



**UNITED STATES ENVIRONMENTAL PROTECTION
AGENCY
REGION 10**

1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3123

OFFICE OF REGIONAL
ADMINISTRATOR

JUL - 1 2019

Colonel Phillip Borders
Alaska District Engineer
U.S. Army Corps of Engineers
P.O. Box 6898
JBER, Alaska 99506-0898

Dear Colonel Borders:

The U.S. Environmental Protection Agency has reviewed the U.S. Army Corps of Engineers (Corps) Public Notice POA-2017-00271 for a Clean Water Act (CWA) Section 404 permit, dated March 1, 2019 (PN). The PN describes PLP's proposal to produce commodities, including copper, gold, and molybdenum from the Pebble deposit located near Iliamna Lake approximately 200 miles southwest of Anchorage, Alaska. The PN and concurrently released Draft Environmental Impact Statement (DEIS) indicate that the discharge of fill material associated with the proposed project may result in substantial impacts to waters of the United States within the Bristol Bay and Cook Inlet watersheds, including:

- The permanent loss of approximately 3,560 acres of jurisdictional wetlands and other aquatic resources, including 3,443 acres of wetlands, 55 acres of lakes and ponds, 81 miles (50 acres) of stream channels, and 11 acres of marine waters.
- Temporary impacts to approximately 510 acres of jurisdictional wetlands and other aquatic resources from the discharge of fill material for construction-related purposes, including 48 acres of wetlands, 76 acres of lakes and ponds, 4.7 miles (3 acres) of stream channels, and 382 acres of marine waters.
- Degradation of 2,807 acres of jurisdictional wetlands and other aquatic resources including:
 - 1,896 acres of wetlands and other waters that would be indirectly impacted by fugitive dust from the mine site and transportation corridor, including 1,555 acres of wetlands and 340 acres of other waters.
 - 449 acres of wetlands and other waters that would be indirectly impacted by dewatering at the mine site, including 341 acres of wetlands and 108 acres of other waters.
 - 462 acres of wetlands and other waters that would be indirectly impacted by fragmentation, including 449 acres of wetlands and 13 acres of other waters.

Project Description included in the Draft Environmental Impact Statement

The multiple components of the proposed copper-gold-molybdenum mine would have an initial surface disturbance footprint of approximately 8,086 acres. The open pit mined during the initial twenty years of operation would be approximately 609 acres with a maximum depth of 1,970 feet. The mine pit would convert to a pit lake after mining is complete. Discharges from the pit lake would require water treatment in perpetuity. Two tailings storage facilities (TSFs) are proposed, one for the potentially acid-generating (PAG) and metal-leaching (ML) tailings and waste rock, and a second for the non-PAG bulk tailings. The PAG/ML TSF would be approximately 1,071 acres in size and contained by three associated dams with a maximum height of 425 feet. The bulk TSF would be approximately 2,796 acres in size with two dams having a maximum height of 545 feet.

Facilities at the mine site would also include a 955-acre water management pond, 873 acres of quarries to supply rock and gravel for construction, a 270-megawatt generating facility to supply power for ore processing, camp housing, two water treatment plants, two sewage treatment plants, a landfill, and an incinerator.

The proposed access infrastructure includes a 188-mile long 12-inch diameter natural gas pipeline originating near Anchor Point on the Kenai Peninsula and crossing both Cook Inlet and Iliamna Lake; a port facility in Kamishak Bay near Amakdedori Creek; ferry terminals on the north and south shores of Iliamna Lake for use by an ice-breaking ferry; and road and pipeline corridors between the port and the Lake (37 miles) and from the Lake to the mine site (29 miles). There would also be a road connection to the existing road network and airport at the Village of Iliamna.

Overview of Comments and Recommendations

This letter responds to the CWA Section 404 PN and addresses the adequacy of the PN, DEIS, and supporting documents for evaluating compliance with the restrictions on discharge contained in the CWA Section 404(b)(1) Guidelines (Guidelines). Detailed comments and recommendations are contained in the enclosure.

The EPA is separately providing comments on the DEIS pursuant to our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. The EPA has participated as a cooperating agency in the NEPA process to develop the EIS for the proposed mine. We provided scoping comments and comments on several sections of the Preliminary DEIS.

The Guidelines are the substantive environmental criteria for the evaluation of proposed discharges of dredged or fill material, which cannot be permitted unless compliance with the Guidelines has been demonstrated. The Guidelines recognize that the level of required analysis and documentation are scaled to reflect the significance and complexity of the proposed discharge activity. The proposed project would be more than five times the worldwide median size for a deposit of this type on an undeveloped landscape with dense and highly interconnected

aquatic resources. In addition, the values of the potentially affected aquatic resources in this case are among the highest evaluated under CWA Section 404 and support important commercial, sport, and subsistence fisheries for salmon and other fishes. Because the nature and extent of the proposed discharges reflect some of the most highly significant and complex discharge activities with the potential for serious adverse impact contemplated by the Guidelines, the level of information, evaluation, and documentation necessary for this project to demonstrate compliance with the Guidelines is significant.

Our review finds that the PN, DEIS, and supporting documents do not contain sufficient information to support a reasonable judgment that the proposed discharges will comply with the Guidelines. The EPA's specific recommendations about how the Corps' record can support a Guidelines analysis are described in the enclosure. The final EIS should include sufficient information, evaluation, and documentation to address the requirements of the Guidelines.

Conclusion

The EPA has concerns regarding the extent and magnitude of the substantial proposed impacts to streams, wetlands, and other aquatic resources that may result, particularly in light of the important role these resources play in supporting the region's valuable fishery resources. Pursuant to the field level procedures outlined in Part IV, paragraph 3(a) of the 1992 Memorandum of Agreement (MOA) between EPA and the Department of the Army regarding CWA Section 404(q), Region 10 finds that this project as described in the PN may have substantial and unacceptable adverse impacts on fisheries resources in the project area watersheds, which are aquatic resources of national importance.

The EPA recognizes that the standard set out in the MOA is similar to the Section 404(c) standard. However, Region 10's decision to utilize the coordination procedures under the MOA is not a decision regarding its Section 404(c) action and should not be interpreted as such. The EPA has not made a decision regarding whether to withdraw the 2014 Proposed Determination or leave it in place. Region 10 is coordinating under the MOA at this time to ensure that the EPA can continue to work with the Corps to address concerns raised during the permitting process. The EPA looks forward to continuing to work closely with the Corps on further development of the EIS and other supporting analyses related to this PN.

I appreciate the attention that you and your staff have provided to this project. Should you have any questions about this letter, please do not hesitate to contact me or have your staff contact Matthew LaCroix in our Alaska Operations Office at (907) 271-1480, or by email at lacroix.matthew@epa.gov.

Sincerely,



Chris Hladick
Regional Administrator

Enclosure

Enclosure

The following are detailed comments submitted by the U.S. Environmental Protection Agency (EPA) in response to the U.S. Army Corps of Engineers (Corps) Public Notice POA-2017-00271, the Pebble Limited Partnership (PLP).

Outline of Enclosure

- I. Project Description included in the Draft Environmental Impact Statement
- II. Aquatic Resources of the Bristol Bay Watershed and Sub-watersheds
- III. Aquatic Resource Impacts Documented in the Draft Environmental Impact Statement
- IV. Clean Water Act Section 404(b)(1) Guidelines Analysis
 - A. Four Primary Restrictions on Discharges in the Guidelines
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- V. Evaluating the Potential Effects of the Discharges of Dredged or Fill Material
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 - C. Fish Values
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 2. Fish
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 4. Commercial and Recreational Fisheries
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- VI. Determination of Least Environmentally Damaging Practicable Alternative (40 C.F.R. § 230.10(a))
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- IX. Minimization/Compensatory Mitigation (40 C.F.R. § 230.10(d))
- X. Conclusions

I. Project Description included in the Draft Environmental Impact Statement

PLP proposes to produce commodities -- including copper, gold, and molybdenum -- from the Pebble deposit located near Iliamna Lake in the Bristol Bay watershed in southwest Alaska. The proposed mine site is approximately 17 miles from each of the communities of Iliamna, Newhalen, and Nondalton.

The proposed copper-gold-molybdenum mine includes numerous components and would have an initial surface disturbance footprint of approximately 8,086 acres. The open pit mined during the initial twenty years of operation would be approximately 609 acres with a maximum depth of

1,970 feet. The mine pit would convert to a pit lake after mining is complete requiring perpetual water treatment. Two tailings storage facilities (TSFs) are proposed, one for the potentially acid-generating (PAG) and metal-leaching (ML) tailings and waste rock, and a second for the non-PAG bulk tailings. The PAG/ML TSF would be approximately 1,071 acres in size and contained by three associated dams with a maximum height of 425 feet. The bulk TSF would be approximately 2,796 acres in size with two dams having a maximum height of 545 feet. Facilities at the mine site would also include a 955-acre water management pond, 873 acres of quarries to supply rock and gravel for construction, a 270-megawatt generating facility to supply power for ore processing, camp housing, two water treatment plants, two sewage treatment plants, a landfill, and an incinerator.

The proposed access infrastructure includes: a 188-mile long 12-inch diameter natural gas pipeline originating near Anchor Point on the Kenai Peninsula that crosses both Cook Inlet and Iliamna Lake; a port facility in Kamishak Bay near Amakdedori Creek; ferry terminals on the north and south shores of Iliamna Lake for use by an ice-breaking ferry; road and pipeline corridors between the port and the Lake (37 miles) and from the Lake to the mine site (29 miles). There would also be a road connection to the existing road network and airport at the Village of Iliamna.

II. Aquatic Resources of the Bristol Bay Watershed and Sub-watersheds

The Pebble deposit lies within the Nushagak and Kvichak watersheds, which together account for more than half of the land area in the Bristol Bay watershed. These large watersheds include a diverse array of streams, wetlands, lakes, and ponds that are relatively free from human-induced alteration and provide extensive and heterogeneous habitats for fishery resources. The Kvichak River watershed is the world's largest producer of sockeye salmon, while Chinook salmon returns to the Nushagak River are among the world's largest.¹ The headwaters of the Nushagak River include the South Fork Koktuli River (SFK) and North Fork Koktuli River (NFK), which flow west from the Pebble deposit. Much of the proposed mine infrastructure would be placed within the NFK watershed and most of the losses of streams, wetlands, lakes, and ponds from the proposed project would occur in the NFK and SFK watersheds. The source of the Kvichak River is Iliamna Lake. Tributaries to Iliamna Lake include Upper Talarik Creek (UTC), which flows south from the Pebble deposit and then southwest into Iliamna Lake. Direct impacts to aquatic resources in the UTC watershed would expand dramatically as mining is expanded at the Pebble deposit. The wetlands, streams, and other aquatic resources in the SFK, NFK, and UTC watersheds are productive and support rich species assemblages. Baseline sampling² indicates that most stream habitat is occupied. These aquatic resources also supply water, invertebrates, organic matter, and other resources to larger downstream waters.

The Bristol Bay watershed supports an abundance of genetically diverse wild Pacific salmon populations unrivaled in North America. These salmon populations have significant economic, nutritional, cultural, and recreational value, both within and beyond the Bristol Bay region.

¹ http://www.adfg.alaska.gov/index.cfm?adfg=chinookinitiative_nushagak.main.

² This includes sampling conducted by PLP, ADF&G, and Woody and O'Neil 2010. All survey results are available via ADF&G's web-based mapper at: <https://www.adfg.alaska.gov/sf/SARR/AWC/index.cfm?ADFG=main.interactive>.

The streams, wetlands, and other aquatic resources within the Bristol Bay watershed support important commercial and sport fisheries for salmon and other fishes, as well as a more than 4,000-year-old subsistence-based way of life for Alaska Natives. The aquatic resources within the watershed produce the world's largest wild sockeye salmon runs, comprising approximately 51 percent of world commercial harvest³ (The Kvichak and Nushagak Rivers together produce over 40 percent of the total Bristol Bay sockeye salmon.⁴). Bristol Bay's Chinook salmon runs are frequently at or near the world's largest, and the region also supports significant coho, chum, and pink salmon populations. These salmon populations help to maintain the productivity of the entire ecosystem, including numerous other fish and wildlife species. For example, Iliamna Lake supports the only freshwater seal population in the United States, which depends on the fishery resources of the watershed.

The Bristol Bay watershed supports the most valuable wild salmon fishery in the world and three of the top 10 United States commercial fishing ports. The value of the over 2,800 Bristol Bay fishing permits account for 41 percent of total salmon permit value in Alaska. Average data from 2013-2017 indicate that the Bristol Bay salmon industry directly employs approximately 14,800 people, most of whom work in the industry on a seasonal basis. Including multiplier effects, the fishery creates an estimated \$1.2 billion in economic output and \$658 million in labor income per year, resulting in 12,537 average jobs.⁵

Preliminary data released by the Alaska Department of Fish and Game (ADF&G)⁶ indicate that the 2018 inshore Bristol Bay sockeye salmon run of 62.3 million fish was the largest on record dating back to 1893 and was 69 percent above the 36.9 million average run for the latest 20-year period. It was the fourth consecutive year that inshore sockeye salmon runs exceeded 50 million fish.

The 2018 Bristol Bay preliminary ex-vessel value of \$281 million of all salmon species ranks first in the history of the fishery and was 242 percent above the 20-year average of \$116 million. It was 39 percent higher than the \$202 million ex-vessel value of the 1990 harvest, which ranks second. The 43.5 million harvest of all species was the second largest in the history of the fishery, after the 45.4 million fish harvest in 1995.⁷

Subsistence fisheries are a critical resource for residents of the Bristol Bay region. Communities are not connected to the road system and commercial food prices reflect the costs of shipping by barge or airplane. ADF&G data indicate that 1,128 subsistence permits were issued to residents in the Bristol Bay region in 2017. Subsistence harvesters collected an estimated 116,537 salmon.⁸ Based on average weights of salmon caught in the commercial fisheries, this volume of fish was equal to approximately 743,700 pounds of salmon, or 99 pounds per capita for regional residents.

³ Pinsky et al. 2009; Ruggerone et al. 2010.

⁴ ADF&G 2011.

⁵ Wink Research & Consulting, 2018.

⁶ ADF&G Press Release 9/18/2018.

⁷ *Id.*

⁸ ADF&G, 2017 Annual Management Report.

Sport fisheries for Bristol Bay salmon create additional economic benefits for the region. In 2016, a total of 102 sport fish guiding businesses, employing 563 guides, completed 16,041 sportfishing trips for salmon in the Bristol Bay area. Sportfishing clients caught a total of 85,353 salmon (retaining 28,366). Nonresidents accounted for 90 percent of the days fished, meaning that most of the money generated by guided sportfishing for Bristol Bay salmon came from outside Alaska.⁹

In addition, ADF&G estimates that approximately 43,800 salmon were harvested and retained by unguided anglers in the Bristol Bay region during 2016. Most anglers target Chinook and coho salmon.

III. Aquatic Resource Impacts Documented in the Draft Environmental Impact Statement

EPA has reviewed Corps Public Notice POA-2017-00271, dated March 1, 2019 (PN), which identifies discharges of dredged or fill material associated with mining the Pebble deposit into streams, wetlands, lakes, ponds, and marine waters. This Clean Water Act (CWA) Section 404 permitting action triggered preparation of the draft Environmental Impact Statement (DEIS), which was released concurrently with the PN.

The PN and concurrently released Draft Environmental Impact Statement (DEIS) indicate that the discharge of fill material associated with the proposed project may result in substantial impacts to waters of the United States within the Bristol Bay and Cook Inlet watersheds, including:

- The permanent loss of approximately 3,560 acres of jurisdictional wetlands and other aquatic resources, including 3,443 acres of wetlands, 55 acres of lakes and ponds, 81 miles (50 acres) of stream channels, and 11 acres of marine waters.
- Temporary impacts to approximately 510 acres of jurisdictional wetlands and other aquatic resources from the discharge of fill material for construction-related purposes, including 48 acres of wetlands, 76 acres of lakes and ponds, 4.7 miles (3 acres) of stream channels, and 382 acres of marine waters.
- Degradation of 2,807 acres of jurisdictional wetlands and other aquatic resources including:
 - 1,896 acres of wetlands and other waters that would be indirectly impacted by fugitive dust from the mine site and transportation corridor, including 1,555 acres of wetlands and 340 acres of other waters.
 - 449 acres of wetlands and other waters that would be indirectly impacted by dewatering at the mine site, including 341 acres of wetlands, and 108 acres of other waters.
 - 462 acres of wetlands and other waters that would be indirectly impacted by fragmentation, including 449 acres of wetlands and 13 acres of other waters.

⁹ Wink Research & Consulting, 2018.

Much of the proposed mine infrastructure would be placed within the NFK watershed and most of the aquatic resource losses would occur here. The DEIS¹⁰ documents that the proposed project would directly impact:

- 17 percent of all stream channel length in the 171,000-acre Headwaters Koktuli River Hydrologic Unit Code (HUC);
- 12 percent of all shrub wetlands in the HUC;
- 7 percent of all herbaceous wetlands in the HUC;
- 6 percent of all bogs and fens in the HUC;
- 5 percent of all riverine wetlands in the HUC;
- 4 percent of all rivers and streams in the HUC; and
- 1 percent of all lakes and ponds in the HUC.

Though few impacts to fish are specifically quantified, the draft Essential Fish Habitat (EFH) Assessment discloses a 9 percent loss of salmon spawning habitat under modeled “dry year” conditions.¹¹ The proposed bulk TSF and seepage collection system alone would fill multiple NFK tributaries, eliminating approximately ten miles of streams and 7.5 miles of anadromous habitat. Nearly the entire length of Tributary 1.190,¹² approximately six miles, would be filled. Tributary 1.190 is used by coho salmon for spawning and rearing, and by Chinook salmon for rearing. This tributary also supports rainbow trout, Dolly Varden, Arctic grayling, and sculpin. Two specified tributaries to 1.190¹³ are used by coho salmon for rearing and would also be eliminated by the proposed bulk TSF.

The proposed NFK treated water discharge point would be to the remaining short reach of tributary 5215 at the confluence with tributary 4083. This discharge point is immediately upstream of a stream reach specified by ADF&G as important for Chinook salmon spawning.

The main water management pond would eliminate the upper reaches of the specified NFK tributaries 4083-5217 (used by coho salmon), 5215-6001, and 5215-6001-7012 (used by Chinook and coho salmon). The upper 2.5 miles of this latter tributary would be eliminated by mine infrastructure including the pyritic tailings facility and water management pond. In total, approximately twenty miles of fish-bearing streams would be blocked or filled by mine components in the NFK drainage, including approximately 8.2 miles of anadromous waters.¹⁴

The second phase of mine development would require expansion of the pit, power plant, and mill, as well as the construction of additional bulk and pyritic TSFs and two waste rock facilities. The DEIS¹⁵ indicates that future expansion would “potentially affect” an additional 12,445 acres of aquatic resources at the mine site but does not characterize these resources. Section 4-22 also does not identify whether this figure includes functional degradation from secondary effects. The DEIS identifies that an additional 35 miles of streams documented to support salmon will be

¹⁰ DEIS 4.22-11.

¹¹ Draft EFH Assessment Table 5-3.

¹² Anadromous Waters Catalog number 325-30-10100-2202-3080-4083-5215.

¹³ Anadromous Waters Catalog numbers 5215-6006 and 5215-6007.

¹⁴ DEIS 4.24-3.

¹⁵ DEIS Section 4-22.

eliminated due to mine expansion but does not quantify the total miles of stream that would be lost.

The acreage of wetlands and miles of stream affected by aquifer drawdown will increase substantially under the expanded development scenario. Mine expansion would require “roughly a five-fold increase in the size of the pit capture zone straddling the SFK and UTC drainages. There would be a similar increase in the amount of groundwater needing to be dewatered and treated during operations, and the amount pumped and treated throughout post-closure to maintain hydraulic containment of the pit lake.”¹⁶

IV. Clean Water Act Section 404(b)(1) Guidelines Analysis

The CWA Section 404(b)(1) Guidelines (Guidelines) are the substantive environmental criteria used to evaluate the proposed discharges of dredged or fill material.¹⁷ The Guidelines require the Corps to make written factual determinations of the potential short-term or long-term effects of a proposed discharge on the physical, chemical, and biological components of the aquatic environment and “[s]uch factual determinations shall be used in § 230.12 in making findings of compliance or non-compliance with the restrictions in § 230.10.”¹⁸

A. Four Primary Restrictions on Discharges in the Guidelines

The Guidelines contain four primary restrictions on discharge that must be satisfied:

1. Section 230.10(a): “no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.”;
2. Section 230.10(b): “[n]o discharge of dredged or fill material shall be permitted if it:
(1) Causes or contributes, after consideration of disposal site dilution and dispersion, to violations of any applicable State water quality standard; (2) Violates any applicable toxic effluent standard or prohibition under section 307 of the [CWA] Act;
(3) Jeopardizes the continued existence of species listed as endangered or threatened under the Endangered Species Act...or results in likelihood of the destruction or adverse modification of...critical habitat...; (4) Violates any requirement imposed by the Secretary of Commerce to protect any marine sanctuary designated under title III of the Marine Protection, Research, and Sanctuaries Act.”;
3. Section 230.10(c): “no discharge of dredged or fill material shall be permitted which will cause or contribute to significant degradation of the waters of the United States. Findings of significant degradation related to the proposed discharge shall be based upon appropriate factual determinations, evaluations, and tests required by subparts B

¹⁶ DEIS Executive Summary 3.2.2.2.

¹⁷ 40 C.F.R. § 230.10; 40 C.F.R. § 230.12.

¹⁸ 40 C.F.R. §230.11.

and G, after consideration of subparts C through F, with special emphasis on the persistence and permanence of the effects outlined in those subparts.”; and

4. Section 230.10(d): “no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem.”¹⁹

Each of these restrictions is discussed separately in further detail below in sections VI-IX.

B. Level of Information, Evaluation, and Documentation for Guidelines’ Determinations

The Guidelines recognize that the level of required information, evaluation, and documentation are scaled to reflect the significance and complexity of the proposed discharge activity. The Guidelines provide that “the compliance evaluation procedures will vary to reflect the seriousness of the potential for adverse impacts on the aquatic ecosystems posed by specific dredged or fill material discharge activities.”²⁰ In accordance with 40 C.F.R. § 230.6, the lead agency, here the Corps, “must recognize the different levels of effort that should be associated with varying degrees of impact and require or prepare commensurate documentation.”²¹ The evaluation under the Guidelines “depends on the physical, biological, and chemical nature of the proposed extraction site, the material to be discharged, and the candidate disposal site, including any other important components of the ecosystem being evaluated.”²² For routine cases, a finding of compliance will likely not require extensive testing, evaluation, or analysis.²³

Appropriate documentation of the analysis required is an important aspect of application of the Guidelines.²⁴ Specifically, “the level of documentation should reflect the significance and complexity of the discharge activity.”²⁵ The purpose of the required documentation is to provide “a record of actions taken that can be evaluated for adequacy and accuracy and ensures considerations of all important impacts in the evaluation of proposed dredged or fill material.”²⁶

With respect to the proposed permit for the Pebble Project, the level of information, evaluation, and documentation necessary are significant given the potential permanent losses of aquatic resources, and, as discussed above (Section II), the values of the potentially affected aquatic resources are among the highest evaluated under CWA Section 404.

The nature of the disposal site make this project distinguishable from other comparable projects. The currently proposed Pebble Project would mine approximately 1.3 billion tons of ore;²⁷ at this size, the proposal would be more than five times the worldwide median size for a deposit of this

¹⁹ This includes compensatory mitigation.

²⁰ 40 C.F.R. § 230.10.

²¹ 40 C.F.R. §230.6(b).

²² 40 C.F.R. § 230.6.

²³ 40 C.F.R. §230.6(b).

²⁴ 45 Fed. Reg. 85336, 85434 (December 24, 1980).

²⁵ *Id.*

²⁶ 45 Fed. Reg. 85336, 85434 (December 24, 1980).

²⁷ PLP 2018.

type.²⁸ As it stands now, the proposed project represents a relatively large mine for its type. It also has the potential to expand to one of the, if not the, largest of its type in the world. The project proponent has developed preliminary plans to mine as much as 6.5 billion tons of ore at the Pebble deposit;²⁹ at this size it would be 26 times larger than the worldwide median size for a deposit of this type. The project proponent asserts that total mineral resources at the Pebble deposit are approximately 12 billion tons of ore.³⁰

While other large-scale porphyry copper mines in the United States tend to be located in relatively arid regions (e.g., Bingham Canyon Mine, Utah), the Pebble deposit is situated within a landscape covered by a dense network of streams, wetlands, lakes, and ponds with a complex and highly interconnected surface and subsurface hydrology. This means that construction and operation of such a large-scale open pit mine would result in the permanent loss and degradation of streams, wetlands, and other aquatic resources because they overlay and surround the deposit itself. Development of the mine pit, two TSFs, water management pond, and other infrastructure reflect a highly significant and complex discharge activity. The development would permanently alter the contours of the landscape. In addition, dewatering of the mine pit would alter regional groundwater flow. These changes, coupled with the loss of wetland, lake, and pond acreage and streams, would cause permanent streamflow alternations to the NFK, SFK, and UTC. The consequence would be permanent modification of the hydrology, chemistry, and aquatic habitat of the three streams. These changes and their potential effects on the aquatic ecosystem should also be carefully and thoroughly evaluated.

Further, the area's complex and highly interconnected surface and subsurface hydrology amplifies the risk that acid generating mine waste and other contaminants typically produced by a mine of this type could escape into the aquatic ecosystem during construction and operation as well as into perpetuity as mine wastes continue to be managed, treated, and contained after any mine at the site is closed. These challenges should be evaluated in the context of a region subject to climate extremes as well as seismic risks.

The complexities and potential for a high degree of impact associated with the discharges of dredged and fill material related to construction and operation of a mine at the Pebble deposit are further magnified by the fact that the network of streams, wetlands, lakes, and ponds potentially eliminated or degraded are situated at the headwaters of the Nushagak River which, as discussed above, often has the world's larger returns of Chinook salmon, and the headwaters of the Kvichak River whose watershed, as discussed above, is the world's larger producer of sockeye salmon.

The productivity of the Bristol Bay fisheries is tied to a diverse portfolio of aquatic habitats. The complex habitat mosaic supports multiple locally adapted fish populations and plays a critical role in protecting the genetic diversity of Bristol Bay's salmon populations.³¹ Losing and

²⁸ According to Singer et al. (2008), the worldwide median size porphyry copper deposit is approximately 0.25 billion tons.

²⁹ Ghaffari et al. (2011) call the 6.5 billion-ton mine scenario the "Resource Case," which is based on 78 years of open pit production and seeks to assess the long-term value of the project in current dollars.

³⁰ Ghaffari et al. 2011.

³¹ Griffiths et al. 2014; Schindler et al. 2010; Brennan et al. 2019.

degrading these fish habitats and populations would erode the genetic diversity that is crucial to the stability of the overall Bristol Bay salmon fisheries. Eliminating and degrading the headwater habitats within the NFK, SFK, and UTC watersheds could reduce the diversity, productivity, and stability of the remaining habitats, and the species they support. As a result, these effects and their consequences for the aquatic ecosystem should also be carefully and thoroughly evaluated and documented. Recent Alaska-specific Section 404 guidance issued by EPA and the Department of the Army underscores this point, noting that when “anadromous fish habitat may be harmed [as is contemplated with the Pebble Project], it is likely that a more detailed Guidelines analysis will be necessary.”³²

Given all of these factors, the extent and magnitude of the proposed impacts to streams, wetlands, and other aquatic resources should be carefully and thoroughly evaluated, particularly in light of the important role these resources play in supporting the region’s fishery resources. The degree to which these aquatic resource impacts would reverberate downstream, potentially depriving downstream habitats of nutrients, groundwater inputs, and other subsidies should also be carefully and thoroughly evaluated. Similarly, the degree to which water withdrawal and capture, storage, treatment, and discharge would alter the hydrographs and chemical, physical, and biological characteristics of downstream aquatic resources should be carefully and thoroughly evaluated.

As discussed in this letter, the nature and extent of the proposed discharges acknowledged in the DEIS reflect some of the most highly significant and complex discharge activities with the potential for serious adverse impact contemplated by the Guidelines. For these reasons, the level of information, evaluation, and documentation necessary for this project to demonstrate compliance with the Guidelines is significant.³³

C. Factual Determinations in the Guidelines

To make the requisite finding of compliance or non-compliance with the four primary restrictions on discharge contained in 40 C.F.R. § 230.10 pursuant to 40 C.F.R. § 230.12, the Corps “shall include the factual determinations required by [40 C.F.R.] § 230.11.”³⁴ Pursuant to 40 C.F.R. § 230.11, the Corps “shall determine in writing the potential short-term or long-term effects of a proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment.” 40 C.F.R. § 230.11 contains a list of factual determinations that the Corps “shall include.” The following factual determinations are particularly relevant in this case and are referenced in our comments and recommendations below.

- **Section 230.11(b) *Water circulation, fluctuation, and salinity determinations.***
Determine the nature and degree of effect that the proposed discharge will have individually and cumulatively on water, current patterns, circulation including downstream flows, and normal water fluctuation. Consideration shall be given to water

³² Memorandum of Agreement between the Department of the Army and the Environmental Protection Agency concerning the Mitigation Sequence for Wetlands in Alaska under Section 404 of the Clean Water Act, dated June 15, 2018 (2018 Army/EPA Alaska Mitigation MOA).

³³ 40 C.F.R. § 230.6(b).

³⁴ 40 C.F.R. § 230.12(b); see also 40 C.F.R. § 230.11.

chemistry, salinity, clarity, color, odor, taste, dissolved gas levels, temperature, nutrients, and eutrophication plus other appropriate characteristics. Consideration shall also be given to the potential diversion or obstruction of flow, alterations of bottom contours, or other significant changes in the hydrologic regime. Additional consideration of the possible loss of environmental values (§§ 230.23 through 230.25) and actions to minimize impacts (subpart H), shall be used in making these determinations. Potential significant effects on the current patterns, water circulation, normal water fluctuation and salinity shall be evaluated on the basis of the proposed method, volume, location, and rate of discharge.

- **Section 230.11(d) Contaminant determinations.** Determine the degree to which the material proposed for discharge will introduce, relocate, or increase contaminants. This determination shall consider the material to be discharged, the aquatic environment at the proposed disposal site, and the availability of contaminants.
- **Section 230.11(e) Aquatic ecosystem and organism determinations.** Determine the nature and degree of effect that the proposed discharge will have, both individually and cumulatively, on the structure and function of the aquatic ecosystem and organisms. Consideration shall be given to the effect at the proposed disposal site of potential changes in substrate characteristics and elevation, water or substrate chemistry, nutrients, currents, circulation, fluctuation, and salinity, on the recolonization and existence of indigenous aquatic organisms or communities. Possible loss of environmental values (§ 230.31), and actions to minimize impacts (subpart H) shall be examined. Tests as described in § 230.61 (Evaluation and Testing), may be required to provide information on the effect of the discharge material on communities or populations of organisms expected to be exposed to it.
- **Section 230.11(g) Determination of cumulative effects on the aquatic ecosystem.**
(1) Cumulative impacts are the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material. Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems. (2) Cumulative effects attributable to the discharge of dredged or fill material in waters of the United States should be predicted to the extent reasonable and practical. The permitting authority shall collect information and solicit information from other sources about the cumulative impacts on the aquatic ecosystem. This information shall be documented and considered during the decision-making process concerning the evaluation of individual permit applications, the issuance of a General permit, and monitoring and enforcement of existing permits.
- **Section 230.11(h) Determination of secondary effects³⁵ on the aquatic ecosystem.**
(1) Secondary effects are effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material. Information about secondary effects on aquatic ecosystems shall

³⁵ The National Environmental Policy Act (NEPA) uses the term “indirect” to describe these types of effects.

be considered prior to the time final section 404 action is taken by permitting authorities. (2) Some examples of secondary effects on an aquatic ecosystem are fluctuating water levels in an impoundment and downstream associated with the operation of a dam, septic tank leaching and surface runoff from residential or commercial developments on fill, and leachate and runoff from a sanitary landfill located in waters of the U.S. Activities to be conducted on fast land created by the discharge of dredged or fill material in waters of the United States may have secondary impacts within those waters which should be considered in evaluating the impact of creating those fast lands.

The Corps makes the factual determinations required by 40 C.F.R. § 230.11 “in light of Subparts C through F [of the Guidelines],”³⁶ which identify different categories of potential impacts of the discharge of dredged or fill material:

- Subpart C: Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem³⁷
 - Substrate³⁸
 - Suspended particulates/turbidity³⁹
 - Water⁴⁰
 - Current patterns and water circulation⁴¹
 - Normal water fluctuations⁴²
 - Salinity gradients⁴³
- Subpart D: Potential Impacts on Biological Characteristics of the Aquatic Ecosystem⁴⁴
 - Threatened and endangered species⁴⁵
 - Fish, crustaceans, mollusks, and other aquatic organisms in the food web⁴⁶
 - Other wildlife⁴⁷
- Subpart E: Potential Impacts on Special Aquatic Sites⁴⁸
 - Sanctuaries and refuges⁴⁹
 - Wetlands⁵⁰
 - Mud flats⁵¹

³⁶ 40 C.F.R. § 230.11.

³⁷ 40 C.F.R. Part 230, Subpart C.

³⁸ 40 C.F.R. § 230.20.

³⁹ 40 C.F.R. § 230.21.

⁴⁰ 40 C.F.R. § 230.22.

⁴¹ 40 C.F.R. § 230.23.

⁴² 40 C.F.R. § 230.24.

⁴³ 40 C.F.R. § 230.25.

⁴⁴ 40 C.F.R. Part 230, Subpart D.

⁴⁵ 40 C.F.R. § 230.30.

⁴⁶ 40 C.F.R. § 230.31.

⁴⁷ 40 C.F.R. § 230.32.

⁴⁸ 40 C.F.R. Part 230, Subpart E.

⁴⁹ 40 C.F.R. § 230.40.

⁵⁰ 40 C.F.R. § 230.41.

⁵¹ 40 C.F.R. § 230.42.

- Vegetated shallows⁵²
- Coral Reefs⁵³
- Riffle and pool complexes⁵⁴
- Subpart F: Potential Effects on Human Use Characteristics⁵⁵
 - Municipal and private water supplies⁵⁶
 - Recreational and commercial fisheries⁵⁷
 - Water-related recreation⁵⁸
 - Aesthetics⁵⁹
 - Parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves⁶⁰

Our review finds that the PN, DEIS, and supporting documents do not contain sufficient information to address the factual determinations required by 40 C.F.R. § 230.11 and to make a reasonable judgment that the proposed discharges will comply with the Guidelines under 40 C.F.R. § 230.12.⁶¹ Sections V-IX provide our comments regarding information and evaluation relevant to each requirement, and our recommendations regarding how the Corps' record can support a Guidelines analysis for this project.⁶² As a general matter, this information and evaluation should be documented in the record.⁶³

V. Evaluating the Potential Effects of the Discharges of Dredged or Fill Material

As discussed above, the nature and extent of the proposed discharges for the Pebble Project acknowledged in the DEIS reflect highly significant and complex discharge activities with the potential for serious adverse impact, and thus require an extensive information and evaluation and a greater level of documentation to demonstrate compliance with the Guidelines.⁶⁴ As discussed in our DEIS comment letter⁶⁵ and below, the current record likely underestimates the extent, magnitude, and permanence of the adverse effects of the Pebble Project's discharges of

⁵² 40 C.F.R. § 230.43.

⁵³ 40 C.F.R. § 230.44.

⁵⁴ 40 C.F.R. § 230.45.

⁵⁵ 40 C.F.R. Part 230, Subpart F.

⁵⁶ 40 C.F.R. § 230.50.

⁵⁷ 40 C.F.R. § 230.51.

⁵⁸ 40 C.F.R. § 230.52.

⁵⁹ 40 C.F.R. § 230.53.

⁶⁰ 40 C.F.R. § 230.54.

⁶¹ 40 C.F.R. § 230.12(a)(3)(iv); *see also* 230.6(c)(explaining that even in the case of short form evaluations "there must still be sufficient information (including consideration of both individual and cumulative impacts) to support the decision of whether to specify the site for disposal of dredged or fill material")

⁶² Determining the potential effects of the discharges on certain categories of resources identified above (coral reefs, municipal water supplies) are not applicable in this case.

⁶³ 40 C.F.R. § 230.6(b); 40 C.F.R. § 230.11; and 40 C.F.R. § 230.12(b).

⁶⁴ 40 C.F.R. § 230.6(b).

⁶⁵ The EPA is separately providing comments on the DEIS pursuant to our responsibilities under NEPA and Section 309 of the Clean Air Act and that letter is relevant here since the EIS is being prepared to support the Corps' Section 404 permit action.

dredged or fill material to streams, wetlands, lakes, ponds, and marine waters, and the fisheries resources they support.

A. Defining Geographic Extent of Potentially Affected Aquatic Resources

According to the Guidelines, the Corps “shall determine in writing the potential short-term or long-term effects of a proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment” by making the factual determinations listed in 40 C.F.R. § 230.11. The factual determinations relevant to defining the geographic extent of potentially affected aquatic resources are the water circulation, fluctuation, and salinity determinations (40 C.F.R. § 230.11(b)); contaminant determinations (40 C.F.R. § 230.11(d)); aquatic ecosystem and organism determinations (40 C.F.R. § 230.11(e)); determination of cumulative effects on the aquatic ecosystem (40 C.F.R. § 230.11(g)); and the determination of secondary effects on the aquatic ecosystem (40 C.F.R. § 230.11(h)).

Comment: The DEIS⁶⁶ identifies that all Action Alternatives include areas that lack field-verified wetland mapping. Action Alternatives 2 and 3 include approximately 3,126 acres where existing National Wetland Inventory (NWI) coverage was used to map wetlands instead of field-verified wetland mapping. In addition, Action Alternative 1 includes approximately 1,300 acres where satellite data was used to map wetlands at 100-meter resolution instead of field-verified wetland mapping. Based on EPA’s review of the preliminary jurisdictional determination, NWI coverage and satellite data substantially under-identify wetland area relative to field-verified mapping. In addition, the current disparity in the wetland mapping for different alternatives makes it difficult to compare the wetland impacts between the alternatives. According to the Corps, supplemental wetland mapping to fill these gaps is planned for the 2019 field season and this information would be included in the final EIS.

- Recommendation: Where high resolution information is not currently available, EPA supports the Corps’ decision to conduct additional data collection as greater precision mapping is necessary to accurately identify the impacts in light of the significant and complex nature of the discharge activities in this case.⁶⁷

Comment: The DEIS defines an analysis area that is a fixed width area around the mine site. The DEIS analyzes impacts within this area and does not analyze impacts that are outside it. Section 230.11(h) requires an evaluation of the secondary effects of the discharges of dredged or fill material on the aquatic ecosystem, which include effects of the proposed discharge on the downstream ecosystem. However, the analysis area in the DEIS excludes areas downstream of the mine site where secondary/indirect impacts would occur. In addition, sections 230.11(b), (e), and (g) require an evaluation of the cumulative effects of the discharge of dredged or fill material on the aquatic ecosystem. However, the analysis area in the DEIS does not include the headwaters of UTC where future mining expansion would occur (i.e., the expanded mine scenario evaluated as part of the cumulative effects analysis in the DEIS). The aquatic resources

⁶⁶ DEIS 3.22-4-5.

⁶⁷ 40 C.F.R. § 230.6(b).

in these additional areas were mapped at high resolution and field-verified between 2004 and 2008 during the collection of the environmental baseline data.⁶⁸

- Recommendation: The Corps should use complete and accurate mapping of the extent of potentially affected aquatic resources (including direct, secondary/indirect and cumulative effects), taking advantage of available field-verified aquatic resource mapping information. Alternatively, the Corps should explain why its existing approach is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: Regarding streams, the DEIS relies on the National Hydrography Dataset (NHD) mapping of stream networks to identify the streams that will potentially be impacted by the proposed project. The NHD does not capture all stream courses and may underestimate channel sinuosity, resulting in underestimates of affected stream length.

- Recommendation: The Corps should acknowledge uncertainties in the use of NHD and, to the extent possible, provide an estimate of the additional stream length for reaches that are not captured by the NHD.

Comment: In the DEIS, maps that depict the same areas show different stream channels.⁶⁹ The DEIS does not explain these discrepancies.

- Recommendation: The Corps should 1) use a consistent, thorough, and transparent “baseline” estimate of stream channel extent throughout the analysis area (i.e., for the mine site, transportation corridor, and all other project components); and 2) ensure that these stream channels are visible on all maps.

B. Assessing Impacts to Functions Provided by Potentially Affected Aquatic Resources

According to the Guidelines, the Corps “shall determine in writing the potential short-term or long-term effects of a proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment” by making the factual determinations listed in 40 C.F.R. § 230.11. The factual determinations relevant to assessing impacts to functions provided by potentially affected aquatic resources are the water circulation, fluctuation, and salinity determinations (40 C.F.R. § 230.11(b)); contaminant determinations (40 C.F.R. § 230.11(d)); aquatic ecosystem and organism determinations (40 C.F.R. § 230.11(e)); determination of cumulative effects on the aquatic ecosystem (40 C.F.R. § 230.11(g)); and the determination of secondary effects on the aquatic ecosystem (40 C.F.R. § 230.11(h)).

Comment: Section 230.11(e) requires the Corps to determine “the nature and degree of effect that the proposed discharge will have...on the structure and function of the aquatic ecosystem and organisms.” The DEIS identifies the aquatic resources that will potentially be impacted by the proposed project, including lakes, ponds, and streams, using eight condensed classes. Earlier mapping work conducted by the project proponent used 27 enhanced NWI classes of aquatic

⁶⁸ The 2004-2008 mapping effort assessed over 100,000 acres just in the proposed mine area. The environmental baseline mapping was augmented in 2013 and 2017 to map the newly-proposed southern access route and the Amakdedori Creek and Diamond Point port sites.

⁶⁹ For example, Figures 4.16-1, 4.22-2, 4.24-1, relative to NHD coverages for the same area.

resources, including for lakes, ponds, and streams. This kind of enhanced NWI mapping and differentiation among the aquatic resources allows for more accurate assessments of the functions that the potentially affected aquatic resources perform as compared to an approach that uses more general, condensed classes like those used in the DEIS.⁷⁰ The DEIS⁷¹ does not rely on this more detailed aquatic resource data and does not explain why the greater precision information already existing in the GIS database was not used for analysis.

- Recommendation: The Corps should use the greater precision information that was collected to determine the nature and degree of effect that the proposed discharge will have on the structure and function of the aquatic ecosystem and organisms in light of the significance and complexity of the discharge activities associated with this project. Alternatively, the Corps should explain why this more detailed information was not used and fully explain how a condensed approach allows for a complete and accurate assessment of the functions provided by the resources at issue.

Comment: For wetlands, the Corps provides what it calls “a qualitative overview of wetland functions in the EIS analysis area.”⁷² This qualitative overview does not describe the level at which potentially affected wetlands are currently performing each function. This information is important to determine “the nature and degree of effect that the proposed discharge will have...on the structure and function of the aquatic ecosystem and organisms.”⁷³ In this case, not only are the functional assessment methods available but extensive data was collected, particularly at the mine site, to apply the methods.⁷⁴

- Recommendation: The Corps should characterize the level at which potentially affected wetlands are currently performing each function, taking advantage of available site-specific functional assessment data and where necessary supplementing that data.⁷⁵ Alternatively, the Corps should explain why its “qualitative overview” of wetland functions is sufficient to make a factual determination regarding the nature and degree of effect that the proposed discharge will have on the structure and function of the aquatic ecosystem in light of the significance and complexity of the discharge activities associated with this project.

⁷⁰ The additional aquatic resource classes provided by the enhanced NWI reduce within-class variability and make attributing function easier and more meaningful, supporting a more precise and accurate functional assessment.

⁷¹ DEIS 3.22.1.

⁷² DEIS 3.22-7.

⁷³ 40 C.F.R. § 230.11(e).

⁷⁴ During the 2004-2008 mapping/delineation work, wetlands were identified by both enhanced NWI and Hydrogeomorphic (HGM) class, and data was collected to assess wetland function using the Rapid Procedure for Assessing Wetland Functional Capacity, Based on Hydrogeomorphic Classification (Magee, 1998). The performance of eight wetland functions was quantitatively assessed. These are: 1) modification of ground water discharge; 2) modification of ground water recharge; 3) storm and flood water storage; 4) modification of stream flow; 5) modification of water quality; 6) export of detritus; 7) contribution to abundance and diversity of wetland vegetation; and 8) contribution to abundance and diversity of wetland fauna. Two hundred and twenty-eight wetland functional assessments were conducted in the mine area during the 2004 field season alone. The ENWI water regime modifiers and functional data from the earlier mapping were not used for attributing function and evaluating project-related functional loss and is not referenced in the DEIS.

⁷⁵ 40 C.F.R. § 230.6(b).

Comment: Section 230.11(e) requires the Corps to determine “the nature and degree of effect that the proposed discharge will have...on the structure and function of the aquatic ecosystem and organisms.” Scrub and herbaceous wetlands⁷⁶ constitute most of the wetland losses and degradation anticipated by the proposed project.⁷⁷ However, the DEIS does not include the full set of functions provided by these two types of wetlands. Scrub and herbaceous wetlands, depending on their position in the landscape and water regime, provide high-quality habitat for numerous fish species and contribute water, nutrients, organic material, macroinvertebrates, algae, and bacteria downstream to higher-order streams in the watershed. They also moderate groundwater discharge and surface and subsurface flows to other wetlands and support stream base flows, which all act to support fish habitat, including thermally diverse habitats. The scrub and herbaceous wetlands in the NFK, SFK, and UTC watersheds perform these functions due to the high level of hydrologic connection between streams, wetlands, lakes, and ponds in the area. The DEIS does not attribute these functions to scrub and herbaceous wetlands potentially affected by this project. Without this information, the Corps record would underestimate the anticipated aquatic resource functional losses.

- Recommendation: The Corps should characterize the full array of functions currently performed by the potentially affected wetlands. Alternatively, the Corps should explain why its existing description of the potentially affected wetlands is sufficient to make a factual determination regarding the nature and degree of effect that the proposed discharge will have on the structure and function of the aquatic ecosystem and organisms in light of the significance and complexity of the discharge activities associated with this project.

Comment: The DEIS⁷⁸ identifies certain wetlands as “regionally important”⁷⁹ based on a few general characteristics including whether they provide habitat for regionally important fish (without identification of any specific fish species). The DEIS appears to give more weight to losses of aquatic resources that it identifies as “regionally important.” This list of regionally important wetlands appears to omit the wetland types that are estimated to sustain the greatest level of project induced impacts (i.e., scrub and herbaceous wetlands).⁸⁰ In addition, due to the strong hydrologic and ecologic connection, virtually all wetlands in the analysis area appear to meet the Corps’ definition of a “regionally important” wetland because they, either directly or indirectly, support habitat for anadromous and resident fish through flow contribution or moderation, water quality benefit, or organic matter or nutrient contribution. Similarly, the DEIS does not explicitly identify streams as “regionally important,” although all fish-bearing streams (and their tributaries), lakes, and ponds provide habitat support for anadromous and resident fish species. As a result, EPA is concerned that the DEIS’ approach to filter resources based on a determination of whether they are “regionally important” does not account for the full functions of these resources and results in an underestimation of anticipated aquatic resource functional losses.

⁷⁶ Classified using NWI.

⁷⁷ This comment also applies to wetlands classified as slope wetlands under the HGM classification because there is extensive overlap between HGM slope wetlands and the wetlands classified as scrub or herbaceous under NWI.

⁷⁸ DEIS 3.22-8.

⁷⁹ This is not a term relevant to compliance with the Guidelines, and it is unclear how and why the Corps is making this determination.

⁸⁰ As previously noted, many of these wetlands were also classified as slope wetlands using HGM.

- **Recommendation:** EPA recommends that the Corps not use this “regionally important” approach when making determinations of compliance with the Guidelines because the Corps does not explain how the few characteristics it considered support a conclusion that some aquatic resources are regionally important, and others are not. In addition, the Corps does not explain how its criteria as applied results in identifying resources that are more “important” than others. EPA recommends that the Corps conduct a detailed analysis of the functions provided by each of the aquatic resource types as a basis for determining the value of what would be lost due to impacts from the project in light of the significance and complexity of the discharge activities associated with this project.

Comment: No functions are attributed to the specific stream reaches, lakes, or ponds that would be lost or degraded by the project. The DEIS does not identify what functions these specific aquatic resources perform or the degree to which they are currently performing each function. This information is important in determining “the nature and degree of effect that the proposed discharge will have...on the structure and function of the aquatic ecosystem and organisms.”⁸¹

- **Recommendation:** The Corps should characterize the full array of functions currently performed by the potentially affected streams, lakes, and ponds as well as the degree to which they are currently performing each function. Alternatively, the Corps should explain why its current approach is sufficient in light of the significance and complexity of the discharge activities associated with this project. Characterization of fish habitat functions and potential impacts to those functions is discussed in more detail below.

Comment: The DEIS does not characterize how performance of each function would change as a result of the direct, secondary/indirect, and cumulative effects of the discharge of dredged or fill material associated with the project. Instead, the DEIS only includes general statements such as “[e]xcavation, filling, and clearing of wetlands and other waters would alter or remove their capacity to provide hydrologic, biogeochemical, and biological functions.”⁸²

- **Recommendation:** The Corps should characterize the degree to which each of the functions provided by each of the potentially affected aquatic resources will change as a result of the direct, secondary/indirect, and cumulative effects of the discharges (see factual determinations listed above). Alternatively, the Corps should explain why its current general approach is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: Section 230.11(h) requires an evaluation of the secondary/indirect effects of the proposed discharges on the aquatic ecosystem. The scale and location of the direct impacts associated with the Pebble Project’s discharges of dredged or fill material will result in numerous secondary/indirect effects. The DEIS⁸³ identifies seven general types of secondary/indirect effects associated with the project: disruption of wetland hydrology; conversion of wetland type; habitat degradation downstream of the mine site; fragmentation of habitats; water quality and quantity changes; erosion and sedimentation; and fugitive dust. However, the DEIS only

⁸¹ 40 C.F.R. § 230.11(e).

⁸² DEIS 4.22-8.

⁸³ DEIS 4.22-4.

estimates the acreage of wetlands and other waters potentially impacted by three of these types of secondary/indirect effects: habitat fragmentation, fugitive dust, and dewatering.

- Recommendation: The Corps should estimate the geographic extent (i.e., area, and for impacts to streams, linear miles also) of all of the types of secondary/indirect effects identified in the DEIS. Of particular importance in this case is the omission of the estimated amount (in linear miles and area) of habitat degradation downstream of the mine site, and its potential implications for fish (discussed in more detail in Section V.C. below). Alternatively, the Corps should explain why its evaluation of the secondary/indirect effects of the proposed discharges on the aquatic ecosystem is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: The attribution of fugitive dust impacts is based on a fixed-width buffer rather than the dust dispersion model developed for the project, which would likely be more accurate than an assumed buffer.

- Recommendation: The Corps should explain which method is expected to provide more accurate results for determining the geographic extent of fugitive dust impacts on aquatic resources and utilize that method. The Corps should explain why the method it selected is sufficient to make a factual determination regarding fugitive dust impacts in light of the significance and complexity of the discharge activities associated with this project.

Comment: The DEIS indicates that there is uncertainty regarding the extent of the cone of depression and the predicted changes to groundwater and surface water hydrology.⁸⁴ Thus, the volume of water produced during pit dewatering could be greater than predicted by the groundwater model, and the capture zone and zone of influence could be larger,⁸⁵ meaning that additional aquatic resources could be impacted by the groundwater drawdown.

- Recommendation: The Corps should disclose the uncertainty in the estimates of the geographic extent of dewatering impacts and what effect this uncertainty has on the Corps' factual determinations made pursuant to the Guidelines.

Comment: As discussed in more detail in Section VIII, the Guidelines require a factual determination of the severity or significance of the adverse effects of the proposed discharges on the aquatic ecosystem. However, the DEIS does not identify the severity or significance of these effects. For example, the DEIS identifies that roughly 12 percent of the shrub wetlands and 17 percent of all stream channel length⁸⁶ in the 171,000-acre watershed would be directly impacted (i.e., permanently lost), but it does not identify the loss of functions and the severity or significance for those effects (i.e., the relative importance of that loss). Similarly, the DEIS discloses that the proposed natural gas pipeline may impact two weathervane scallop beds, potentially affecting the sustainability of the Kamishak Bay weathervane scallop fishery. The DEIS also discloses that the Pacific herring sac roe fishery in Kamishak Bay could experience direct or cumulative effects. The specific ecological or economic consequences of these impacts are not evaluated.

⁸⁴ DEIS 2.2.2.1-2-16 and 4.17-3.

⁸⁵ DEIS 4.17.3.1.

⁸⁶ DEIS 4.22-11.

- Recommendation: The Corps should identify the “nature and degree of effect” of the proposed discharge on the aquatic ecosystem, including the severity or significance of those effects.

Comment: The Guidelines require the prediction of cumulative effects to the extent reasonable and practical.⁸⁷ The DEIS considers mine expansion as a cumulative effect but does not include reasonable and practical predictions. In addition, the Corps must make a determination under 230.11(e) of the nature and degree that the proposed discharge will have individually and *cumulatively* on the aquatic ecosystem. Potential cumulative effects are mentioned in general terms (e.g., page 4.16-46), with little or no evaluation of these impacts. Page 4.18-36 of the DEIS states, “[t]he potential for cumulative impacts on surface water, groundwater, and sediment would increase substantially,” but the DEIS does not estimate the extent of these impacts. Section 4-22 of the DEIS does not indicate how many stream miles would be lost due to the expanded mine scenario. While this section does note that an “additional 12,445 acres” of aquatic resources would be “potentially affected” at the mine site, the DEIS does not identify whether this estimate includes both direct losses and functional degradation from secondary/indirect effects, what type of aquatic resources and functions would be lost or degraded, or the severity or significance of these impacts.

- Recommendation: The Corps should characterize the geographic extent of cumulative direct and secondary/indirect effects (e.g., acreage of wetlands and other aquatic resources impacted, miles of stream impacted – by impact types), the expected change in functions provided by the affected aquatic resources, and the severity or significance of these changes. Given the extensive available information about the expanded mine development scenario it appears both reasonable and practical for the Corps to include and evaluate this information. Alternatively, the Corps should explain why its current approach is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: The project applicant has proposed mining the deeper Pebble East portion of the deposit,⁸⁸ potentially during a future phase using surface or underground mining techniques.

- Recommendation: The Corps should evaluate the aquatic resource impacts associated with mining this portion of the deposit (Location Alternative 006) as part of the expanded mine scenario or explain why evaluating the impacts of mining the deeper Pebble East portion is not reasonable or practical.

Comment: The DEIS considers impacts to streams, wetlands, lakes, and ponds in terms of Hydrological Unit Code (HUC)-10 watersheds, whereas impacts to fish resources (discussed in more detail below) are considered at a different scale (i.e., the NFK, SFK, and UTC watersheds), even though streams, wetlands, lakes, ponds, and fish are highly inter-related aquatic resources.

- Recommendation: The Corps should evaluate effects to streams, wetlands, lakes, ponds and fish at the same scale (i.e., the NFK, SFK, and UTC watersheds) to make the required factual determinations. Alternatively, the Corps should explain why it is

⁸⁷ 40 C.F.R § 230.11(g)(2).

⁸⁸ Northern Dynasty Minerals, *The Pebble Project: The Future of U.S. Mining and Metals*, January 2017.

appropriate to use different evaluation scales for these inter-related aquatic resources and make factual determinations that satisfy the Guidelines.

C. Fish Values

According to the Guidelines, the Corps “shall determine in writing the potential short-term or long-term effects of a proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment” by making the factual determinations listed in 40 C.F.R. § 230.11. The factual determinations relevant to fish values are the water circulation, fluctuation, and salinity determinations (40 C.F.R. § 230.11(b)); contaminant determinations (40 C.F.R. § 230.11(d)); aquatic ecosystem and organism determinations (40 C.F.R. § 230.11(e)); determination of cumulative effects on the aquatic ecosystem (40 C.F.R. § 230.11(g)); and the determination of secondary effects on the aquatic ecosystem (40 C.F.R. § 230.11(h)).

1. Fish Habitat

The abundance and distribution of different fish species are dictated by availability of the diverse, ecologically important habitats—wetlands, streams, lakes, ponds, off-channel areas, and other habitat types—that each species requires. The sufficiency, spatial arrangement, and proximity of the habitats each species requires throughout its life cycle (e.g., for spawning, rearing, overwintering, feeding) are key factors determining productivity and sustainability of fish populations. For this reason, the Corps should analyze how the project will affect both the amount and the accessibility of the full complement of habitats that each fish species requires to complete their life histories. If spawning and rearing habitats no longer exist at sufficient levels (in terms of quantity or quality), or no longer exist in proximity to each other, the abundance, productivity, and sustainability of fish populations will be compromised. These habitats need to remain both sufficiently represented and connected, throughout the project area, to sustain resiliency and persistence of fish populations.

Habitat Characterization

Comment: Table 3.24-1 presents different types of habitats: mainstem reach, riffle, run/glide, pool, beaver pond, and other off-channel habitat types. The DEIS does not explain or provide evidence to support (1) how these habitats were selected and sampled; (2) whether these habitats represent all fish habitats that may be impacted by the project; and (3) how and when these habitats are used by fish [e.g., in terms of species, season, and life history stage (e.g., spawning vs. rearing vs. overwintering habitats)]. The DEIS also does not explain how this habitat information is used to evaluate effects of the project on fish (i.e., DEIS Section 4.24).

- Recommendation: The Corps should include information regarding how and when fish habitats were defined, identified, and sampled; whether they represent all relevant fish habitats in the project area; how and when different fish species use these (and any other) habitats; and how these habitats will be affected by this project. Alternatively, the Corps should explain why its existing description of fish habitats is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: The Draft Essential Fish Habitat (EFH) Assessment discloses that areas of spawning, migration, and rearing are delineated based on the available ADF&G Anadromous Waters Catalog and observations PLP made during project studies. However, it does not explain the repeatable process framework by which habitats were identified or characterized. Representative habitat characterization provides the foundation on which interrelated studies (e.g., fish distribution and abundance studies) can be overlain. A consistent project framework that clearly states criteria used to classify or characterize different habitat types should be a precursor to quantifying pre-existing and post-project fish habitat.

- Recommendation: The Corps should include additional information used to support baseline habitat characterizations, including references to baseline habitat studies and the framework used to characterize fish habitats. Alternatively, the Corps should explain why its existing analysis of fish habitat is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: The DEIS does not provide a comprehensive analysis of environmental factors associated with distributions and abundances of fish species throughout the project area watersheds, which is needed to evaluate project-related changes in fish habitat.

- Recommendation: The Corps should ensure its analysis is comprehensive—which would include summaries of seasonal fish species’ distributions and abundances (with uncertainty estimates), associated environmental conditions, and an assessment of factors potentially limiting distributions and abundances of fish species found within the project area watersheds. The Corps should discuss how habitat was assessed at both sites where fish were observed and sites where fish were not observed, to evaluate what characteristics (e.g., groundwater upwelling or downwelling, water temperature) were significant predictors of fish occurrence. The Corps also should disclose areas that were assessed as overwintering habitat. Inclusion of such information will help validate and support inferred relationships between fish distribution, abundance, and habitat selection. Alternatively, the Corps should explain why its existing analysis of fish habitat and relevant environmental factors is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: The DEIS states that, “[s]pecies diversity and abundance data indicate there is sufficient available habitat for relocation without impacts to existing populations.”⁸⁹ EPA’s review finds that the DEIS does not provide support for this statement, and that it does not present information on how available relocation habitats were assessed or what constitutes fish habitat.

- Recommendation: The Corps should explain what is meant by “sufficient available habitat that would allow for relocation without impacts to existing populations” and provide information and analyses to support this statement. Alternatively, the Corps should explain why its existing assessment of fish habitat and population-level effects of the project is sufficient in light of the significance and complexity of the discharge activities associated with this project.

⁸⁹ DEIS pg. 4.24-8.

Comment: Table 4.24-2, entitled “Average precipitation year spawning habitat for all streams and species in the mine site area pre-mine, during operations, and post-closure,” does not include all species documented to occur at the mine site area.⁹⁰ Values are reported in terms of stream area for all watersheds combined, but both stream area and stream length and breakdowns by watershed are necessary for evaluation purposes.

- Recommendation: The Corps should revise this table to include (1) all anadromous and resident fish species (including lamprey) documented to occur in the project area watersheds and (2) values in terms of stream miles in each of the three project area watersheds, in addition to stream acreage. Alternatively, the Corps should explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Habitat Function and Connectivity

Comment: The DEIS and the Draft EFH Assessment do not analyze habitat function (i.e., how fish species are using the different habitats at risk from project impacts during all life stages). Fish species and populations use different habitats for different functions (e.g., spawning, egg incubation, rearing, refugia, feeding, overwintering, and migration), and this habitat use varies both seasonally and from year to year.⁹¹

- Recommendation: The Corps should describe fish habitat functions and their spatial and temporal variability and disclose the consequences of project-related changes to each of those habitats in terms of the different habitat functions (i.e., spawning, egg incubation, rearing, refugia, feeding, overwintering, and migration). This would allow for estimation of the amount of habitat loss (in acres and linear miles) related to different habitat functions, for different fish species. Alternatively, the Corps should explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: The DEIS does not analyze the spatial arrangement or connectivity of different habitat types used by anadromous and resident fish species throughout their life cycles within the project area.

- Recommendation: The Corps should analyze the spatial arrangement and connectivity of different fish habitats. Alternatively, the Corps should explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: The DEIS states that “[f]ree passage of resident and anadromous fish may be temporarily interrupted but would continue unimpeded after construction is complete. Habitat at the immediate location of culverts would be altered, but fish would continue to use the streams.”⁹² The DEIS does not cite evidence to support these statements.

- Recommendation: The Corps should include justification and analysis to support these statements or should explain why its existing statement is sufficient in light of the significance and complexity of the discharge activities associated with this project.

⁹⁰ Woody and O’Neal 2010.

⁹¹ Brennan et al. 2019.

⁹² DEIS pg. 4.24-6.

Habitat Quantification

Comment: The DEIS and Draft EFH Assessment lack basic habitat quantifications for streams, lakes, ponds, and marine habitats: stream loss of channel length is not quantified by linear feet and/or miles; habitats assessed to be spawning, incubation, rearing, overwintering, and feeding areas are not quantified in acreage; migratory habitats are not quantified as linear stream miles and acreage; and, there is not sufficient quantification of habitat types and fish usage.

- Recommendation: The Corps should quantify the geographic extent of potentially affected fish habitats, or should explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project. Specific recommendations are included for each of the instances listed below:
 1. The Draft EFH Assessment (Table 5-1 p. 68) presents a summary of essential fish habitat for managed fish species that will be lost/destroyed during mine site development. The Corps also should include a table which quantifies potential habitat losses for all species (including resident and non-managed anadromous species) found in the project impact area. This information will enable the Corps to quantify impacts to fish species from the current proposal as well as from the potential future expanded mine scenario.
 2. The DEIS asserts that “[t]he percentage reductions in habitat would generally decrease in a downstream direction until reaching the confluence of the NFK and the SFK (with a few exceptions). In terms of extent, rainbow trout, chum, sockeye, Dolly Varden, and Arctic grayling would have habitat decreases only in the headwater tributaries” (pg. 4.24-13). The Corps should provide evidence to support this statement.
 3. The Draft EFH Assessment and DEIS present miles of spawning and rearing habitats for Chinook, coho, chum, and sockeye salmon, but do not quantify overwintering, incubation, or migratory habitat. The EFH Assessment uses the Anadromous Waters Catalog to calculate spawning and rearing habitat in linear feet and miles. The Anadromous Waters Catalog covers fish spawning or presence (and less frequently migration and rearing), and it does not differentiate other critical habitats, such as overwintering habitat. Therefore, the DEIS provides an incomplete picture of fish habitat use. There is no data provided to verify the accounting of habitat miles (or acreage, by fish species) that will be impacted by the Pebble Project. The Corps should include a complete table of quantified habitat classifications by fish species documented to occur in the project impact area, to understand the amount of habitat that will be lost because of the project and the functions those habitats provide to each fish species.

Habitat Quality

Comment: EPA’s review finds that the DEIS and the Draft EFH Assessment make unsupported conclusions related to habitat quality (see list below). In particular, conclusions related to “low use” and “low quality” fish habitat are not supported by the information provided in the DEIS.

- Recommendation: As discussed in the recommendations above, the Corps should conduct additional analyses of habitat characterization, function, quantification, spatial

arrangement and connectivity, and the full seasonal distribution of fish species and life stages across multiple years. Once these analyses are done, the Corps should provide this additional information to support its conclusions. Alternatively, the Corps should explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project. The following are specific recommendations:

1. The Draft EFH Assessment (pg. 66) states that construction of the mine site “would discharge fill material into 46,836 linear feet (14,276 linear miles)⁹³ of EFH catalogued as anadromous streams in the [Anadromous Waters Catalog] and/or identified by PLP research as EFH” and concludes that impacted reaches “support primarily low levels of use by rearing Chinook salmon and rearing and spawning coho salmon.” The Draft EFH Assessment further states that “the NFK and SFK reaches that would be removed have a low Pacific salmon presence compared to downstream reaches indicating that these habitats are of lower quality EFH.” The Corps should provide detailed analyses or references to support these conclusions regarding “low levels of use” or “low Pacific salmon presence.” This supporting information is particularly important given recent research highlighting the importance of temporally and spatially shifting habitat mosaics for Pacific salmon populations in this region.⁹⁴
2. The Draft EFH Assessment (pg. 67) states that habitats that would be removed exhibited some of the “lowest density use by both coho and sockeye salmon juveniles” within the SFK drainage, suggesting “low overall quality EFH or abundance of quality habitat in unaffected areas.” The Corps should provide additional information to support these conclusions. Specifically, the Corps should present fish sampling data as catch-per-unit effort values, rather than as density use; present data on seasonal fish distributions; present data on habitat quality within the project waters; and discuss whether the DEIS and the Draft EFH Assessment evaluated and compared habitat characteristics at sites where fish were and were not observed.
3. The Draft EFH Assessment (pg. 67) asserts that, considering the low use of EFH and direct habitat losses in the SFK-E reach and the NFK 1.190 tributary, “drainage-wide impacts to Pacific salmon populations from these direct habitat losses would be unlikely.” The Corps should include evidence that supports this conclusion.
4. The Draft EFH Assessment concludes that the Pebble Project may adversely affect EFH. However, the Assessment also concludes that “...mortalities are unlikely and EFH characteristics would return to normal shortly after the activity ceases, or in the short term” (pg. 120) and that “habitat removed is generally of low biological importance.” The Corps should either explain or resolve this apparent discrepancy and include references or documentation to support these assertions.

⁹³ There also appears to be a conversion error in these number which come from the Draft EFH Assessment.

⁹⁴ Brennan et al. 2019.

Geospatial mapping of habitat

Comment: The DEIS does not include geospatial representation (i.e., the location and spatial arrangement) of assessed baseline fish habitats. Such geo-location of classified habitats, analyzed by their functions for individual species, is needed to understand how the project will affect habitat availability, spatial arrangement, and connectivity, which in turn will determine impacts to fish populations.

- Recommendation: The Corps should document the location of existing baseline fish habitats, their proximity to other similar or dissimilar habitats required by those fish, and how the spatial arrangement of these habitats will change as a result of the proposed mine project. Alternatively, the Corps should explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Headwater streams

Comment: The DEIS and the Draft EFH Assessment do not address the effects of decreased inputs from headwater streams on downstream waters. Headwater streams support numerous fish species and habitats, and the disruption to headwater streams from the mine site has the potential to result in large environmental consequences to fish and aquatic resources at a scale beyond that included in the Mine Site EIS Analysis Area (Figure 3.24-1).

- Recommendation: The Corps should include discussion of the extensive body of scientific evidence demonstrating that headwaters are critical aquatic habitats,⁹⁵ and evaluate the role and importance of headwater streams in the project area in terms of both direct use of these habitats and their inputs to downstream waters. Alternatively, the Corps should explain why its existing consideration of headwater streams is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Intermittent stream reaches.

Comment: The DEIS does not analyze intermittent stream surface and groundwater flow pathways relevant to fish and fish habitat. Intermittent streams may lack flow during critical summer low flow periods and are often viewed as having limited ecological function for fish habitat or water quality when surface flow ceases. However, hyporheic flow composed of mixed shallow groundwater and surface water under and along the channel bed can continue in these intermittent channels after surface flow has ceased. This hyporheic flow can be thermally moderated (i.e., buffered from the effects of solar heating by the channel substrate),⁹⁶ and thus can create thermally distinct fish habitat in isolated pools in intermittent streams.⁹⁷ The literature supports the idea that intermittent streams can provide high quality habitat. Subsurface flow can also increase thermal heterogeneity where it emerges at confluence zones with perennial water bodies, such as lakes⁹⁸ or streams and rivers,⁹⁹ providing patches of cold-water habitat in

⁹⁵ For example, Schlosser, I. J. 1995; Wipfli, M.S. J.S. Richardson, and R.J. Naiman. 2007.

⁹⁶ May and Lee 2004, Arrigoni et al. 2008.

⁹⁷ Bilby 1984, May and Lee 2004.

⁹⁸ Buttle et al. 2001.

⁹⁹ Ebersole et al. 2015.

otherwise warm downstream waters. The functional role of colder tributaries in providing thermally distinct water that supports cold water fish species is a clear example of an ecosystem service provided by the tributaries,¹⁰⁰ potentially even after surface flow has ceased in an intermittent stream reach.

- Recommendation: The Corps should evaluate the potential importance of intermittent stream reaches, which are seasonally important for fish migration, spawning, and rearing¹⁰¹ as part of stream-lake networks, in the project impact area. Alternatively, the Corps should explain why its existing consideration of intermittent streams is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: The DEIS states that the mainstem SFK has a 10-mile reach, from two miles below Frying Pan Lake to the SFK Tributary 1.19, that frequently exhibits zero or intermittent flow during winter and summer months. The DEIS states that the loss of surface water in this reach transfers an average of 22 cfs from the SFK (Nushagak River headwaters) into the UTC (Kvichak River headwaters) via groundwater exchange, indicating complex hydrological connections. Groundwater remaining in the SFK basin reemerges at the downstream end of the intermittent reach, 20 miles above the NFK confluence. The DEIS states that this reach is not considered “quality” habitat for purposes of environmental review (pg. 3.24-9), but this conclusion is not adequately supported within the DEIS. As discussed above, scientific literature supports the conclusion that intermittent stream reaches can be seasonally important for fish migration, spawning, and rearing¹⁰² as part of stream-lake networks. Furthermore, the DEIS states that the highest densities of chum salmon redds occurred in the reach immediately downstream of the dry channel (SFK-C), where accretion of groundwater is most evident.¹⁰³ The DEIS does not present the data or other information on stream habitat that were analyzed to reach the conclusion that the intermittent stream reach does not represent quality habitat.

- Recommendation: The Corps should evaluate the intermittent reach on the mainstem SFK, between SFK Tributary 1.19 and the outlet of Frying Pan Lake, as potential habitat for Chinook, sockeye, and chum salmon and resident fish. Alternatively, the Corps should explain why its analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Off-channel habitat

Comment: The DEIS does not quantify off-channel floodplain habitats or disclose models that will be used to account for off-channel habitats, even though off-channel habitats can be an extremely important factor in salmonid distribution.¹⁰⁴ Tables 4.24.2 and 4.24.3 assert that there will be an increase in downstream spawning and rearing habitats, but the DEIS does not provide scientific evidence supporting this claim.

- Recommendation: The Corps should document and quantify pre-existing off-channel habitats that may be affected by the project, analyze potential losses of off-channel habitats due to the project, and address the consequences of these habitat losses to fish

¹⁰⁰ Torgersen et al. 2012.

¹⁰¹ Heim et al 2018; Ebersole et al. 2015; Ray et al. 2015.

¹⁰² *Id.*

¹⁰³ R2 et al 2011a.

¹⁰⁴ For example, Swales and Levins 1989.

populations. The Corps should use results from the Pebble Project Draft Environmental Baseline Studies 2006 Study Plan to help illustrate the mechanics of flow connectivity to the channel from surface flow, groundwater flow, or both combined. For example, Figure 11.1-3 of PLP 2006 includes a map of off-channel habitat transects from the SFK River. Alternatively, the Corps should explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project.

2. Fish

Distribution and Abundance

Comment: The DEIS and the Draft EFH Assessment do not characterize the full seasonal distribution and abundance of resident and anadromous fish or capture interannual variability in these parameters. Because the distribution and abundance of fish can vary substantially both seasonally and interannually, and because the project will affect the area in perpetuity, long-term data on fish distributions and abundances are needed to evaluate impacts of the project.

- Recommendation: The Corps should analyze the full seasonal and interannual variability in distributions and abundances of fish species and assemblages that are supported by the diversity of habitats in the Nushagak and Kvichak River watersheds, including habitats in the headwater streams of the SFK, NFK, and UTC over multiple years. Alternatively, the Corps should explain why its existing analysis of spatial and temporal variability in fish abundances and distributions is sufficient in light of the significance and complexity of the discharge activities associated with this project. Specific recommendations include:
 1. Fish may be absent from a site during some years or some portions of a single year, but present in high abundances at other times. Low abundance at one point in time does not necessarily equate to low abundance at another point in time, nor does it mean that the habitat is not ecologically important. The Corps should disclose the seasonal and interannual distributions and abundances of fish species in terms of migration, spawning, incubation, rearing, and overwintering habitat within streams affected by the Pebble Project, including those affected by the withdrawal, storage, and discharge of water. When abundance and distribution data are presented, the Corps should specify how that data was generated (e.g., in terms of sampling frequency).
 2. The DEIS includes little data on fish densities (see DEIS Sections 3.24 and 4.24), although density data is available.¹⁰⁵ The statements that are included in the DEIS are qualitative and unsupported. The Corps should include relevant data collected by PLP and should supplement their analysis with relevant data collected by others.¹⁰⁶
 3. The DEIS states (pg. 4.24-3) that rearing Chinook salmon have been documented in the 2.9 miles of NFK Tributary 1.19 in lower densities (0.11 fish/100m²) compared to the mainstem NFK (4.99 fish/100m²) but does not include a citation to support this statement. These estimates appear to conflict with research conducted by ADF&G in

¹⁰⁵ For example, Tables 7.1-7.3 in EPA 2014, which show data from PLP's Environmental Baseline Document.

¹⁰⁶ For example, Woody and O'Neal 2010.

the Nushagak River watershed that concludes that juvenile salmon are likely more abundant in the tributaries and headwaters of the drainage, where finer scale habitat such as riffles and woody debris are more common.¹⁰⁷ The Corps should consider this ADF&G report and provide supporting information for the above referenced statement in the DEIS.

4. The Draft EFH Assessment states that no adult Pacific salmon were observed within the headwater reach of the SFK River that would be eliminated by the Pebble Project during the 2004-2008 aerial surveys to document adult salmon distribution (pg. 67). Aerial surveys can substantially underestimate salmon abundances in narrow, deep, highly vegetated, or tannic waters.¹⁰⁸ Inclusion of supplemental survey methods such as mark-recapture can help identify error and bias in estimates.¹⁰⁹ The Corps should include discussion of the limitations of aerial surveys and how these limitations could impact conclusions made in the EFH Assessment and in the DEIS (i.e., by underestimating salmon counts in headwater streams).
5. Fish abundance estimates from the Environmental Baseline Document (Figure 15-1-96; PLP 2011) suggest that over 80,000 returning sockeye salmon were counted during one aerial survey in UTC and Tributary 1.60. This estimate, combined with remaining adult aerial counts, suggest that over 100,000 spawning sockeye salmon were counted in UTC alone in 2008, but this information is not included in the DEIS. The Corps should include these and other existing project-specific fish abundance estimates in the record.

Bristol Bay salmon portfolio

Comment: The DEIS and the Draft EFH Assessment do not fully analyze population level effects from the potential loss of genetic diversity of the Bristol Bay salmon portfolio.¹¹⁰ The Pebble Project could result in population-level effects on the genetic diversity of salmon stocks in the Nushagak and Kvichak River watersheds, which in turn could impact the salmon portfolio and overall resilience of salmon populations within the Bristol Bay watershed. Thus, additional information on the genetically distinct fish populations in the project area is needed.

- Recommendation: The Corps should analyze the relative contribution of genetically distinct spawning populations to determine the significance of population losses or reductions that may result in impacts beyond recovery thresholds of species.¹¹¹ The Corps should also analyze and discuss existing scientific information on the Bristol Bay salmon portfolio and the consequences of genetic biodiversity losses for salmon populations. Alternatively, the Corps should explain why its existing discussion of genetic diversity and the portfolio effect in the Bristol Bay region is sufficient in light of the significance

¹⁰⁷ For more information about this research see:

http://www.adfg.alaska.gov/index.cfm?adfg=chinookinitiative_nushagak.main#juvenileabundance.

¹⁰⁸ Bevan 1961.

¹⁰⁹ For example, Parken et al. 2003.

¹¹⁰ Schindler et al. 2010.

¹¹¹ *Id.*

and complexity of the discharge activities associated with this project. Specific topics the Corps should discuss and evaluate include:

1. There are several hundred discrete sockeye salmon populations in Bristol Bay.¹¹² It is possible that as many as 200 to 300 discrete sockeye salmon spawning aggregates occupy the Kvichak River system alone.¹¹³ The heterogeneity of these Kvichak River populations reduces the variability of sockeye salmon returns in the Bristol Bay region and contributes to the stability and robustness of the resource.
2. ADF&G has built and tested the Bristol Bay salmon genetic baseline over the past 17 years.¹¹⁴
3. Recent research indicates that sockeye and Chinook salmon productivity vary over space and time in the Nushagak River drainage, and that shifting habitat mosaics throughout the drainage, including streams draining the project area, help stabilize interannual salmon production.¹¹⁵

Population-level effects

Comment: The DEIS Summary for Habitat Loss (Section 4.24.2.1) concludes that 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” (p. 4.24-6). Standard fisheries management techniques are applied at the population level, not the individual level, and the approach mentioned in the DEIS is inconsistent with ADF&G population/stock management approaches. The DEIS also does not provide fish population estimates or the models used to support the determination that impacts would occur at the individual level rather than at the population level.

- Recommendation: The Corps should clarify their distinction between individual-level and population-level effects and include supporting information for the conclusion that there would be no measurable impacts to salmon populations in the DEIS. Alternatively, the Corps should explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: The Draft EFH Assessment asserts that “population effects within the context of the NFK river, SFK river and UT creek are not anticipated” (pg. 68), that population-level effects to the local watersheds are unlikely, and that population-level effects at the Bristol Bay watershed level would be undetectable (pg. 78). No evidence was provided in the Draft EFH Assessment to support these conclusions.

- Recommendation: The Corps should include data and analyses that support its conclusions regarding population-level effects of the project (i.e., well-supported and documented analyses of population-level effects to demonstrate the validity of these statements).

Temporal availability of salmon

¹¹² *Id.*

¹¹³ Habicht et al. 2004; Ramsted et al. 2004; Ramstad et al 2009.

¹¹⁴ For more information see:

http://www.adfg.alaska.gov/index.cfm?adfg=fishinggeneconservationlab.bbaysockeye_baseline.

¹¹⁵ Brennan et al. 2019.

Comment: The Pebble Project proposes to eliminate, dewater, block, and fragment headwater streams, which could result in the loss of habitats that support headwater spawning and rearing salmonid populations. Headwater stream populations arrive later to their spawning grounds than those downstream in the mainstem and lower tributaries. Later arriving salmon populations are important because they extend the seasonal availability of salmon to terrestrial wildlife (e.g., bears, wolves) and other aquatic biota (e.g., fish and invertebrates) in the NFK, SFK, and UTC, and the overall Nushagak and Kvichak watersheds. Predators and scavengers roam from lakes to mainstems to tributaries in search of food subsidies offered by asynchronous salmon run timings across the landscape. The DEIS does not evaluate the importance of late arriving salmon to the ecology of headwater and downstream areas or of the potential consequences of losses due to the project.

- Recommendation: The Corps should evaluate the importance of late arriving salmon to the ecology of headwater and downstream areas and the potential consequences of losses of these asynchronous subsidies due to the project. Alternatively, the Corps should explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Age structure

Comment: The DEIS acknowledges the presence of multiple age classes of Chinook, coho, and sockeye salmon in the Nushagak and Kvichak River watersheds. As a result, project impacts may result in losses of multiple age classes of multiple species. This loss of age class representation could significantly impact annual production or returns within a few generations. This issue is currently not evaluated in the DEIS.

- Recommendation: The Corps should analyze and disclose the potential for losses of multiple age classes, including across multiple species, and the potential resulting depletion of annual returns. Alternatively, the Corps should explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Egg Incubation

Comment: The DEIS and the Draft EFH Assessment do not fully address egg incubation or potential impacts to incubating fish eggs from habitat alterations. While the DEIS analyzes timing of spawning, egg incubation is a different life stage that occurs during a different time period. Table 3.24-4 does not include egg incubation, and thus this table presents an incomplete picture of life-stage periodicities of fish species in the NFK, SFK, and UTC watersheds. In addition, egg incubation could be affected by several project induced physical and chemical alterations, including changes in water temperature, groundwater inputs/flow pathways, surface flows, dissolved oxygen, pH, conductivity, and other water quality parameters.

- Recommendation: The Corps should add egg incubation to Table 3.24-4, between spawning and emergence periods. The Corps also should evaluate potential impacts to incubating eggs from changes in flow (e.g., scour) and other physical and chemical project induced alterations, as well as the consequences of the potential impacts to incubating eggs for fish species and populations. DEIS Table 4.24-1, which presents "Priority species and life stages used to determine habitat flow needs in the mine site area," should be revised to include the incubation life stage for all species documented to occur in potentially affected waters, including lamprey (resident and anadromous). The

analysis of impacts to lamprey are important because lamprey eggs hatch into larvae (ammocoetes) in about two weeks' time and drift downstream to slow velocity areas, where they reside in the substrate from three to seven years, resulting in multiple age classes in the substrate at once. Lamprey eggs and ammocoetes, as well as eggs of other nest-building fish species, can be impacted by high flows that scour redds during sensitive life stages. Table 4.24-3, entitled "Average precipitation year juvenile habitat for all streams and species in the mine site area pre-mine, during operations, and post-closure," also should be revised to include all species documented at the mine site area.¹¹⁶ Alternatively, the Corps should explain why its existing consideration of egg incubation is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Resident and Anadromous Fish

Comment: The DEIS discloses that potential direct and indirect (i.e., secondary) effects for aquatic resources are assessed according to the magnitude of impact from the project depending on the specific species sensitivity to the type of disturbance (p. 4-24-1). However, only select species are mentioned and several species that would be impacted are not included. As a result, the DEIS presents an incomplete picture of the number of impacted fish species and underestimates direct, secondary/indirect and cumulative impacts to the diversity of species and assemblages that provide ecological sustainability to the NFK, SFK, and UTC watersheds.

- Recommendation: The Corps should analyze impacts for the full diversity of resident and anadromous fish species known to occur in the Nushagak and Kvichak River watersheds. Alternatively, the Corps should explain why its existing focus on selected species is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: DEIS Table 3.24-4 presents periodicity information only for select species. This table is incomplete and does not sufficiently represent periodicity because the length of time between spawning and fry emergence varies with species, population, and water temperature.¹¹⁷

- Recommendation: The Corps should include the complete periodicity of critical life stages of all anadromous and resident species known to occur in the mainstem and tributaries of the Nushagak and Kvichak River watersheds in Table 3.24-4. Alternatively, the Corps should explain why its existing focus on selected species is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: DEIS Figures 3.24-2 and 3.24-3 present the fish distribution and relative contribution of "anadromous salmonids," "resident salmonids," "non-salmonid fish," and "no fish observed." The DEIS does not clearly define these terms, which differ from the regulatory language of the ADF&G Anadromous Waters Catalog.

- Recommendation: The Corps should clearly define the categories used in Figures 3.24-2 and 3.24-3. For comparative purposes, the Corps should refer to life history strategies as either "anadromous" or "resident," consistent with the ADF&G Anadromous Waters

¹¹⁶ Woody and O'Neal 2010.

¹¹⁷ Murray and McPhail 1988, Quinn 2004.

Catalog. The Corps also should clarify whether “no fish” means that the reaches were sampled and no fish were found (and if so, when and how frequently these reaches were sampled), or that reaches were not sampled. Alternatively, the Corps should explain why its existing categories are sufficient in light of the significance and complexity of the discharge activities associated with this project.

Life history strategies

Comment: The DEIS does not disclose potential impacts to life history strategies. Some fish species (e.g., rainbow trout, least cisco, Dolly Varden char, three-spine stickleback, lamprey) exhibit both resident and anadromous forms, each with diverse habitat needs for successful completion of life cycles. Resident and anadromous forms of lamprey were documented in the NFK, SFK, and UTC during the 2007 Baseline studies.¹¹⁸ The presence of lamprey has also been documented in these headwater streams.¹¹⁹ Anadromous Dolly Varden have also been documented in Bristol Bay watersheds.¹²⁰

- Recommendation: The Corps should analyze life history strategies of the fish species documented to occur in the project impact area, consider potential impacts of the project to these life history strategies, and disclose whether anadromous populations of these fish are also present within the Nushagak and Kvichak River watersheds. Alternatively, the Corps should explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: The DEIS does not analyze potential impacts to diverse fish spawning strategies (e.g., nest builders versus broadcast spawners; spring versus fall spawners). For example, salmonids and lamprey species build redds in the channel substrate. Least cisco are broadcast spawners with eggs that disperse in the water column. Coho salmon are fall/winter spawners, while rainbow trout are spring spawners. Adaptive spawning strategies may not be resilient to the physical and chemical alterations resulting from the project.

- Recommendation: The Corps should analyze impacts of the project to the diversity of spawning strategies known to be used by fish species documented in the project area and resulting changes to the overall ecology of fish populations and assemblages. Alternatively, the Corps should explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Bivalves

Comment: The DEIS does not discuss the presence or absence of freshwater mussels in the Bristol Bay region, nor does it analyze project impacts to bivalves. The Pebble Project Draft Environmental Baseline Studies, 2006 Study Plan, Figure 11.5-1, presents a map of the 2005-2006 project freshwater mussel sampling locations for Lake Iliamna.

- Recommendation: The Corps should characterize the pre-existing bivalve populations and analyze and disclose potential impacts to bivalves from the project. Alternatively, the Corps should explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project.

¹¹⁸ Northern Dynasty Minerals 2007.

¹¹⁹ Woody and O’Neal 2010.

¹²⁰ Lisac and Nelle 2000, Reynolds 2000, Taylor et al. 2008.

Sampling design and reporting

Comment: The DEIS does not describe site selection and sampling design for fish habitat, distribution, or relative abundance studies. The DEIS does not disclose methodologies used for the selection of habitat transects (i.e., random, systematic) or if there was statistical reasoning behind the study transect selection. In addition, levels of uncertainty and error are not consistently reported for data used in the analysis. Fish counts reported in PLP's Environmental Baseline Document¹²¹ do not always include estimates of observer efficiency, sampling efficiency, or other factors that affect the proportion of fish present observed. Thus, counts may often underestimate true abundance. The DEIS also includes limited or no information regarding when samples were collected, how many were collected, how often they were collected, and overall sample size on which estimates were based. This information should be included within the DEIS to support its statements.

- Recommendation: The Corps should provide information on site selection and study sampling designs and associated levels of uncertainty and error, as well the above-mentioned sample reporting information, for all data included in the DEIS, because this information is necessary to understand and support the presented analysis. Alternatively, the Corps should explain why its existing presentation of sampling design information is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Impacts of Streamflow Alterations

Comment: The project proposes to directly alter the natural flow regimes of streams that support resident and anadromous fish. A stream's flow regime—its daily, seasonal, annual, and flood fluctuations—is key to stream structure and function; thus, assessing impacts based only on mean monthly streamflows at large spatial scales does not adequately capture impacts. Numerous case studies in the literature indicate that altering a stream's hydrograph can cause measurable changes in ecosystem structure.¹²² Streamflow changes are characterized in the DEIS using changes to monthly and annual mean flows. Fish habitat is created and maintained through daily and seasonal variations (e.g., minimums and maximums) of the natural hydrograph and therefore the time scale used in the DEIS does not capture flow impacts on fish. Reporting mean monthly values alone does not represent the range of flows that occurs each month or during extreme precipitation or drying events.

- Recommendation: The Corps should model flow alterations associated with the project on a more conservative basis, such as a daily or diurnal basis, to adequately predict potential impacts on fish. The Corps should also characterize flow alterations such that pre-existing, mine operation, and post-closure hydrographs can be compared in terms of changes in the frequency or magnitude of daily peak and minimum flows. To support this analysis, the Corps should include a table that identifies: stream, reach, length (miles), percent and absolute (cfs) streamflow alteration (in terms of monthly mean, minimum, and maximum flows), and fish species and life stages known to be present. The Corps also should consider including one or more maps of streams in the mine area that illustrate the specific percent streamflow changes expected along those streams (e.g., see

¹²¹ PLP 2011.

¹²² Richter et al. 2012.

Figure 7-14 in EPA 2014). Alternatively, the Corps should explain why its existing analysis of flow alterations is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: The DEIS does not disclose how flow alterations may alter ice formation in the Nushagak and Kvichak River watersheds. The DEIS does not include information on locations, thickness, or movement of ice; timing of break up and ice-out; under-ice temperatures; or under-ice spawning and overwintering habitat.

- **Recommendation:** The Corps should evaluate the project's potential impacts on the ice-related factors discussed above. Alternatively, the Corps should explain why its existing consideration of ice-related factors is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: The DEIS asserts that increasing flow will only result in positive benefits by increasing habitat. However, increasing flow can have negative effects as well (e.g., via temperature changes, redd scouring, and changes in channel stability and form), and it is well established that for many species and life stages, increasing flow does not create more habitat. In addition, the timing, frequency, and duration of increased flows should be considered.

- **Recommendation:** The Corps should further evaluate the extent to which increasing flow will result in potential positive benefits for the species and life stages impacted, as well as the potential negative impacts that could result from flow increases, in terms of the magnitude, timing, frequency, and duration of these changes. Alternatively, the Corps should explain why its existing analysis of the impacts of flow increases is sufficient in light of the significance and complexity of the discharge activities associated with this project.

Comment: According to Draft EFH Assessment, the net changes to habitat are expected to be negative across species in an average year and even greater in a dry year. The Draft EFH Assessment (Table 5-3) discloses a 9 percent decrease of spawning habitat for all four salmon species (Chinook, sockeye, coho, chum) in a dry year.

- **Recommendation:** The Corps should revise the record, including assertions in the DEIS that the Pebble Project will increase habitat, to accurately reflect analyses showing net habitat decreases. Alternatively, the Corps should explain why its existing analysis is sufficient and accurate in light of the significance and complexity of the discharge activities associated with this project.

Comment: In considering mine site impacts on fish resources, the DEIS states that the EIS analysis area (the NFK, SFK, and UTC watersheds, plus a 1,000 ft buffer around the mine site) includes "all aquatic habitats potentially impacted by changes in streamflow from the diversion, capture, and release of water associated with the project that result in a modeled reduction of streamflow greater than 2 percent" (pg. 4.24.-1). No rationale is provided for why this two percent threshold was selected, the spatial or temporal scale at which this two percent value was calculated, how these delineations were supported by modeled streamflow changes, or whether this area also encompassed streamflow increases greater than 2 percent.

- Recommendation: The Corps should explain what the 2 percent threshold represents and why it is considered a scientifically defensible threshold for considering impacts to fish resources.

Comment: The DEIS states that approximately 2.3 miles of the Tributary 1.190 mainstem and sub-tributary stream channels will remain free-flowing between the TSF and the water seepage pond, and that this could be resident species habitat (Section 4.24.2.1 Habitat Loss – North Fork Kaktuli). The DEIS does not explain how this stream segment will remain free-flowing if it is blocked on both ends by mine structures, the upstream end of which is designed as a flow-through system such that water in this segment would be, in part, mining process water from the TSF.

- Recommendation: The Corps should revise or clarify this statement.

Comment: The DEIS estimates the potential extent of downstream flow-related impacts of the project. The estimate, however, is unsupported. The DEIS states that “[o]nce the mainstem of the Kaktuli is reached, flow changes would not be detectable” (pg. 4.24-13). EPA’s review finds that the DEIS does not contain any support for this conclusion, and that the DEIS does not define ‘detectable.’

- Recommendation: The Corps should support this statement regarding downstream flow-related impacts and revise or clarify as necessary.

Comment: According to the DEIS surface water modeling chapter (Appendix K.17 and RFI 104), the margins of error for flow model results are high; for example, the maximum difference between actual and modeled flows is approximately 20 percent.

- Recommendation: The Corps should, both graphically and tabularly, display flow changes (increases and decreases) for all project phases to show the extent (i.e., 3, 5, and 10 percent) and degree of downstream flow. The Corps also should show how changes in effluent discharges will result in fish habitat changes, taking into account the 20 percent margins of error in the flow model. Alternatively, the Corps should explain why its existing analysis of flow alteration is sufficient in light of the significance and complexity of the discharge activities associated with this project.

3. Water Quality Relevant to Fish

Water Chemistry

Comment: The DEIS lacks analyses of the potential for fish toxicity from the introduction, relocation, or increase in contaminants in the aquatic environment. This is a concern because anadromous and resident species are genetically adapted to a relatively narrow and unique range of habitat and water quality parameters within their natal streams.¹²³

- Recommendation: The Corps should analyze: 1) potential impacts of increased metal loading to fish; and 2) how increases in loading, especially of copper and selenium, would affect fish downstream of the discharge points. The Corps should evaluate both the level of chemical alteration and potential consequences to fish and fish habitat. Alternatively, the Corps should explain why its existing analysis of metal loading and

¹²³ Woody 2018; Lytle et al. 2004.

impacts on fish is sufficient in light of the significance and complexity of the discharge activities associated with this project. Additional technical recommendations include:

1. The Pebble Project proposes to treat all discharges to meet water quality standards. The Corps should analyze the potential for discharges to match the existing water quality of the receiving waters. Discharges that meet standards may still impact fish and fish habitat. For example, small changes, such as increases in dissolved copper concentrations, can be lethal or sublethal.¹²⁴ In order to improve this analysis, the Corps should predict changes to concentrations in streams due to project impacts (such as treated water discharges, fugitive dust, and uncaptured groundwater) and evaluate the impacts that these changes could have on fish and fish habitat.
2. DEIS Section 3.24.1, Fish Tissue Trace Element Analysis, does not provide summary baseline or existing concentrations of elements (i.e., zinc, copper, arsenic, mercury, methylmercury). The Pebble Project Draft Environmental Baseline Studies 2006 Study Plan (Figure 11.1-1) includes a map of fish tissue sample site locations and the Draft 2007 Environmental Baseline Studies include a table of fish tissue sample locations (Table 11.1-2). The Corps should include this information to support analysis of potential impacts to fish from elevated elements.
3. Neither the DEIS nor the Draft EFH Assessment include analyses and discussion of potential toxicity impacts to fish. The Corps should analyze the potential for the following toxicity impacts:
 - Impairment to olfaction and homing capabilities in salmonids;
 - Attraction to very high lethal levels of water contamination;
 - Interference with respiratory function;
 - Reduction in immune efficiency;
 - Disruption to osmoregulation capabilities;
 - Impacts to the sensitivity of the lateral line canals;
 - Impairment of brain function; and
 - Changes in enzyme activity, blood chemistry, and metabolism.

Water Temperature

Comment: The DEIS and the Draft EFH Assessment do not analyze how disruption in groundwater pathways, surface water flow, and aquifers will alter water temperatures and thermal patterns within the NFK, SFK, and UTC watersheds. The alteration of water temperatures is a concern because fish are at risk from changes in the heterogeneity of thermal patterns, which drive their metabolic energetics. Fish populations rely on groundwater-surface water connectivity, which has a strong influence on stream thermal regimes throughout the Nushagak and Kvichak River watersheds and provides a moderating influence against both summer and winter temperature extremes.¹²⁵

- Recommendation: The Corps should characterize existing baseline heterogeneity of the water temperature regime and what this heterogeneity means for fish and fish habitat, including analyses of the regulating effects of groundwater/surface water connectivity.

¹²⁴ Eisler 2000, Baldwin et al. 2003, Sandahl et al. 2006, Hecht et al. 2007, Sandahl et al. 2007, Tierney et al. 2010.

¹²⁵ C.A. Woody and B. Higman. 2011.

The Corps also should analyze how flow alterations will affect pre-existing daily thermal regimes, as well as consequences for fish. A color-coded thermal map of the existing water temperature regimes versus those under the project operations would be helpful to show changes that could occur with project implementation. Alternatively, the Corps should explain why its existing analysis of temperature changes and impacts to fish is sufficient, in light of the significance and complexity of the discharge activities associated with this project. Additional technical recommendations regarding water temperature include:

1. The Draft EFH Assessment Table 5-4 presents a range of average stream water temperatures pre-mine and after release of treated surplus water during winter and summer. The Corps should revise this analysis to include temperature variability (i.e., changes in daily minimum and maximum temperatures). Broadly characterized winter and summer average temperature ranges are not relevant to disclosing changes in thermal patterns to which NFK, SFK and UTC resident and anadromous fish are locally adapted. The Corps also should analyze potential short-term effects of water temperature increases during dry years.
2. The Corps should analyze impacts of temperature alteration to critical life history stages of fish species, particularly in terms of changes in incubation conditions and accumulated thermal units necessary to complete egg development. Egg development is a sensitive life stage and water temperature differences of one degree Celsius can impact growth and development.¹²⁶
3. The DEIS assumes that the impacts of the proposed project to average stream water temperatures during the winter will be negligible or beneficial with no supporting evidence. The Corps should present analysis to support or revise these conclusions.¹²⁷
4. The Draft EFH Assessment asserts that ice and beaver effects on stream morphology would likely minimize potential effects of flow alteration on channel morphology (5.1.1.3 Water Flow, pg. 70). The Corps should provide additional information to support this conclusion.
5. The Corps should revise Section 3.24.5 of the DEIS to consider how future changes in the regional climate may affect fish populations. The Corps should analyze long-term management under expected future climate scenarios, particularly in terms of water treatment and management and salmon populations. As discussed earlier, a key feature of salmon populations in the Bristol Bay watershed is their genetic diversity (i.e., the portfolio effect), which serves as an overall buffer for the entire population. Different sub-populations may be more productive in different years, which affords the entire population stability under variable conditions year-to-year. If this variability increases over time due to changes in temperature and precipitation patterns, this portfolio effect becomes increasingly important in providing the genetic diversity to potentially allow for adaptation; thus, impacting or destroying genetically

¹²⁶ Brannon 1987, Beacham and Murray 1990, Hendry et al. 1998, Quinn 2005, Healey 2011, and Martins et al. 2012.

¹²⁷ For example, Sparks 2018.

diverse sub-populations may have a larger effect on the overall population than expected under future climatic conditions.

Nutrient Inputs

Comment: The discussion of stream productivity (Section 4.24.2.4) includes unsupported conclusions regarding the importance of marine-derived nutrients, stating “[a]s shown in the baseline data above, marine-derived nutrients do not appear to influence the nutrient availability in the Koktuli or uppermost reaches of the Upper Talarik watersheds in the project area” (pg. 4.24-17). It is not clear what baseline data are referred to in this statement. Further, baseline water quality data are not relevant to supporting such conclusions, as it is likely that marine-derived nutrients in these relatively low-nutrient systems would get taken up quickly by biota rather than remain in the water column. Consideration of whether biotic production differs between anadromous and non-anadromous streams would be of more value in determining the influence of marine-derived nutrients.

- Recommendation: To evaluate the contribution of marine-derived nutrients to stream productivity, the Corps should evaluate changes to marine-derived nutrient inputs from the pre-existing condition and the consequences of these changes for stream productivity at multiple trophic levels. Alternatively, the Corps should explain why its existing analysis of stream productivity is sufficient, in light of the significance and complexity of the discharge activities associated with this project.

Comment: The DEIS includes almost no analyses of direct losses of autochthonous and allochthonous inputs from upstream reaches lost and/or disconnected from wetland and other riparian habitats, as well as the incremental reductions in those inputs in downstream segments throughout the stream reaches.

- Recommendation: The Corps should analyze these losses of autochthonous and allochthonous inputs and their effects on system-wide primary, secondary, and tertiary production that support fish populations. Alternatively, the Corps should explain why its existing analysis of these inputs is sufficient, in light of the significance and complexity of the discharge activities associated with this project.

Comment: The DEIS similarly includes almost no analyses to address invertebrate transport and production. Invertebrates are a significant source of food for fish. Macroinvertebrate and periphyton data are very spatially and temporally limited in the mine site area, limiting the utility of generalizations about stream productivity. No data on macroinvertebrate exports from headwater streams are presented in the DEIS, despite numerous studies showing these exports can be important in Alaska streams.¹²⁸ We understand that a macroinvertebrate technical working group was convened, and limited data on macroinvertebrates were collected in the mine site area and along the northern transportation corridor as part of the environmental baseline for the project; however, the DEIS does not include this information.

- Recommendation: The Corps should analyze invertebrate transport and production, using available site-specific data and where necessary supplementing these data with additional sampling and information. Alternatively, the Corps should explain why its existing

¹²⁸ For example, Wipfli and Gregovich 2002, Wipfli et al. 2007.

analysis of invertebrate exports is sufficient, in light of the significance and complexity of the discharge activities associated with this project.

Modeling of Impacts to Aquatic Resources

Comment: The DEIS identifies significant uncertainty in the groundwater model, which affects the water balance and streamflow alteration predictions¹²⁹ (see Groundwater and Surface Water section of EPA's DEIS comment letter). No accuracy or sensitivity analysis was performed on the water quality modeling and predictions (see Water Quality section of EPA's DEIS comment letter), or the physical habitat simulation modeling (see comments below). The DEIS does not disclose information about how the uncertainties in modeled predictions (e.g., predictions in flow alterations and sources of water and contaminant contributions) affect predicted impacts to fish and fish habitat.

- Recommendation: The Corps should disclose and discuss the validity and accuracy of model outputs when assessing project impacts to fish and fish habitat. Alternatively, the Corps should explain why its existing analysis of model results is sufficient, in light of the significance and complexity of the discharge activities associated with this project.

Comment: The Draft EFH Assessment discloses that a hybrid simulation analysis model (HABSYN) was used to synthesize habitat-flow relationships. According to the document, HABSYN is meant to account for predicted stream flow reductions and treated surplus water discharges from the mine water treatment plants, and its predictions are based on physical habitat simulation system (PHABSIM) modeling at measured transects. PHABSIM forces/assumes a fish-habitat relationship based on water depth and velocity (discharge) alone. We also note that PHABSIM and its subcomponents (habitat suitability curves and wetted usable area) were identified by the Pebble Project Instream Flow Technical Working Group as being problematic and inappropriate for assessing fish habitat in the project area.¹³⁰ The DEIS and supporting documents have not established that there is a relationship between discharge and fish habitat selection, which is of particular concern given that the impacted sub-watersheds of the proposed Pebble Project mine site are groundwater-driven systems.

- Recommendation: The Corps should fully disclose the uncertainties and limitations of the PHABSIM and HABSYN models and describe how the limitations affect the analysis of fish and fish habitat impacts. Alternatively, the Corps should explain why its existing use and discussion of the PHABSIM and HABSYN models is sufficient, in light of the significance and complexity of the discharge activities associated with this project.

Additional technical recommendations related to habitat modeling include:

1. PHABSIM and associated preliminary watershed model results presented in the Draft EFH Assessment (Table 5-3) indicate habitat losses in the NFK and SFK Rivers for some species and habitats (e.g., coho and Chinook salmon spawning). The DEIS asserts that there are habitat gains downstream (due to increase discharges), but these are modeled increases in discharge, and no analysis is provided to indicate that there

¹²⁹ Monthly average discharges were chosen as inputs in the streamflow model, which do not represent the range of flows that occurs each month or extreme precipitation events, both of which affect stream ecology. Calibration of the stream flow model indicated that cumulative flows were overpredicted during the first two years of the calibration period and underpredicted during the remaining three years. In some cases, measured and calculated flows differed by more than 20 percent. The model may also not be able to predict the lowest flows (RFI 104).

¹³⁰ ISF TWG meeting minutes 2010.

will be resulting habitat increases. Table 5-3 also reports net gains in sockeye salmon. We are also concerned that PHABSIM is not appropriate for capturing habitat for species that key into habitat factors, such as areas of groundwater upwelling (e.g., spawning sockeye), that are unrelated to water depth and discharges. The Corps should include additional analyses to support the results reported in EFH Assessment Table 5-3.

2. The Draft EFH Assessment discloses that wetted usable area will be used to identify available habitat; however, the information presented in Table 4.24-2 and Table 4.24-3 appears to be based on the assumption that increases in water depth and/or velocity equate to additional spawning and/or rearing habitat (see discussion above regarding limitations of PHABSIM modeling). While the tables may lead to the conclusion that there will be an increase in habitat due to discharges, discharges also may result in negative impacts (e.g., redd scouring). The Corps should evaluate potential impacts of water discharges on all relevant habitat factors, rather than focusing only on increases in water depth and/or velocity.
3. Baseline documents indicate and the Draft EFH Assessment discloses that habitat suitability curves were developed from PHABSIM modeling efforts, but the DEIS does not discuss habitat suitability curves or the appropriateness of their use. The Corps should include additional data and analyses to demonstrate the validity of this approach.

Comment: The DEIS does not include analysis of how the predictive models work together to analyze and quantify the cumulative impacts of potential changes in streamflow or water quality, and the subsequent consequences for fish and fish habitat (e.g., how flow modeling integrates with downstream water temperature modeling to demonstrate lateral and longitudinal changes in the heterogeneity and complexity of side-channel spawning habitat or beaver pond rearing habitat, or how impacts from surface and groundwater flow alterations and corresponding changes in downstream water quality affect distribution and production of benthic macroinvertebrates).

- **Recommendation:** The Corps should analyze and discuss model integration to explain how individual predictive models are combined to assess and quantify project impacts and to identify what consequential outputs mean for fish and fish habitat. Alternatively, the Corps should explain why its existing analysis is sufficient, in light of the significance and complexity of the discharge activities associated with this project.

4. Commercial and Recreational Fisheries

Comment: The DEIS does not fully describe the value of the Bristol Bay fisheries, which includes the largest sockeye salmon fishery in the world, or the Pebble Project's potential impacts to these fisheries. The Commercial and Recreational Fisheries section of EPA's DEIS comment letter provides specific comments regarding deficiencies in the DEIS's evaluation of potential impacts to commercial and recreational fisheries, as well as specific recommendations on how to address these deficiencies.

- **Recommendation:** The Corps should address the specific comments provided in the Commercial and Recreational Fisheries section of EPA's DEIS comment letter, or alternatively explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project.

D. Groundwater and Surface Water Hydrology

According to the Guidelines, the Corps "shall determine in writing the potential short-term or long-term effects of a proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment" by making the factual determinations listed in 40 C.F.R. § 230.11. The factual determinations relevant to groundwater and surface water hydrology are the water circulation, fluctuation, and salinity determinations (40 C.F.R. § 230.11(b)); aquatic ecosystem and organism determinations (40 C.F.R. § 230.11(e)); the determination of cumulative effects on the aquatic ecosystem (40 C.F.R. § 230.11(g)); and the determination of secondary effects on the aquatic ecosystem (40 C.F.R. § 230.11(h)).

Comment: The DEIS relies on watershed, groundwater, and water balance models to predict how mine site activities will change groundwater conditions and impact surface water and aquatic resources. The uncertainty analysis for the groundwater model, however, concludes that the model may underpredict the amount of water produced during mine pit dewatering. The DEIS discloses that this could result in the groundwater zone of influence being larger than predicted and NFK, SFK, UTC, and tributary stream flows being reduced to a greater extent than is currently predicted in the DEIS. Significant adverse impacts to wetlands and to streams with documented anadromous fish occurrence (and tributaries of those streams) may result from such stream flow reductions.

- **Recommendation:** The Corps should revise the groundwater model to reduce this uncertainty and provide more accurate predictions associated with open pit dewatering. The Corps should also fully analyze the potential adverse impacts to groundwater, wetlands, and streams with documented anadromous fish occurrence (and tributaries of those streams) based on the results of the revised modeling. The Groundwater and Surface Water Hydrology section of EPA's DEIS comment letter provides additional specific comments regarding issues in the DEIS' evaluation of potential impacts to groundwater and surface water hydrology as well as specific recommendations on how to address these issues. Alternatively, the Corps should explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project.

E. Water Quality

According to the Guidelines, the Corps "shall determine in writing the potential short-term or long-term effects of a proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment" by making the factual determinations listed in 40 C.F.R. § 230.11. The factual determinations relevant to water quality are the contaminant determinations (40 C.F.R. § 230.11(d)); aquatic ecosystem and organism determinations (40 C.F.R. § 230.11(e)); the determination of cumulative effects on the aquatic

ecosystem (40 C.F.R. § 230.11(g)); and the determination of secondary effects on the aquatic ecosystem (40 C.F.R. § 230.11(h)).

Comment: The DEIS may substantially underpredict potentially significant impacts to water quality. Our key comments are:

- The DEIS provides inadequate support for several assumptions regarding the behavior of leachate and relies on limited sample representativeness for prediction of acid rock drainage and metal leaching. This may result in unanticipated leaching of metals/metalloids at elevated concentrations;
- The DEIS lacks important details regarding the design and operation of the water treatment plants, particularly at closure. The DEIS reference material states that there is insufficient available information to evaluate the effectiveness of the closure water treatment plant to meet water quality criteria. This may prevent meaningful analysis and disclosure of potential water quality impacts related to water treatment;
- As a result of groundwater model uncertainty, the DEIS states that the water treatment plants may need to treat and discharge more mining process water than that for which the plants are currently designed. Significant impacts to water quality could occur if that is the case; and
- Use of conceptual drainage and seepage containment systems for the TSFs and water management pond do not fully support the DEIS's assumption that 100% of the seepage would be captured.

The DEIS also does not include: a data quality assessment for background water quality data, a modeling sensitivity analysis of the water quality modeling and inputs, a reasonably complete analysis of water quality impacts in the closure and post-closure phases, and monitoring and adaptive management plans.

- Recommendation: The Corps should provide a water quality analysis that accurately identifies potential significant adverse impacts to water quality and monitoring and adaptive management plans sufficient to detect and prevent unanticipated impacts to water quality. The Water Quality section of EPA's DEIS comment letter provides additional specific comments regarding issues in the DEIS' evaluation of potential water quality impacts as well as specific recommendations on how to address these issues. Alternatively, the Corps should explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project.

F. Wildlife/Sanctuaries and Refuges

According to the Guidelines, the Corps "shall determine in writing the potential short-term or long-term effects of a proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment" by making the factual determinations listed in 40 C.F.R. § 230.11. The factual determinations relevant to evaluating potential impacts of discharges on wildlife¹³¹ and sanctuaries and refuges¹³² are the aquatic ecosystem and organism determinations (40 C.F.R. § 230.11(e)); determination of cumulative effects on the

¹³¹ 40 C.F.R. § 230.32.

¹³² 40 C.F.R. § 230.40.

aquatic ecosystem (40 C.F.R. § 230.11(g)); and the determination of secondary effects on the aquatic ecosystem (40 C.F.R. § 230.11(h)).

Comment: The proposed Amakdedori port and southern access road would be constructed adjacent to the northern boundary of McNeil River State Game Refuge (“MRSGR”). The Refuge and contiguous McNeil River State Game Sanctuary (“MRSGS”) were established by the Alaska legislature to protect the world's largest concentration of wild brown bears and the unique viewing opportunities this provides. According to the ADF&G, as many as 144 individual bears have been observed at McNeil River in a single summer¹³³ and the long-term (1976–2018) average number of individual bears annually identified is 94.4.¹³⁴

Many brown bears have large home ranges and travel seasonally between the Refuge and Sanctuary and adjacent lands to take advantage of food resources, especially salmon. ADF&G has documented that bears seen at McNeil Falls use habitat north of the Refuge where the port, access road, and pipeline are proposed.¹³⁵

The McNeil River State Game Sanctuary Annual Management Report for 2018 states that “The recently applied for Pebble Mine project has the potential for impacts to wildlife resources, management and public uses within the MRSGR and MRSGS. ADF&G staff are working within the Army Corps of Engineers (ACOE) process to identify and address MRSGS/SGR issues and concerns.”

The 2008 McNeil River State Game Refuge and State Game Sanctuary Management Plan states that activities will be restricted as necessary to prevent disturbance to or displacement of bears and other fish and wildlife. Policies in the Management Plan prohibit the construction of new permanent roads and restrict the construction of pipelines, utilities, and docks. The potential for these activities to damage fish and wildlife and to disturb fish and wildlife populations, especially brown bears that seasonally use the Refuge or Sanctuary, is incompatible with the statutory purposes for which the Sanctuary and Refuge were established.

Construction of the proposed access road would fragment high-use brown bear habitat and bisect a travel corridor. Traffic noise and disturbance may deter bears from utilizing McNeil Refuge and Sanctuary. Bears actively move along the coast and use intertidal habitats. Noise and activity at the proposed port may deter bears from using the coastal habitats at and near Amakdedori beach.

Disturbance and displacement of bears from increased noise or perturbation of food resources in the areas surrounding McNeil River could reduce the number of bears using McNeil River and prevent access to a critical natural food source. Interactions with humans or facilities at the port may affect bear behavior through food conditioning of bears or reduced tolerance of humans. Both could lead to direct mortality of bears by humans. Impacts to these Sanctuaries/Refuges and wildlife from the discharge of dredged or fill material receive limited evaluation in the record.

¹³³ <http://www.adfg.alaska.gov/index.cfm?adfg=mneilriver.main>; original data in Table A6, McNeil River State Game Refuge and State Game Sanctuary Management Plan, ADF&G 2008.

¹³⁴ 2019 ADF&G. McNeil State Game Sanctuary Annual Management Report 2018.

¹³⁵ *Id.*

- Recommendation: The Corps should evaluate possible loss of values associated with the discharge of dredged or fill material, by considering loss or change of wildlife travel corridors, disruption of migratory movements or other critical life requirements of resident or transient fish or wildlife resources, as well as the creation of incompatible human access. Alternatively, the Corps should explain why its existing analysis is sufficient in light of the significance and complexity of the discharge activities associated with this project.

VI. Determination of Least Environmentally Damaging Practicable Alternative (40 C.F.R. § 230.10(a))

The Guidelines only allow authorization of the Least Environmentally Damaging Practicable Alternative (LEDPA). The Guidelines¹³⁶ identify that, “no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.” Identification of the LEDPA is achieved by performing an alternatives analysis that evaluates the direct, secondary/indirect, and cumulative impacts to jurisdictional waters resulting from each alternative considered. Project alternatives that are not practicable and do not meet the project purpose are eliminated.

The Guidelines recognize that the alternatives analysis developed under NEPA may provide the information needed to evaluate alternatives under the Guidelines. The Guidelines acknowledge that there may be instances where “NEPA documents may address a broader range of alternatives than required to be considered under this paragraph or may not have considered the alternatives in sufficient detail to respond to the requirements of these Guidelines. In the latter case, it may be necessary to supplement these NEPA documents with this additional information.”¹³⁷

According to the Guidelines, an alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the overall project purposes.¹³⁸ Where the activity associated with a discharge is not “water dependent,” practicable alternatives that do not involve a discharge to wetlands and other special aquatic sites “are presumed to be available, unless clearly demonstrated otherwise.”¹³⁹

The following comments highlight information relevant to the LEDPA analysis that the Corps should consider.

Mine site component locations

Comment: The DEIS evaluates one location for each of the tailings storage facilities (TSFs), both of which involve a discharge to wetlands or other special aquatic sites. TSFs are not water dependent, and as a result, practicable alternatives that do not involve a discharge to wetlands and other special aquatic sites “are presumed to be available, unless clearly demonstrated

¹³⁶ 40 C.F.R. § 230.10(a).

¹³⁷ 40 C.F.R. § 230.10(a)(4).

¹³⁸ 40 C.F.R. § 230.10(a)(2).

¹³⁹ 40 C.F.R. § 230.10(a)(3).

otherwise.” DEIS Appendix B (TSF-025, pg B-80) indicates that the Corps considered 26 different locations for the TSFs that were not evaluated as alternatives. The DEIS identifies the location of three of these 26 options in Figure B-3 and the locations of the other 23 options are found in RFI 098. RFI 098 identifies TSF location options assessed by PLP that have less impacts to streams with anadromous fish than the proposed action. The DEIS does not fully explain why these 26 options are not practicable.

- Recommendation: Consistent with the requirements of 40 C.F.R. § 230.10(a), the Corps should include all 26 TSF options on Figure B-3 and explain why each of the 26 TSF locations are not practicable. In the alternative, EPA recommends that the Corps further explain why its existing description of the 26 TSF options is sufficient to satisfy the requirements of 40 C.F.R. § 230.10(a). This information is particularly important in light of the significance and complexity of the discharge activities associated with this project.

Comment: The location proposed for the main WMP involves a discharge to wetlands or other aquatic sites. WMPs are not water dependent, and as a result, practicable alternatives that do not involve a discharge to wetlands and other special aquatic sites “are presumed to be available, unless clearly demonstrated otherwise.” The options screening analysis in DEIS Appendix B does not appear to consider any alternative locations for the main WMP. The DEIS does not explain why the main WMP location is the only practicable alternative or explain how the WMP location was optimized to avoid and minimize impacts to aquatic resources.

- Recommendation: Consistent with the requirements of 40 C.F.R. § 230.10(a), the Corps should describe why the proposed location for the main WMP is the only practicable alternative and explain the extent to which the proposed WMP location was optimized to avoid and minimize impacts to aquatic resources. In the alternative, EPA recommends that the Corps further explain why its existing description of the main WMP is sufficient to satisfy the requirements of 40 C.F.R. § 230.10(a). This information is particularly important in light of the significance and complexity of the discharge activities associated with this project.

Comment: According to RFI 098, the 26 TSF layouts were compared to several attributes, including minimizing managed water volume, impacts to fish-bearing streams, and impacts to wetlands and stream miles. None of the attributes consider downstream impacts in the event of a tailings dam failure. In light of the value of fisheries resources in the potentially affected watersheds (see Section II), downstream impacts in the event of a tailings dam failure should be one of the attributes included in the comparison. EPA notes that the current best practice for evaluating the different tradeoffs between TSF location, dam type, and impacts is a Multiple Accounts Analysis (MAA).

- Recommendation: Consistent with the requirements of 40 C.F.R. § 230.10(a), the Corps should evaluate and document the potential downstream impacts in the event of a tailings dam failure to support its LEDPA determination and conclusions that there are not alternate location(s) that would have less impacts in the event of a tailings dam failure. The Corps should explain whether a MAA was performed for the TSFs. In the alternative, the Corps should further explain why its existing description of the alternatives analysis for the TSFs is sufficient to satisfy the requirements of 40 C.F.R. §

230.10(a). This information is particularly important in light of the significance and complexity of the discharge activities associated with this project.

Bulk TSF liner

Comment: The DEIS predicts that groundwater contamination will occur under and beyond the bulk TSF. The DEIS assumes that all contaminated groundwater will be collected by the seepage management system. As explained in more detail in the Water Quality section of EPA's DEIS comment letter, EPA's review finds that this assumption is not supported by the information provided.¹⁴⁰ EPA recommends consideration of additional measures to mitigate the predicted groundwater contamination. A liner is a typical management practice for TSFs that minimizes groundwater contamination, and such an alternative could be part of the LEDPA. We note that the Corps has recently permitted two fully lined tailings facilities at the Donlin and Haile mines and that a liner is currently being included for the pyritic TSF for the Pebble Project. The Corps' documentation does not fully explain why a liner for the bulk TSF is not practicable.

- Recommendation: Consistent with the requirements of 40 C.F.R. § 230.10(a), the Corps should evaluate use of a liner or further explain why a liner is not a practicable alternative to mitigate the predicted groundwater contamination.¹⁴¹ This information is particularly important in light of the significance and complexity of the discharge activities associated with this project.

Concentrate Pipeline:

Comment: A variant of Alternative 3 (North Road and Concentrate Pipeline) includes the discharge of treated concentrate filtrate water at the port site. As discussed in the Alternatives section of EPA's DEIS comment letter, the discharge of that process wastewater is prohibited under the CWA and the effluent limitations guidelines and new source performance standards which have been in place since 1982.¹⁴² Thus, to the extent this aspect of the variant would involve the discharge of process wastewater subject to the discharge prohibition in EPA's new source performance standards, that aspect of the variant is not practicable.

- Recommendation: Consistent with the requirements of 40 C.F.R. § 230.10(a), the Corps should remove the aspect of the variant of Alternative 3 (North Road and Concentrate Pipeline) that would involve the discharge of process wastewater subject to the discharge prohibition in EPA's new source performance standards from the alternatives analysis because it is not practicable.

Transportation Corridors

Comment: The DEIS presents alternatives for the proposed transportation corridor, each of which involves discharges to wetlands and other special aquatic sites. The road and pipeline alignments are not water dependent, and as a result, practicable alternatives that do not involve

¹⁴⁰ See the Conceptual-Level of Design and Development of Key Project Features and Plans section of EPA's DEIS comment letter for EPA's recommendations on additional information necessary to evaluate effectiveness of seepage control, support seepage rate estimates in groundwater modeling, and determine environmental impacts. The Corps should also consider whether there are other appropriate and practicable mitigation measures to address these issues consistent with 40 C.F.R. §230.10(d).

¹⁴¹ The alternative also should consider overdrains on top of the liner and pumping tailings supernatant to the main WMP, which could be an additional mitigation measure to enhance stability by further removing water from a lined tailings storage facility.

¹⁴² See 40 C.F.R. § 440.104(b)(1).

the discharge to wetlands and other special aquatic sites “are presumed to be available, unless clearly demonstrated otherwise.” The DEIS does not fully explain the information it considered when selecting which alternative road alignments to evaluate and in particular how this information relates to impacts on the aquatic ecosystem. In addition, the figures presented in K4.22 only provide information on wetlands and other aquatic resources inside the proposed corridors and do not indicate the status of areas outside the corridors. As a result, it is unclear whether impacts to aquatic resources in the proposed transportation corridors could have been avoided and minimized.

- Recommendation: Consistent with the requirements of 40 C.F.R. § 230.10(a), the Corps should clearly explain and document the information it considered for the transportation corridor alternatives to demonstrate that there are not practicable alternatives to the transportation corridors analyzed that would have less adverse impact on the aquatic ecosystem. In addition, the record should include information about how wetlands and other aquatic resources were avoided and minimized to the extent practicable. In the alternative, the Corps should further explain why its existing description of the alternatives analysis for the transportation corridor is sufficient to satisfy the requirements of 40 C.F.R. § 230.10(a). This information is particularly important in light of the significance and complexity of the discharge activities associated with this project.

Comment: Alternatives 2 and 3 include a port at Diamond Point, which is currently being developed as a rock quarry. Development of the Diamond Point rock quarry involves construction of an access road, breakwater, barge landing, and a solid-fill dock. It also involves 11.42 acres of intertidal fill and dredging in Iliamna Bay. The DEIS does not consider the Diamond Point alternative in light of this rock quarry. Specifically, the DEIS does not explain whether and how the rock quarry and Diamond Point alternative will cause impacts to the same aquatic resources. The DEIS would be strengthened by a discussion of whether and how the dredging for the rock quarry would reduce the 58 acres of dredging and 16 acres of onshore dredge materials storage proposed for Alternatives 2 and 3. In addition, the DEIS does not consider whether and how the two projects will be integrated, if at all. As a result, the DEIS does not fully explain whether there is a practicable alternative to the Diamond Port alternative that would have less adverse impact on the aquatic ecosystem.

- Recommendation: Consistent with the requirements of 40 C.F.R. § 230.10(a), the record should document whether and how the rock quarry and proposed Diamond Point port infrastructure, dredging, and vessel operations will cause impacts to the same aquatic resources. In addition, the Corps should explain whether and how the two projects will be integrated, if at all. In the alternative, the Corps should further explain why its existing description of the alternatives analysis for the Diamond Port alternative is sufficient to satisfy the requirements of 40 C.F.R. § 230.10(a). This information is particularly important in light of the significance and complexity of the discharge activities associated with this project.

Potential Additional Transportation Corridor – Terminating at Iniskin Bay

Comment: The DEIS indicates that expanded surface mining would require construction of the north access road and concentrate pipeline as described in Action Alternative 3. However, the concentrate pipeline would terminate at a new deepwater port facility constructed in Iniskin

Bay¹⁴³ rather than at Diamond Point. A diesel pipeline following the road route and a diesel terminal at the Iniskin Bay port would also be required.¹⁴⁴ The Iniskin Bay port and diesel pipeline are not, however, being evaluated as alternatives for the currently proposed project, and the DEIS does not explain this decision. These components may be practicable now and it is possible that they could be part of the LEDPA. In evaluating whether the Iniskin Bay Port and diesel pipeline are part of the LEDPA, the Corps must evaluate the direct, secondary/indirect, and cumulative impacts to jurisdictional waters resulting from each alternative considered. One potential advantage of the Iniskin Bay port and diesel pipeline is that constructing this infrastructure now may avoid redundant infrastructure for expanded surface mining. Specifically, when the cumulative impacts of expanded mine development are considered, infrastructure such as the southern access route and ferry would appear to be redundant and therefore involve avoidable impacts.

- Recommendation: Consistent with the requirements of 40 C.F.R. § 230.10(a), the Corps should evaluate this additional transportation corridor alternative terminating in Iniskin Bay or explain why it is not practicable. This information is particularly important in light of the significance and complexity of the discharge activities associated with this project.

VII. Water Quality (40 C.F.R. § 230.10(b))

The Guidelines prohibit discharges that will cause or contribute to violations of any applicable state water quality standard.¹⁴⁵ The following comments highlight information relevant to water quality that the Corps should consider.

Comment: As included above (see Section V.E) and in more detail in our DEIS comment letter (see Water Quality section of EPA's DEIS comment), the DEIS may substantially underpredict potentially significant impacts to water quality.

- Recommendation: Consistent with the requirements of 40 C.F.R. § 230.10(b), the Corps should provide a water quality analysis that accurately identifies potential significant adverse impacts to water quality and monitoring and adaptive management plans sufficient to detect and prevent unanticipated impacts to water quality. The Water Quality section of EPA's DEIS comment letter provides additional specific comments regarding issues in the DEIS' evaluation of potential water quality impacts as well as specific recommendations on how the Corps should address these issues. In the alternative, the Corps should further explain why its existing description of water quality impacts is sufficient to satisfy the requirements of 40 C.F.R. § 230.10(b). This information is particularly important in light of the significance and complexity of the discharge activities associated with this project.

¹⁴³ The project proponent previously evaluated Iniskin Bay as a potential port site and we understand that multiple years of baseline data were collected.

¹⁴⁴ DEIS Table 4.1-2.

¹⁴⁵ 40 C.F.R. § 230.10(b).

VIII. Significant Degradation (40 C.F.R. § 230.10(c))

The Guidelines prohibit authorization of a proposed discharge that causes or contributes to significant degradation of the aquatic ecosystem.¹⁴⁶ The evaluation of the potential for significant degradation “shall be based upon appropriate factual determinations, evaluations, and tests” as described in 40 C.F.R. § 230.11 after consideration of potential impacts and effects identified in the Guidelines “with special emphasis on the persistence and permanence of the effects.”¹⁴⁷ According to the Guidelines, effects contributing to significant degradation considered individually or collectively, include:

1. Significantly adverse effects of the discharge of pollutants on human health or welfare, including but not limited to effects on municipal water supplies, plankton, fish, shellfish, wildlife, and special aquatic sites.
2. Significantly adverse effects of the discharge of pollutants on life stages of aquatic life and other wildlife dependent on aquatic ecosystems, including the transfer, concentration, and spread of pollutants or their byproducts outside of the disposal site through biological, physical, and chemical processes;
3. Significantly adverse effects of the discharge of pollutants on aquatic ecosystem diversity, productivity, and stability. Such effects may include, but are not limited to, loss of fish and wildlife habitat or loss of the capacity of a wetland to assimilate nutrients, purify water, or reduce wave energy; or
4. Significantly adverse effects of discharge of pollutants on recreational, aesthetic, and economic values.¹⁴⁸

The impacts identified in the DEIS (see Section III above) suggest that the proposed discharges may have the potential to cause or contribute to significant degradation. However, as discussed in detail in Sections V and VII, the current record lacks sufficient information necessary to make a reasonable judgment that the discharges of dredged or fill material will not cause or contribute to significant degradation of the aquatic ecosystem. The level of information supporting the Corps’ factual determinations and documentation explaining the basis for its ultimate conclusions regarding significant degradation should be commensurate with the significance and complexity of the discharge activities associated with this project.

Consistent with EPA’s recommendation in Section V.A. and V.B., the analysis should include sufficient information that characterizes:

- the extent of streams, wetlands, lakes, ponds and other aquatic resources that are potentially affected;
 - the array of functions currently provided by these aquatic resources and the degree to which each function is currently being performed by each aquatic resource type;
 - the degree to which performance of these functions would change as a result of the direct, secondary/indirect, and cumulative impacts of the discharges if they were implemented;
- and

¹⁴⁶ 40 C.F.R. § 230.10(c).

¹⁴⁷ *Id.*

¹⁴⁸ *Id.*

- the significance or severity of those changes.

Sections V and VII describe the types of information and analysis that are relevant to determining the proposed project's potential impacts on fishery resources. The factual determinations should address the impacts to fish and fish habitat including:

- habitat characterization, assessment, quantification, and spatial referencing;
- mechanistic linkages of how the loss and/or degradation of habitat will impact fish species and life stages (i.e., incubating eggs, spawning fish and rearing juveniles);
- groundwater and surface water flow characterization that is relevant to fish and fish habitat;
- population-level effects and genetic diversity within the context of the Bristol Bay salmon portfolio; and
- uncertainties associated with habitat and impact assessments (e.g., in terms of sampling, data, and modeling limitations).

While we are placing focus on evaluation of the potential adverse effects of the discharges on fish, Section 230.10(c) requires the evaluation of the potential for significant adverse effects of the discharges on a broader suite of factors associated with the aquatic ecosystem as well as human health and welfare (which in this case includes potential adverse effects on subsistence resources) and recreational, aesthetic, and economic values.¹⁴⁹

IX. Minimization/Compensatory Mitigation (40 C.F.R. § 230.10(d))

The Guidelines prohibit discharges that do not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem.¹⁵⁰ This requirement includes appropriate and practicable compensatory mitigation to offset unavoidable environmental impacts associated with discharges permitted under CWA Section 404.

Conceptual Plans Relevant to Minimization

Comment: The DEIS and supporting reference information acknowledges that critical aspects of the Pebble Project are at a conceptual level (i.e., early or initial stage) of design and development. Critical but conceptually developed project components include: the open pit mine dewatering system; the dams retaining the mine's tailings and main water management pond; the collection, pumpback, and monitoring systems for managing seepage from the TSFs and main water management pond; and the closure water treatment plant. Critical plans that are missing from or only conceptually described in the DEIS include plans for: mine reclamation and closure; environmental monitoring; adaptive management; tailings and waste rock characterization and management; fugitive dust control; and strategic timing of water discharges. Our DEIS comment letter provides detailed descriptions of the critical information currently missing from these project components and plans, see section entitled Conceptual-Level of Design and Development of Key Project Features and Plans. The DEIS states that these designs and plans will be developed during the state of Alaska permitting process and, because PLP has not started the State permitting process, the detailed designs and plans are not currently available.

¹⁴⁹ *Id.*

¹⁵⁰ 40 C.F.R. § 230.10(d) and § 230.12(a)(3)(iii).

These project components and plans include information regarding critical aspects of the project relevant to the evaluation of minimization of environmental impacts and often serve as a record basis supporting a determination that all appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge. As discussed above, there is insufficient information to make a reasonable judgment regarding the severity of environmental impacts that the plans are meant to prevent or minimize. The DEIS assumes without justification that they all will be completely effective and therefore, EPA is unable to independently determine the effectiveness of each plan.

- Recommendation: Consistent with 40 C.F.R. § 230.10(d), critical project information or plans should be developed beyond the conceptual stage with a reasonable level of detail to support a determination that the project complies with the minimization requirements in the Guidelines. Specific recommendations can be found in our DEIS comment letter, see section entitled Conceptual-Level of Design and Development of Key Project Features and Plans. Alternatively, the Corps could explain why information or plans at the conceptual stage provide sufficient information to make a reasonable judgment that the proposed discharge will comply with the Guidelines in light of the significance and complexity of the discharge activities associated with this project.

Comment: The DEIS does not include information to demonstrate that that all appropriate and practicable steps will be taken to minimize potential adverse impacts on the aquatic ecosystem associated with the impoundment structure. The DEIS only includes conceptual design information on this issue but does not include information demonstrating that the impoundment complies with dam safety criteria. The Corps can require an independent review during the application process pursuant to 33 C.F.R. § 325.1(d)(6), which states:

If the activity would involve the construction of an impoundment structure, the applicant may be required to demonstrate that the structure complies with established state dam safety criteria or that the structure has been designed by qualified persons and, in appropriate cases, independently reviewed (and modified as the review would indicate) by similarly qualified persons.

- Recommendation: Given the size and nature of the tailings and water management pond impoundments and embankments, the significance and complexity of the discharge activities associated with this project, and the importance of downstream aquatic resources, the Corps should require an independent review of the structures.¹⁵¹ At a minimum, the Corps should require PLP to demonstrate that the impoundment structures would comply with state dam safety criteria. This information is critical to make a reasonable judgment that all appropriate and practicable steps have been taken to minimize impacts on the aquatic ecosystem associated with the construction and operation of the impoundments. The information generated through this process may be relevant to both minimization and the LEDPA determination.

¹⁵¹ We note that other recent mining EISs developed by the Corps have included more than conceptual design information (i.e., Donlin and Haile).

Compensatory Mitigation

The Corps must include appropriate and practicable compensatory mitigation to offset unavoidable impacts.¹⁵² Compensatory mitigation is defined as the restoration, establishment, enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.¹⁵³

Comment: To be considered complete, CWA Section 404 permit applications must include a statement describing how impacts to waters of the United States are to be compensated for or a statement explaining why compensatory mitigation should not be required.¹⁵⁴ EPA acknowledges that the final rule preamble explains that the statement in 33 C.F.R. § 325.1(d)(7) “should be brief, because the permit evaluation process is iterative and district engineers often require additional avoidance and minimization as they evaluate permit applications.”¹⁵⁵ PLP’s Section 404 permit application materials published to the Corps’ website include the following statement regarding compensatory mitigation:

The 2008 Compensatory Mitigation for Losses of Aquatic Resources: Final Rule established mechanisms to provide compensatory mitigation for unavoidable impacts to WOUS, and mitigation will be considered in detail throughout the permitting and NEPA processes. PLP will work with USACE throughout the process to identify and implement a compensatory mitigation plan that is appropriate for the final Project.¹⁵⁶

Corps and EPA regulations state that “the public notice for the proposed activity must contain a statement explaining how impacts associated with the proposed activity are to be avoided, minimized, and compensated for. This explanation shall address, to the extent that such information is provided in the mitigation statement required by 33 C.F.R. § 325.1(d)(7) . . . the amount, type, and location of any proposed compensatory mitigation, including any out-of-kind compensation, or indicate an intention to use an approved mitigation bank or in-lieu fee program.”¹⁵⁷

Importantly, the regulations require that “[t]he level of detail provided in the public notice must be commensurate with the scope and scale of the impacts.”¹⁵⁸ The purposes of the public notice requirements are to allow for an opportunity for meaningful input and comment by the public and federal agencies on the proposed mitigation, even at this initial stage.¹⁵⁹

¹⁵² 40 C.F.R. § 230.10(d).

¹⁵³ 40 C.F.R. § 230.92.

¹⁵⁴ 33 C.F.R. § 325.1(d)(7).

¹⁵⁵ 70 Fed. Reg. at 19617 (2008).

¹⁵⁶ Pebble Project Department of the Army Application for Permit, POA-2017-271, January 2019, page 37.

¹⁵⁷ 33 C.F.R. § 332.4(b)(1)/ 40 C.F.R. § 230.94(b)(1).

¹⁵⁸ 33 C.F.R. § 332.4(b)(1)/ 40 C.F.R. § 230.94(b)(1).

¹⁵⁹ 33 C.F.R. § 332.4(b)(1)/ 40 C.F.R. § 230.94(b)(1) (discussing that the “notice must still provide enough information to enable the public to provide meaningful comment on the proposed mitigation” even where the permittee asserts Confidential Business Information claims). 33 C.F.R. § 332.4(b)(2)/ 40 C.F.R. § 230.94(b)(2) requires that the District Engineer consider timely comments and recommendations from other federal agencies; tribal; state or local governments; and the public.”

PLP's mitigation statement in POA-2017-00271 included per 33 C.F.R. § 325.1(d)(7) does not include information regarding specific compensatory mitigation projects (i.e., the amount, type and location) and does not address compensatory mitigation for all of the impacts identified in the DEIS. Like the mitigation statement included in the permit application, the public notice for the permit does not include the types of information discussed in 40 C.F.R. § 230.94(b)(1).

PN POA-2017-00271 states that PLP has proposed mitigation measures to avoid, minimize, and compensate for impacts to waters of the United States in DEIS Chapter 5 and Appendix M. Appendix M contains the applicant's draft conceptual Compensatory Mitigation Plan (CMP). The CMP provides summary information regarding the compensatory mitigation regulations, the potential impacts, and potentially affected watersheds. It states that PLP proposes to compensate for 3,524 acres of direct permanent losses of waters of the United States. It also states that "PLP's compensatory mitigation approach will focus on opportunities that benefit water quality and fish and their habitat. While the intent is to seek such opportunities within the watershed, if opportunities are not available PLP will reach for similar opportunities outside the watershed." The CMP does not include any proposed compensatory mitigation projects or information regarding type and location of compensatory mitigation under consideration. It states that "[t]his CMP will be amended in the future to include proposed mitigation plans." The DEIS states that "[s]pecific mitigation conditions would be determined following completion of the environmental review and would be included in the ROD for any permit that may be issued."¹⁶⁰

- Recommendation: The Corps should provide an opportunity for meaningful public comment on a CMP that includes a level of detail "commensurate with the scope and scale of the impacts" as well as the "amount, type, and location" of compensation they could potentially provide. Alternatively, the Corps should further explain why, considering the scope and scale of the impacts associated with the proposed project, the CMP contains the level of detail and information required by the public notice regulations at 40 C.F.R. § 230.94(b)(1). In addition, the Corps should explain why the information included in the public notice provided the public or other federal agencies with an opportunity to provide meaningful comment or recommendations on the proposed mitigation as contemplated by the regulations. The Corps should further explain why the CMP complies with the requirements under Section 404 discussed above or the NEPA requirements that mitigation measures be discussed in the EIS sections on alternatives and environmental consequences.¹⁶¹ This is particularly important in light of the significance and complexity of the discharge activities associated with this project.

Comment: The Guidelines identify that "[c]ompensatory mitigation requirements must be commensurate with the amount and type of impact that is associated with a particular DA permit."¹⁶² They also specify that "the amount of required compensatory mitigation must be, to the extent practicable, sufficient to replace lost aquatic resource functions."¹⁶³

¹⁶⁰ DEIS 5-23.

¹⁶¹ 40 C.F.R. § 1502.14(f) and § 1502.16(h).

¹⁶² 40 C.F.R. § 230.93(a)(1).

¹⁶³ 40 C.F.R. § 230.93(f)(1).

The CMP indicates that PLP proposes to compensate for 3,524 acres of direct permanent losses of waters of the United States. As discussed above in Section V, the DEIS may not have accounted for and characterized all of the potential direct and secondary/indirect impacts of the discharges of dredged or fill material. In addition, the CMP does not address potential compensatory mitigation for the other impacts acknowledged in the DEIS: the direct impacts to over 80 linear miles of streams, the temporary impacts to 510 acres of wetlands and other waters, and the more than 2,800 acres of secondary/indirect impacts to wetlands, streams and other aquatic resources.

- Recommendation: PLP's revised CMP should explain how the amount of compensation reflects the amount necessary to meet applicable requirements for the full scope of direct and secondary/indirect impacts of the discharge of dredge and fill material (see Section V). This information is particularly important in light of the significance and complexity of the discharge activities associated with this project.

Comment: The factual determinations underlying the Corps' Guidelines compliance involves a determination of "the nature and degree of effect that the proposed discharge will have, both individually and cumulatively, on the structure and function of the aquatic ecosystem and organisms."¹⁶⁴ "Compensatory mitigation requirements must be commensurate with the amount and type of impact"¹⁶⁵ identified and "sufficient to replace lost aquatic resource functions."¹⁶⁶ The Guidelines state that where functional assessments are available (as they are here), they should be used to determine the amount of compensation that would be sufficient to offset the authorized impacts.¹⁶⁷ Functional assessments provide a mechanism to quantify the extent of functional loss (debits) and functional gain (credits). Debits represent the loss of function at the impact site, while credits represent the accrual or attainment of aquatic functions at a compensatory mitigation site.

The Corps Alaska District has a Credit Debit Methodology that uses function or condition data to quantify the functional losses or gains between the current and proposed future condition. These functional deltas are used to calculate debits and credits, as recommended by the regulations.

As discussed in Section V.B., data was collected that could support development of a functional assessment to identify the amount of functional losses resulting from impacts to wetlands and other aquatic resourced and inform compensatory mitigation decisions. However, this data was not used in the DEIS. As discussed in Section V.C., additional information and analysis is needed to identify the amount of losses specifically associated with fish-related functions. This information and analysis are critical to informing decisions regarding the appropriate type and amount of compensation necessary to offset impacts to fish and fish habitat.

- Recommendation: The Corps should use available data that was collected to support aquatic resource functional assessments and supplement that data where necessary, particularly to identify the amount of losses associated with fish-related functions and use this information to inform decisions regarding the appropriate type and amount of compensatory mitigation necessary to offset the expected functional losses from the

¹⁶⁴ 40 C.F.R Section 230.11(e).

¹⁶⁵ 40 C.F.R. § 230.93(a)(1).

¹⁶⁶ 40 C.F.R. § 230.93(f)(1).

¹⁶⁷ 40 C.F.R. § 230.93(f)(1) and 73 FR 19633 (2008).

proposed Pebble Project. These analytical steps are particularly important in light of the significance and complexity of the discharge activities associated with this project.

X. Conclusions

The EPA has concerns regarding the extent and magnitude of the substantial proposed impacts to streams, wetlands, and other aquatic resources that may result, particularly in light of the important role these resources play in supporting the region's valuable fishery resources. Pursuant to the field level procedures outlined in Part IV, paragraph 3(a) of the 1992 Memorandum of Agreement (MOA) between EPA and the Department of the Army regarding CWA Section 404(q), Region 10 finds that this project as described in the PN may have substantial and unacceptable adverse impacts on fisheries resources in the project area watersheds, which are aquatic resources of national importance.

The EPA recognizes that the standard set out in the MOA is similar to the Section 404(c) standard. However, Region 10's decision to utilize the coordination procedures under the MOA is not a decision regarding its Section 404(c) action and should not be interpreted as such. The EPA has not made a decision regarding whether to withdraw the 2014 Proposed Determination or leave it in place. Region 10 is coordinating under the MOA at this time to ensure that the EPA can continue to work with the Corps to address concerns raised during the permitting process. The EPA looks forward to continuing to work closely with the Corps on further development of the EIS and other supporting analyses related to this PN.

