.3). With the exception of occupancy, adult OC coho salmon and eggs will not be exposed to the proposed activities because they will only be present from September through January. Activities associated with occupancy are not expected to affect OC coho salmon due to their location away from streams.

Fry typically have emerged from redds by the end of March such that rearing juveniles will be mobile when mining operations begin. Smolts will also be exposed to activities occurring prior to July. Although not all life history stages will be present during the mining season, all life history stages will be exposed to the long-term effects of the proposed action on natural cover.

Stranding, Displacement, Screen Impingement, and Entrainment

Water withdrawal to fill the settling pond will measurably reduce the amount of water by 1.45 cfs in Starveout Creek for smolts and rearing juveniles. During periods of decreased water juvenile fish are likely to become more vulnerable to predation or stranding. Even early in the season when the main water withdrawal will occur, the withdrawal of 1.45 cfs would measurably reduce flows by approximately 44%-97%. Additionally, the withdrawal rate will likely be rapid enough that the amount of available space and habitat would be quickly decreased by dewatering, especially on the stream margins. Therefore, even a small and localized reduction in water quantity will likely strand some smolts and rearing juvenile OC coho salmon as water quantity is reduced by water withdrawal, albeit to a small extent and minimizing the number of individuals affected. This is because the small stream size and the modified environmental baseline conditions likely limit the overall abundance of OC coho salmon in the action area.

As baseline stream flows decrease throughout late spring and summer, withdrawal of 1.45 cfs will cause greater effects on water quantity and space and increase the risk of stranding for juveniles and smolts because there will be even less water present in the channel (Table 6). A small portion of the stream could also go dry. Some individuals may be able to move from their preferred location to avoid being trapped or stranded. However, displaced individuals are reasonably certain to experience increased predation, increased competition with other juveniles, and a reduction in feeding due to a less favorable feeding position. Each disturbance would be temporary (i.e., a few hours) and very localized, although there will be approximately five annual withdrawal events. Because of the small stream size and the modified environmental baseline conditions it is anticipated that only a small number of juveniles and smolts will be affected or likely to be injured or killed in each of these events. However, NMFS cannot predict the number precisely because the distribution and abundance of fish within the action area, at the time of the action, are not a simple function of the quantity, quality, or availability of predictable habitat resources within that area. Rather, the distribution and abundance of fish also show wide, random variations due to biological and environmental processes operating at much larger demographic and regional scales.

Some individuals in the diversion pool will be temporarily displaced during annual maintenance of the pool at the beginning of the mining season. However, individuals are likely to be displaced only for a very short time while the applicant uses hand tools for substrate removal, debris removal, and screen cleaning. Minimal disturbance of the pool makes it highly unlikely that the normal behavioral patterns of displaced juveniles and smolts will be meaningfully altered or that they would be injured in any way.

Water withdrawal will also alter water flows and velocities in the pool at the proposed diversion site. Although the diversion is by gravity flow and BLM says the point of diversion will be screened to NMFS screening criteria,[7] no specific design information was provided to NMFS with the consultation request. NMFS typically recommends a minimum fish screen approach velocity of 0.4 feet per second (fps) for the smallest-fry-sized salmon to minimize screen contact or impingement (NMFS 2011). Due to the lack of screen design information, we are unable to determine that NMFS guidelines and criteria will be met for the proposed water diversion and therefore cannot assume that juvenile coho salmon will not be impinged or entrained. In fact, without a proper screen, the approach velocity will greatly exceed 0.4 fps; if the pipe is completely submerged the approach velocity could be as high as 16 fps. Therefore, use of a screen that does not meet NMFS criteria for fish passage and for approach velocities during water withdrawal will result in entrainment into the diversion or impingement on the screen for some smolts and juvenile OC coho salmon during each water withdrawal event. This means that some individuals will swim into the diversion only to be trapped in the pipe or other part of the withdrawal system or that some individuals will be unable to swim away from or avoid contact with the screen. Either outcome will cause injury (i.e., bruising and descaling) or death. As noted above, NMFS is unable to precisely quantify the number of juveniles and outmigrating smolts expected to be present in the action area and exposed to impingement or entrainment due to the complex relationship and variables, but because these events will be temporary (i.e., 3.5 hours or less for each event) and with localized effects, only a small number of fish will die or be injured.

[7] NMFS screening criteria and the preliminary design development process are presented in NMFS anadromous salmonid passage facility design (NMFS 2011 or latest version).

Although there will be multiple withdrawal events per year (up to 5), for a period of 5 years, the overall total amount of dead or injured fish will still be small because the pool size will decrease throughout the mining season (Table 4, Figure 4), which restricts the number of fish present.

Reduced In-stream Habitat Complexity and Forage

Removal of riparian vegetation will reduce wood recruitment to streams and in-stream cover/shelter that provides complex rearing habitat important to juvenile OC coho salmon survival. Although the 20-foot undisturbed setback will continue to contribute some in-stream wood, approximately 0.5 acre of riparian area of the proposed excavated area will be prevented from doing so until trees planted during reclamation grow, mature, and recruit to the stream. The resulting lack of refuge from high water velocities, cover for predator avoidance, rearing areas, and holding areas will adversely affect all life history stages of OC coho salmon by decreasing survival. The reduction of riparian vegetation and in-stream wood that provides habitat for macroinvertebrate prey will also adversely affect growth of juveniles and smolts, further contributing to decreased survival. Additionally, the continuing reduction of channel forming processes associated with large wood, including pool development, velocity and stream flow diversity, and substrate sorting, will be sustained until trees planted during reclamation grow, mature, and recruit to the stream, thus adversely affecting the reproductive success of spawning adult OC coho salmon and egg/fry survival by limiting available spawning habitat. Measurable effects will extend for approximately 0.07 mile of Tributary A and 1.94 miles of Starveout Creek until the downstream confluence of Fizzleout Creek.

Water Quality – Temperature

Estimated temperature for Starveout Creek (from 1994 and 2002, see Section 2.4) is cool with an average 7-day maximum temperature of 15.6^{o}C; however it is possible this has slightly increased over the past 16 years. Due to lack of data for Tributary A, we will also consider this the average 7-day maximum temperature for Tributary A. In spite of a slight possible increase through time, existing stream temperatures are likely well below the upper lethal temperatures of 23-26^{o}C for juvenile rearing coho salmon (refer to NMFS 2015); local lethal temperatures are also attenuated by acclimation, feeding rate, behavior, and genetic adaptations. Therefore, small increases from the proposed action are unlikely to directly injure or kill coho salmon in Tributary A. However, the preferred or optimal rearing temperature (i.e., temperature at which fish are metabolically and physiologically efficient and most likely to thrive) of juvenile coho salmon at approximately 10-17^{o}C is much lower than the upper lethal temperatures (refer to NMFS WCR-2013-76, 2015). Even so, it is very improbable the proposed action will contribute to measurable elevated temperature above the preferred/optimal range (i.e., greater than 17^{o}C) in Tributary A from a reduction in shade and riparian vegetation due to the hyporheic flows in summer, partial shade provided by incised streambanks, and the moderate approximated increase (i.e., 0.6^{o}C). Additionally, increases in water temperature in Starveout Creek due to water withdrawals are highly likely to be immeasureable (see Section 2.5.1). Therefore, the proposed action is highly unlikely to meaningfully change rearing, growth, or survival of OC coho salmon or result in injury or death.

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). 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 contribution of non-Federal activities to the current condition of ESA-listed species and designated critical habitat within the action area was described in the Status of the Species and Critical Habitat and Environmental Baseline sections. Habitat in the action area is currently modified by agriculture, forestry, and mining. These activities have resulted in reduced water quantity, loss of large wood in streams, reduced floodplain connectivity, and a lack of high quality riparian characteristics. Impacts associated with these activities are ongoing and likely to continue to have a depressive effect on critical habitat quality and function resulting in additional stress on OC coho salmon in the action area. We were unable to identify any specific future non-Federal activities in the action area. Foreseeable non-Federal activities identified by BLM include casual mining operations. Although the location, timing, and duration is speculative they anticipate these activities result in only negligible disturbance. Therefore, we expect cumulative effects to have a slight negative impact on population abundance and productivity. Likewise, we do not expect a decline in the quality and function of critical habitat PBFs in the action area as a result of cumulative effects.

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 diminishes the value of designated or proposed critical habitat for the conservation of the species.

The description of the proposed action's effects includes any influence of current environmental conditions and their associated variability. While climate change is expected to continue over the relatively short duration of the action's direct and indirect effects, we cannot distinguish changes in temperature, precipitation, or other factors attributable to climate change from annual and decadal climate variability over this time period (Cox and Stephenson 2007, Deser *et al.* 2012, McClure *et al.* 2013). For these reasons, climate change is not expected to amplify the effects of the proposed action in ways not already described in Section 2.5.

2.7.1 Critical Habitat

The Middle Cow Creek 5th field watershed has a high conservation value. Thus, this critical habit unit is essential to support the South Umpqua River population of OC coho salmon. The baseline condition of critical habitat function and value in the watershed (Section 2.2) and in the action area (Section 2.4) is moderately degraded, primarily due to riparian vegetation removal, agricultural development, roads, reduced floodplain connectivity, and water withdrawals. All of the PBFs (i.e., substrate, water quality, water quantity, floodplain connectivity, forage, natural cover, and fish passage free of obstruction) are likely to be limiting the conservation role of the critical habitat unit (Section 2.2). In the action area, water quality appears to be functional, but PBFs of reduced quality include water quantity, floodplain connectivity, and natural cover (Section 2.4). Although the quality and function of critical habitat has been reduced, it does provide some support for OC coho salmon. As described in Section 2.6, we do not expect a decline in the quality and function of critical habitat PBFs in the action area as a result of cumulative effects.

The proposed action could potentially impact five freshwater PBFs (Section 2.5), but only three will be adversely affected. Adverse effects on the water quantity PBF will be temporary for each withdrawal event, although multiple events will occur. Adverse effects on the natural cover and forage PBFs will be long-term but non-permanent due removal of riparian vegetation and subsequent riparian plantings. There are three PBFs that are likely to be of reduced quality (i.e., water quantity, floodplain connectivity, and natural forage) in the action area (Section 2.4). As mentioned, there will only be temporary adverse effects on the water quantity PBF and non-permanent adverse effects on the natural cover PBF. The proposed action will not affect the quality and function of the floodplain connectivity or safe passage PBFs. Effects on the remaining PBFs are either undetectable or very improbable. Furthermore, because of the small component of the adversely affected area within the critical habitat unit (approximately 1.9%), the effects of the proposed action are unlikely to have an adverse effect on the function of these OC coho salmon critical habitat PBFs at the 5th field watershed level or its conservation value.

Overall, the effects of the proposed action, when added to the environmental baseline, cumulative effects, and status of critical habitat, will not appreciably reduce the condition and function of critical habitat PBFs in the Middle Cow Creek critical habitat unit or its conservation value. This is because only a small component of critical habitat will be adversely affected, because none of the adverse effects will be permanent, and because the majority of effects will be undetectable on the PBFs. Thus, the affected critical habitat unit will retain its ability to serve its intended conservation role for OC coho salmon. Therefore, the value of the range-wide designation of critical habitat will not be appreciably diminished and will retain its current ability to play the intended conservation role for OC coho salmon, which is to help support viable populations of this ESU.

2.7.2 Species

OC coho salmon are at a moderate risk of extinction (Section 2.2). The proposed action will affect individuals of one functionally independent population (i.e., South Umpqua River), out of a total of 21 functionally independent populations. Additionally, the affected area and individuals constitute only a small amount of the population. Coho salmon abundance in the action area is likely to be low due to the small stream sizes and due to decreased flows, lack of in-stream habitat complexity, and reduced floodplain connectivity (Section 2.4). The effects on the South Umpqua River population of OC coho salmon would be the integrated responses of individuals to the predicted environmental changes. Instantaneous measures of population characteristics, such as population size, growth rate, spatial structure, and diversity, are the sums of individual characteristics within a particular area, while measures of population change, such as a population growth rate, are measured as the productivity of individuals over the entire life cycle (McElhany *et al.* 2000). A persistent change in the environmental conditions affecting a population, for better or worse, can lead to changes in each of these population characteristics.

Abundance of the South Umpqua River population has been highly variable, however, there is high certainty that the South Umpqua River population will persist for the next 100 years (NWFSC 2015). Adverse effects on OC coho salmon individuals in the South Umpqua River population are reasonably certain to occur in the action area from the proposed action include:

- Injury, mortality, increased predation, increased competition, and reduced feeding of rearing juveniles and smolts from stranding and displacement associated with water withdrawal.
- Injury and mortality for rearing juveniles and smolts from entrainment or screen impingement associated with water withdrawal.
- Decreased survival for all life history stages of OC coho salmon and meaningfully changed essential behavior patterns of rearing, migrating, feeding, and sheltering from removal of riparian vegetation resulting in reduction of wood recruitment to streams and in-stream cover/shelter.
- Decreased growth and survival of some juveniles and smolts from removal of riparian vegetation that provides habitat for macroinvertebrate prey.
- Reduced reproductive success of spawning adult coho salmon and reduced egg/fry survival through the long-term and non-permanent lack of channel forming processes associated with large wood, including pool development, velocity and stream flow diversity, and substrate sorting, which all limit available spawning habitat, from removal of riparian vegetation.

The above adverse effects are limited to no more that approximately 2.0 miles of Tributary A and Starveout Creek combined and will only affect a small number of OC coho salmon individuals within one of 12 occupied 5th field watersheds within the geographic boundaries of the South Umpqua River coho salmon population. Therefore, this amount will be too few to meaningfully change abundance, productivity, distribution, or diversity of the population. We did not identify any cumulative effects for the action area that were not previously described in the Environmental Baseline (Section 2.4). Cumulative effects, as described in Section 2.6, are not likely to change appreciably, and will only have a slight negative impact on population abundance and productivity.

Habitat-related effects from the proposed action are related to the primary limiting factors of the population: water quantity and water quality. Increases in water temperatures will be too small to meaningfully change rearing, growth, or survival of OC coho salmon or result in injury or death. Effects from water withdrawal will only be temporary. Therefore, the proposed action will not meaningfully change the limiting factors of the population and meaningful changes to population abundance and productivity will not occur.

NMFS' recovery direction for OC coho salmon focuses on turning degraded habitat into good habitat, and protecting habitats that are currently functioning. The primary recovery strategy for the populations in the Umpqua River is to protect current high quality summer and winter rearing habitat and strategically restore habitat quality in adjacent habitat. The recovery plan identifies priorities for restoration of ecological processes to improve water quantity, water quality, and instream and estuarine habitat complexity. As discussed above, the proposed action will not meaningfully affect population viability and the proposed action will only have non-permanent effects on limiting factors. Additionally, the proposed action includes a reclamation component which involves the applicant recontouring mine tailing (both existing and new), planting trees on 0.86 acre, using stockpiled topsoil from excavation to augment plantings, removing the existing shed, and decommissioning 0.2 mile of road in the project area. The reduction in abundance to the population from the proposed action will be small and will not result in a measurable decrease in population-scale abundance and productivity, nor will it change the persistence trajectories of the population. Therefore, the population will not be impeded in playing its role in the recovery of the OC coho salmon ESU.

Given the above, the proposed action will not be likely to meaningfully change the limiting factors, will have no discernible effect on population viability, and will not impede recovery of the OC coho salmon ESU. Therefore, the proposed action will not appreciably reduce the likelihood of both the survival and recovery of the OC coho salmon ESU.

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, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of OC coho salmon or destroy or adversely modify its 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). NMFS interprets “harass” to create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. “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

Incidental take is reasonably certain to occur because some OC coho salmon individuals in the action area will be harmed from water withdrawals and habitat modification resulting in reduced in-stream wood recruitment, as detailed in Section 2.7.2.

Accurately quantifying the number of fish harmed by these pathways is not possible because injury and death of individuals in the action area is a function of habitat quality, competition, predation, and the interaction of processes that influence genetic, population, and environmental characteristics. These biotic and environmental processes are highly variable and interact in ways that may be random or directional, and may operate across broad temporal and spatial scales. The precise distribution and abundance of fish within the action area, at the time of the action are not a simple function of the quantity, quality, or availability of predictable habitat resources within that area. Rather, the distribution and abundance of fish also show wide, random variations due to biological and environmental processes operating at much larger demographic and regional scales. Thus, the distribution and abundance of fish within the action area cannot be attributed entirely to habitat conditions, nor can we precisely predict the number of fish that are reasonably certain to be injured or killed either directly or if their habitat is modified or degraded by actions that will be completed under the proposed action. Furthermore, there are no methods available to monitor this death and injury because it will occur throughout the year and in some cases, after the proposed action has been completed. Therefore, it is not practical or realistic to attempt to identify and monitor the number of fish taken by the pathways described. Even for screen impingement, it is possible that small juveniles could be hidden by debris also impinged on the screen and go unobserved.

In cases such as this, where quantifying a number of fish is not possible, we use take surrogates or take indicators that rationally reflect the incidental take caused by the proposed action. We identified two rational surrogates to serve as the best available indicators for the extent of take caused by the proposed action: (1) the number of annual and total water withdrawals from Starveout Creek and (2) the minimum setback widths between Tributary A and the excavation area.

1. The anticipated number of water withdrawals from Starveout Creek or five withdrawal events annually for five years is associated with harm from stranding, entrainment in the water diversion, and screen impingement. The number, flow rate, and duration of water withdrawal events is directly related to the amount of take because more water withdrawn faster leads to greater amounts of stranding, displacement, entrainment, and impingement. Based on information provided by BLM regarding the constraints of the

proposed diversion system, a typical event is based on a flow rate of 1.45 cfs and will last for approximately 3.5 hours, but most events should be of a shorter duration. However, duration will vary based on the flow rate and flow rate will likely change due to performance of the diversion system or changes to the diversion system. Therefore, the annual and total number of water withdrawal events is an effective reinitiation trigger because water withdrawal is only necessary for the operation of the trommel, is a discrete activity, and the number of withdrawals reflects the intensity of disturbance. Water withdrawal is an easily measurable event and will therefore function as a readily discernable and meaningful indicator.

2. The minimum setback widths between the excavation area where trees will be removed for mining and Tributary A is proportional to harm associated with reduced wood recruitment to streams and habitat modification resulting from the removal of trees within one site potential tree height of streams. This is because in-stream wood recruitment and forage are all functions dependent on the proximity of trees to the stream. Specifically, anticipated take will be exceeded if the minimum setback width is less than 20 feet between Tributary A and the excavation area because this means that existing trees and vegetation that were expected to remain on-site in proximity to Tributary A and provide habitat functions would be removed, increasing the intensity of expected effects and resulting in greater take. The minimum setback widths, as described above, will function as an effective reinitiation trigger, in part, because they can be measured and delineated prior to the beginning of mining activities and as mining activities are carried out, and can be triggered at a point in time where reinitiation would have meaningful consequences. Because potential exceedance can be identified prior to mining operations and avoided, the minimum setback width will therefore function as a readily discernable indicator throughout the mining operation.

In summary and as described above, the extent of take surrogates used as reinitation triggers are:

1. Five annual water withdrawal events from Starveout Creek between mid-May and mid-September for a total of 25 events, and

2. The minimum setback width of 20 feet between Tributary A and the excavation area.

Exceeding these surrogates will trigger the reinitiation provisions of this opinion.

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 BLM or the applicant shall implement the following reasonable and prudent measures that are necessary or appropriate to minimize the impact of incidental take of listed species from the proposed action:

1. Minimize incidental take resulting from adverse effects associated with water withdrawal.

2. Minimize incidental take resulting from adverse effects associated with riparian vegetation removal.

3. Complete monitoring and reporting to confirm that the take exemption for the proposed action is not exceeded, and that the terms and conditions in this incidental take statement are effective in minimizing incidental take.

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and BLM or any applicant must comply with them in order to implement the reasonable and prudent measures (50 CFR 402.14). The BLM and/or the applicant have 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.

1. The following terms and condition implement reasonable and prudent measure #1 (water withdrawal):

    a. The BLM shall require that the applicant follows these screen design and operational conditions for water withdrawal:
        i. Two days' notice will be given to BLM by the applicant prior to each water withdrawal event to allow BLM to coordinate regular inspections and/or spot checks for monitoring purposes.
        ii. Applicant must have appropriate approval from Oregon Water Resources Department before beginning water withdrawal to ensure that only the authorized amount of water will be withdrawn.
        iii. Water withdrawal operations shall begin no earlier than one hour after sunrise and must finish no later than one hour before sunset to enable observations and prevention of screen impingement.
        iv. The applicant shall notify BLM and NMFS within 48 hours if any fish become impinged on the screen.

    b. BLM will develop a process for NMFS review and verification of the proposed screen design with regard to the criteria in NMFS Anadromous Salmonid Passage Facility Design (NMFS 2011 or latest version) for approach velocity, escape route, screen orientation, surface area, mesh sizing, and all other relevant items, prior to permit authorization.

2. The following terms and conditions implement reasonable and prudent measure #2 (riparian vegetation removal):

a. The BLM shall require that the applicant maintain a 20-foot setback width between Tributary A and the excavation area by reviewing the marked layout prior to the beginning of mining operations and during mining operations.
b. The BLM shall require that the applicant include native deciduous tree species when planting as a part of reclamation to increase riparian vegetation diversity and to increase stream productivity including a greater variety of aquatic invertebrates as forage for coho salmon.

3. To implement reasonable and prudent measures #1 and #2 (water withdrawal and riparian vegetation removal), the applicant shall:

   a. Ensure and perform all the stipulations listed under Term and Condition 1a above.
   b. Ensure and follow all the stipulations listed under Term and Condition 2 above.

4. The following terms and conditions implement reasonable and prudent measure #3 (monitoring and reporting):

   a. Periodic Review. The BLM fisheries biologist, hydrologist, and geologist will conduct spot checks of the 4 Apples Association Mining Operation multiple times during annual mining activities.
   b. Monitoring. The BLM shall provide a monitoring report annually by February 15 following the completion of mining operations, excluding completion of reclamation, with the following information:

      i. Starting and ending dates of annual mining operations.

      ii. A summary of pollution and erosion control inspections, including any erosion control failure, sediment release, and correction effort.

      iii. Dates and results of periodic spot checks by BLM of the 4 Apples Association Mining Operation.

      iv. Setback widths for the excavation area during and following completion of mining operations.

      v. Number of annual and total withdrawal events including date and duration of each event.

   c. Reclamation. The BLM shall provide a reclamation report, due approximately three years but no later than four years following completion of mining operations, that describes the reclamation activities, survival of trees planted, percentage of deciduous species planted, and percent effective shade recovered. If feasible, percent effective shade should be measured using the same methods and stations along Tributary A that BLM used to measure baseline shade conditions (see Table 5). Otherwise, BLM shall use an equivalent protocol based on determining percent effective shade through measurement of clear sky to evaluate shade recovery for survey areas on Tributary A within the POO area.

d. Submit all reports to:

ARA, Oregon/Washington Coastal Office
NOAA Fisheries, West Coast Region
Attn: WCRO-2018-00046
1201 Lloyd Blvd Suite 1100
Portland, Oregon 97232-1274

2.10 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). The following conservation recommendations are discretionary measures that we believe are consistent with this obligation and therefore should be carried out by the Federal action agency:

1. For mining activities in streams likely to contain ESA-listed fish species, BLM should coordinate with NMFS to provide appropriate screen design criteria and water withdrawal operation conditions to future mining applicants prior to completion of the plans of operation to avoid adverse effects associated with water withdrawal.

2. BLM should consider using riparian trees harvested during mining as in-stream restoration opportunities to increase natural cover and stream productivity in streams that are deficit in large wood or complex habitat.

3. For future consultation for Plans of Operation, BLM should evaluate and recommend specific measures, including appropriate setback distances, to avoid stream temperature increases of $\geq 0.3^{o}C$.

Please notify us if the Federal action agency carries out any of these recommendations so that we will be kept informed of actions that are intended to improve the conservation of listed species or their designated critical habitats.

2.11 Reinitiation of Consultation

This concludes formal consultation for approving the 4 Apples Association Mining POO.

As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) The amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by BLM and descriptions of EFH for Pacific coast salmon (PFMC 2014) contained in the fishery management plans developed by the Pacific Fishery Management Council and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

The proposed action and the action area for this consultation are described above in Sections 1.3 and 2.3. The action area is also designated by the PFMC (2014) as EFH for Pacific salmon and includes spawning habitat. Spawning habitat and complex channel and floodplain habitat are identified by the PFMC as a habitat area of particular concerns (HAPC). The action area is also in an area where environmental effects of the proposed project would likely adversely affect EFH and HAPC for Pacific salmon. While the HAPC designation does not add any specific regulatory process, it does highlight certain habitat types that are of high ecological importance (PFMC 2014).

3.2 Adverse Effects on Essential Fish Habitat

The effects of the action, as proposed, on EFH are similar to those described above in the ESA portion of this document (Section 2.5). The habitat requirements (i.e., EFH) for the MSA-managed species in the action area are similar to those of the ESA-listed species. Based on information provided by the action agency and the analysis of effects presented in the ESA portion of this document, we conclude that the proposed action will have the following adverse effects on EFH designated for Pacific Coast salmon, including the spawning habitat and complex channels/floodplain habitats HAPCs.

Freshwater EFH quantity and quality, including salmon spawning habitat HAPC, will be temporarily reduced by (1) temporary and localized decreases in water quantity and (2) a small reduction in wood recruitment to streams, in-stream cover/shelter, spawning habitat, and habitat for macroinvertebrate prey.

3.3 Essential Fish Habitat Conservation Recommendations

We believe that the following EFH conservation recommendations would address the adverse effects described above. We recommend these measures, which are a subset of the ESA terms and conditions described in Section 2.9 of the accompanying opinion, as actions that can be taken by the action agency to conserve EFH.

1. The BLM should minimize adverse effects of water quantity on rearing and migration EFH by ensuring the applicant follows the screen design and operational conditions for water withdrawal as stated in Term and Condition #1a in the accompanying opinion (Section 2.9) and by developing a process for NMFS review and verification of proposed screen design as stated in Term and Condition #1b in the accompanying opinion.

2. The BLM should minimize adverse effects on riparian vegetation and in-stream cover/shelter, including the spawning habitat and complex channel/floodplain habitats HAPCs, by following and implementing the Terms and Conditions for Reasonable and Prudent Measure #2 in the accompanying opinion (Section 2.9).

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, BLM must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least ten days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations (CRs) unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the CRs, the BLM must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many CRs are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of CRs accepted.

3.5 Supplemental Consultation

The BLM must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH CRs (50 CFR 600.920(l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are BLM and the applicant. Other interested users could include others interested in the conservation of the affected ESU. Individual copies of this opinion were provided to BLM. The format and naming adheres to conventional standards for style.

4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data, and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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