US Fish and Wildlife Service Comments – Pebble Project Preliminary Draft EIS, Section 4.24 – Fish Values

Agency	Comment No.	Section, Paragraph, and Page #	Cooperating Agency Comment (and Purpose of Comment)	Proposed Resolution (Additions or Deletion of Text)	Response
USFWS	1		Within the document, stream miles are reported as “spawning” or “rearing” values based on the AWC observations of spawning or rearing fish. These stream miles are then designated as “number of miles” of spawning or rearing habitat. However, using a single linear value (i.e., stream miles) does not take into account the relative value or importance of unique areas of the affected streams that support spawning or rearing. Spawning or rearing activities may be limited to portions of a stream and typically do not occur throughout the stream’s longitudinal distance. It is well documented that fish will occupy and use areas of a stream disproportionately for rearing and spawning (Tilman 1982; Frissell et al. 1986; Dunning et al. 1992; Foley 2018). A more useful metric of spawning or rearing habitat is a unit of measure associated with area (e.g., average stream reach width x length of stream reach), and not a linear distance (see previous comment on this subject). It is worth discussing this point	See Response.	The use of stream mileages, as used in the AWC database, is sufficient to assess the existing conditions and potential impacts associated with this project. Similarities in sub-basin area, stream lengths, flow characteristics, and habitat conditions among the three principal tributaries also allows for reasonable comparisons among the tributaries. Consequently, additional information is not necessary to disclose the reasonably foreseeable significant impacts of the proposed project. Additionally, the requested information would not be essential to make a reasoned choice among alternatives. Where applicable, language has been added to recognize the distinction between spawning and rearing habitat in affected waterbodies.

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			within the context of describing habitat types. We recommend quantifying using a measure of area, not simplifying as "stream miles".		
USFWS	2		The DEIS should include a discussion on the productivity of Tributary 1.19 contributing to aquatic and terrestrial invertebrate food inputs to fishes downstream. Aquatic and terrestrial food inputs to the system should be discussed within this chapter in terms of the annual food resource budget available to fish. Fish presence and density may be directly related to food sources within a stream network, and a discussion of environmental consequences is not complete without a discussion of annual food inputs within a system and the affected area.	See Response.	Stream productivity is discussed in Section 3.24. Impacts to stream productivity are assessed in Section 4.24. Text revised as: The loss of connection between Tributary 1.19 and the mainstem NFK due to embankments and pond dams could result in permanent, direct effects on the quantity and quality of invertebrate productivity transported downstream into the mainstem NFK. In terms of magnitude and extent, the loss of connection could also directly impact available habitat for benthic macroinvertebrate (BMI) production, which is critical for fish growth and survival. Macroinvertebrate studies conducted as part of the environmental baseline effort concluded that a range of macroinvertebrates and periphyton exist in Tributary 1.19 that would contribute via drift to the food web into downstream reaches. Two other sizeable tributaries (NFK Tributaries 1.17 and 1.12) meet the mainstem NFK within 5 miles below the mine site, so the extent of effects of reduced macroinvertebrate productivity to downstream resources would likely be limited to the area directly downstream of the mine site.
USFWS	3		The document includes use of vague language (e.g., [Best Management Practices] BMPs *may* be considered...) when discussing BMPs in the context of describing "temporary" or "minimal" effects. Including a discussion on BMPs or including a	See Response.	Best Management Practices (BMPs) and mitigation measures are discussed in detail in Chapter 5, Mitigation and Permitting. Specific BMPs will be developed in conjunction with the appropriate regulatory agencies as part of project permitting. Text revised as: *The magnitude and extent of stream sedimentation that could result from such disturbance would depend on the effectiveness of required state-of-the-process BMPs under stormwater pollution prevention regulations implemented, monitored, and*

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			complete list of BMPs which may be considered is necessary to allow for an assessment of potential environmental consequences.		*maintained during all phases of the project. BMPs are designed to mitigate the intensity of surface runoff, erosion, and sediment loads in stream channels. A range of BMPs, including silt fences, bale check dams, sediment retention basins, cross bars and ditches, runoff interception and diversions, gabions and sediment traps, mulching of disturbed surfaces and stockpiles, and other measures, would be implemented and monitored along the mine site road corridors and at all bridge and culvert crossings to ensure minimization of potential impacts from erosion and sedimentation. BMPs would also be employed to minimize impacts of surface runoff and erosion at materials sites. Detailed BMP's are described in 4.16 (Knight Piesold 2018a).*
USFWS	4		Greater detail is needed to quantify the effects of displacement of fish captured out of the mine site and into relocation areas. Resident non-anadromous species displaced from the project area will have an effect upon fish resources in locations up- and downstream of the release site, where they may displace (through competition or predation) anadromous fish.	See Response.	Detail was added to Section 4.24 about fish displacement and potential impacts on anadromous fish. Text revised as: Fish capture and relocation would be implemented according to ADF&G Aquatic Resource Permit (ARP) requirements to reduce impacts to resident fish. Stipulations contained in the ARP would determine timing, capture methods, and relocation protocols. Surveys documented low densities and wide distributions of resident and anadromous fish throughout adjacent reaches in the NFK. Species diversity and abundance data indicate there is sufficient available habitat for relocation without impacts to existing populations (EBD Chapter 15).
USFWS	5		Tracking between Chapter 3.24 and 4.24 is difficult due to inconsistencies with headings of major and minor chapter section and sub-sections. We suggest revising chapter formatting to ensure sections in each chapter (Chapter 3,	See Response.	Due to the nature of the material being presented, a direct match between 3.24 and 4.24 is not feasible. Language has been clarified throughout Section 4.24 in the DEIS to present the potential impacts in an organized manner.

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			Affected Environment and Chapter 4, Environmental Consequences) match. For example, 4.24.2.3 Streamflow is difficult to follow because of organizational structure.		
USFWS	6		When applicable, please include references to other chapters as needed. For example, within Chapter 4.24.2.2 Fish Displacement, Injury, and Mortality, the Transportation Corridor section discusses bridges and culverts, but does not refer to the loss of habitat due to potential sedimentation associated with these activities, as discussed in Chapter 4.24.6 Cumulative Effects. Reference to the impacts of sedimentation in this section would help alleviate reader confusion. See earlier comment on difficulty following chapter sections and subsections. As an example, reference the Surface and Groundwater section within the Mine Site subsection of 4.24.2.3 Stream Flow.	See Response.	Language has been clarified throughout Section 4.24 in the DEIS. Appropriate references have been added where applicable.
USFWS	7		The document contains vague or undefined language, and does not always quantify		Impacts have been quantified and put in context where applicable throughout Section 4.24. Temporal scales have been defined as:

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			impacts resulting from the action within the Environmental Consequences chapter. For example, Page 4.24-3 Ferry Terminal/Iliamna Lake Pipeline does not quantify the area of substrate, or types of "impacts" that may be permanently or temporarily caused by horizontal directional drilling. However, the document does detail specific impacts as part of Fish Displacement, Injury, and Mortality that may occur as part of the Amakdedori Port, Page 4-24-6. Impacts are often described as both short- and long-term, without a clear definition of the temporal scales associated with short- and long-term. Examples include: • Consequences are not adequately quantified, and vague language descriptors are used to characterize conditions (e.g., Page 4.24-7 Paragraph 4, sentence 1 "in general, a larger percentage..."). • Quantify the area that is decreased in the downstream direction (as in spawning habitat decreased because of		Temporary – Recovery days to weeks Short-term – Recovery less than 3 years Long-term – Recovery less than 3 years to less than 20 years Permanent – Recovery greater than 20 years Detailed habitat modeling by stream reach is not available. Additional information is not necessary to disclose the reasonably foreseeable significant impacts of the proposed project. Additionally, the requested information would not be essential to make a reasoned choice among alternatives.

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			decreased flows). As written it is vague and lacking the necessary detail, for example: “The percentage reductions in habitat would generally decrease in a downstream direction until reaching the confluence of the NFK and SFK (with a few exceptions).” • Specify the directionality of change, e.g., from Page 4.24-9 Paragraph 2 Sentence 4 “Habitat changes are less than 1%...” It is unclear if this change is an increase or decrease of habitat.		
USFWS	8		The source of the increase in habitat identified within Table 4.24-3, “Average precipitation year, spawning habitat for all streams and species in the mine site area premine, during operations, and post closure,” is unclear. This information is not included in the discussion, and is important information for understanding the full scope of Environmental Consequences. Please provide discussion on the additional available habitat post closure.		Habitat modeling is based on surface water modeling discussed in Sections 3.16 and 4.16, Surface Water Hydrology. Appropriate citations have been added (R2 Consultants 2018).
USFWS	9		The DEIS should provide an analysis of how flow is	See Response.	Impacts associated with climate change are addressed in

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			expected to change with future climate change projections for wet and dry rainfall years. There is currently no discussion of the future impacts of the project under different environmental adaption scenarios, and future climate conditions are not discussed within subsection 4.24.2.7 Water Temperature.		Sections 3.16 and 4.16, Surface Water Hydrology.
USFWS	10		Juvenile habitat subsection within Section 4.24.2.3 Stream Flow indicates, “Sockeye juvenile habitat increases would generally be associated with the SFK-C reach, where habitat would be increased by 0.76 acres (44 percent) during mining operations...” Please provide citations for these data or further clarification in the text. An increase of 0.76 acre resulting in a 44 percent increase in Sockeye Salmon juvenile habitat suggests 1.73 acres of juvenile habitat within the South Fork Koktuli-C reach. The table presented (Table 4.24-4) in the text does not include the quantity of juvenile habitat per stream, but rather presents data in aggregate for all streams. As such, the table	See Response.	Appropriate citations have been added (R2 Consultants 2018). Tables 4.24-2 and 4.24-3 have been updated to include units of measure (acres).

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			indicates a value of 41.85 acres of available habitat for juvenile Sockeye Salmon during operations. Please assign units of measure associated with the values in Table 4.24-4 (and others).		
USFWS	11		The DEIS should discuss and specify the types and magnitude of impacts to fishery resources from increased sediment input from the mine site (and its associated facilities). The consequences of increased sediment loads and inputs are well documented in the literature. Please discuss the potential impacts in the context of all species and life stages occurring in the project area. There is discussion on specific impacts within the Transportation Corridor subsection that could be expanded to include all subsections within Section 4.24.2.5 Stream Sedimentation and Turbidity.		The magnitude, extent, duration and likelihood of sedimentation impacts from the construction and operations of the mine site have been addressed. Impacts from sedimentation are similar for different project components.
USFWS	12		The DEIS should analyze and discuss the effects of increased water temperatures on growth and development of juvenile salmon eggs.	See Response.	The impacts from increased water temperature on different life stages of fish have been addressed in Section 4.24.2.7- Water Temperature and Quality. Text revised as: *Winter water temperature changes could impact eggs and*

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			Increased water temperatures correlates with an increase of development rates and earlier emergence (degree days) of juveniles. There is no discussion on the effects of early emergence and population level effects.		*alevins within spawning gravels primarily through increased metabolism, growth, and changes in time of emergence. However, current winter temperatures in NFK River and UT Creek, and likely SFK River, are below the optimum egg incubation ranges found for Pacific salmon species in the analysis area. Weber-Scannell (1991) reports the following ranges of optimum egg incubation temperatures from the literature: Chinook, 39.2 to 53.6°F (4.0°C to 12.0°C); coho, 41°F to 51.8°F (5.0°C to 11.0°C); sockeye, 39.9°F to 55.0°F (4.4°C to 12.8°C); chum, 39.9°F to 55.9°F (4.4°C to 13.3°C); and pink salmon, 41.0°F to 57.2°F (5.0°C to 14.0°C). The predicted increased winter discharge water temperatures would not raise river temperatures to the lower limits of optimum egg survival for any species and would therefore be unlikely to negatively affect egg survival, rather there may potential for increased survival of eggs in NFK River. Increases in water temperatures during alevin development can substantially increase development rates and associated yolk conversion rates potentially leading to faster yolk depletion and early emergence from the gravel at overall smaller sizes. Fry could emerge too early at suboptimal periods of the year and experience poor feeding, growth, and survival. Studies reviewed by Weber-Scannell (1991) were conducted at water temperature ranges substantially higher than post-mining temperatures predicted in NFK, SFK or UT Creek. Coho and sockeye salmon length at emergence decreased between 35.6°F and 41.0°F (2.0°C and 5.0°C), while chum and Chinook salmon length at emergence increased between 41.0°F and 46.4°F (5.0°C and 8.0°C), then decreased with higher temperatures (Weber-Scannell 1991). NFK River habitats could warm to near the optimum alevin development temperatures for coho salmon or could be slightly higher. It is unlikely that increases in winter water temperatures will warm adequately to enhance or adversely affect developing alevins in SFK River or UT Creek, and within NFK River, post-mining water temperatures may increase to within the optimal ranges for alevin development of slightly warmer (EFH, Owl Ridge,*

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					2018).
USFWS	13		Please identify how the USACE has addressed the following comments, submitted in our letter dated August 31, 2018: "*Please present environmental consequences to individual fish species. For example, the Bristol Bay region provides 51 percent of the commercial catch of the world's Sockeye Salmon. We recommend a detailed analysis of the potential short- and long-term environmental consequences of the project to this internationally important resource.* ***The chapter should analyze the potential for environmental consequences to destabilize the existing Bristol Bay salmon portfolio represented by numerous individual stocks.*** *It should identify the potential for additional fishing closures due to losses to fisheries and fish habitat. Different species are targeted in commercial, sport, and subsistence fisheries supported by the region.* ***We recommend analyzing the impacts to individual species, distribution,***	See Response.	Potential impacts to fishery resources are assessed for the EIS analysis area. This is the area where potential impacts are likely to occur from project construction and operations. Consequently, additional information is not necessary to disclose the reasonably foreseeable significant impacts of the proposed project. Additionally, the requested information would not be essential to make a reasoned choice among alternatives. Direct impacts of habitat removal would be permanent. Considering the low quality and low use of coho and Chinook rearing habitat, the lack of spawning in SFK-E reaches impacted, and the low level of coho spawning in the NFK 1.190 tributary, measurable impacts to salmon populations would be unlikely. Modeling indicates that indirect impacts associated with mine operations would occur at the individual level and be attenuated upstream of the confluence of the NFK and SFK with no measurable impacts to salmon populations Non-point discharges of process water to surface water are not planned. Permitted point discharges of process water to surface water would occur at three locations: 1) NFK Tributary 1.19 immediately upstream of the NFK confluence; 2) the SFK at its confluence with Frying Pan Lake; and 3) a tributary to the Upper Talarik Creek approximately 2 miles below its headwaters (Figure 4.24-1, Section 3.18 and 4.18, Water Quality). Such permitted discharges would be in compliance with APDES permit, i.e., discharge process water would been treated to achieve the WQCs that are protective of aquatic life. Hence, release of metals to surface water via point discharges of process water are not expected to cause metals toxicity (lethal and sub-lethal) on fish and aquatic invertebrates. Refer to Section 4.27, Spill Risk, for an analysis of impacts associated with upset conditions.

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			abundance, and availability to the different fishery user groups that rely on these resources." • *"The geographic scope of the analyses for project impacts to fishery and fish habitat resources should include the immediate project-site (i.e., north and south fork Koktuli River and upper Talarik Creek), local watersheds (i.e., Newhalen River, Gibraltar Lake, Lake Iliamna), and regional scale (i.e., Bristol Bay, Cook Inlet), and should include analysis related to the global importance of the Bristol Bay fishery."* • *"Certain metals that are essential to fish health at low concentrations may become toxic with relatively small increases in concentration; such metals include copper (Cu), zinc (Zn), selenium (Se), and molybdenum (Mo). Copper is specifically toxic to anadromous salmon. These same metals have a narrow window of non-toxicity before becoming toxic. Non-essential metals are more likely to be toxic even at low concentrations (e.g., gold (Au), lead (Pb), arsenic (As) and*		

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			mercury (Hg)). Please analyze the environmental consequences from point and non-point process discharges, for different species and at different scales."		