June 13, 2019

Program Manager
US Army Corps of Engineers
645 G Street, Suite 100-921
Anchorage, AK 99501

Via drafteis@comments.pebbleprojecteis.com

Re: Pebble Mine Draft Environmental Impact Statement

Dear Sir or Madam:

On behalf of the members of the American Fisheries Society (AFS), the Western Division of AFS, and the Alaska Chapter of AFS, we respectfully submit the following comments in response to the Pebble Mine Draft Environmental Impact Statement (DEIS) released by the U.S. Army Corps of Engineers (USACE) for public comment on March 1, 2019.

AFS represents over 7,500 professional fishery scientists and resource managers who work in the private sector, in academic institutions, and in Tribal, state, and federal agencies. Our common mission is to improve the conservation and sustainability of fishery resources and aquatic ecosystems by advancing fisheries and aquatic science and promoting the development of fisheries professionals.

The American Fisheries Society, the Western Division, and Alaska Chapter seek to ensure the best available science is considered throughout the environmental review and permitting for Pebble Mine,

Because of the scope of the proposed Pebble Mine, its probable expansion into a larger mine and mining district (Chambers et al. 2012), and the uniqueness of the Bristol Bay region (Woody 2018), AFS and the Western Division of AFS provided comments in 2014[1] and do so again with the Alaska Chapter of AFS.

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1 AFS Policy Letter 2014 on Pebble Mine and Failure of Mount Polley Dam – Comments to USEPA Region X, 21 August 2014. Available: https://fisheries.org/wp-content/uploads/2015/05/AFS-POLICY-LETTER-2014-Pebble-Mining-Mount-Polley-Comments-to-USEPA-Region-X.pdf

Bristol Bay is extraordinary because it produces about half of the world's wild Sockeye Salmon supply with runs averaging 37.5 million fish per year (Chambers et al. 2012; USEPA 2014; Woody 2018). The wild salmon fishery in Bristol Bay has been managed in a sustainable manner since 1884 and was valued at $1.5 billion in 2010. In addition to Sockeye Salmon, Bristol Bay and the watershed support one of the world's largest remaining wild Chinook Salmon runs and healthy Coho, Chum, and Pink Salmon runs (Johnson and Blossom 2018). These salmon, as well as resident trout, sustain lucrative commercial and recreational fisheries and provide jobs and food security to 25 rural Alaska Native villages and thousands of people. The high salmon production brings huge levels of marine-derived nutrients to the watersheds in which salmon spawn, fueling sustainable populations of grizzly bears, moose, estuarine birds, and indigenous Yup'ik and Dena'ina peoples. The latter peoples represent two of the planet's last salmon-based subsistence cultures, which were once widespread along the entire North American Pacific Coast. These wilderness-compatible economic sectors support 14,000 workers, including 11,500 in commercial fisheries, 850 in sport fisheries, and 1,800 in sport hunting and recreation (Chambers et al. 2012; USEPA 2014; Woody 2018).

Based on our review of the DEIS, we find it fails to meet basic standards of scientific rigor in a region that clearly demands the highest level of scrutiny and thoroughness. The DEIS is an inadequate assessment of the potential impacts of the project. Specifically, as described below, we find the DEIS is deficient because 1) impacts and risks to fish and their habitats are underestimated; 2) many conclusions are not supported by the data or analysis provided; and 3) critical information is missing.

1. Impacts and risks to fish and their habitats are underestimated.

Mine Footprint: We have serious concerns about the limited scope of the DEIS. An environmental impact statement is expected to fully disclose the risks and options for safely advancing or altering a proposed project. The limited scope considered for the mine footprint in the DEIS vastly underestimates the threats to fish, fisheries, and the human populations that rely on them. It is misleading to constrain the DEIS to a mining plan that only extracts 12% of the known resource and to ignore Pebble Limited Partnership's planned expansion and stated purpose to make the mine commercially viable (Chambers et al. 2012).

The DEIS acknowledges that the Pebble Project Expansion—a 55% of known resource mine, which would need additional tailings storage, additional water storage, new waste rock storage facilities, a concentrate pipeline, and a deep-water loading facility—is reasonably foreseeable (Table 4.1-1). This profitable mining plan appears to be a 78 to 98-year mine prior to closure as opposed to the 20-year mine prior to closure covered in the DEIS (Chambers et al. 2012). Further, it is reasonably foreseeable that the Pebble Project Expansion would begin within the timeframe of the proposed 20-year mine. The DEIS relegates the expansion to "possible future action" status rather than considering it a practicable alternative. As a consequence, this more likely profitable scenario with its much larger mining footprint is not evaluated for direct or indirect effects but more narrowly for cumulative effects only, thus underestimating the impacts on fish, fish habitat, and humans. Since the Pebble Project Expansion would be 1) dependent on the approval of this initial permit, 2) could not proceed unless this permit is approved previously, and 3) is classified as an "expansion" or an interdependent part of the larger Pebble Mine action and thus depends on the larger action for its justification; it should be evaluated as a potential connected action in the indirect impacts analysis (40 CFR 1508.25 (a)(1)(i-iii).)

<u>Diversity of Life History Strategies</u>: The Bristol Bay watershed is pristine with exceptionally high-water quality and habitat diversity, closely connected surface-ground water systems, and an absence of channel fragmentation by roads, pipelines, or dams (Woody 2018). These factors lead to extremely high levels of genetic diversity among hundreds of locally adapted unique salmonid populations, which in turn support high levels of salmon production and system-wide stability. Because of this *portfolio effect*, there is remarkable annual productivity regionally despite considerable fluctuation in any single river system or any single year (Schindler et al. 2010). Similar portfolio conditions have been erased from the salmon rivers of Canada and the USA to the south, by activities associated with resource extraction, human overpopulation, and economic development.

The DEIS fails to consider impacts to fish as they relate to distinct populations and life history diversity. In Table 4.24-4: *Summary of Key Issues for Fish and Aquatics*, the DEIS offers a laundry list of impacts. Although the list is notably long, the table and associated narrative omits how these impacts accumulate and interact over the life history of a particular salmon population. Consequently, there is no way to evaluate how these individual impacts would be amplified biologically and ultimately reflected in the Bristol Bay commercial, recreational, and subsistence fisheries. The importance of a single population and the habitat it uses varies across years. Losses that eliminate local, unique populations would erode the genetic diversity that is crucial to the stability of the overall Bristol Bay salmon fisheries (Hilborn et al. 2003; Schindler et al. 2010; Brennan et al. 2019).

<u>Watershed Connectivity</u>: The DEIS fails to consider the best available science regarding watershed and habitat connectivity. Headwater streams provide numerous services that are essential to ecosystems and are key to the sustainability of fish stocks in both upstream and

downstream waters (Colvin et al. 2019). When the natural flow regimes of headwater streams are altered, downstream water quality is impaired. The headwaters of Bristol Bay provide critical habitat for Pacific Salmon. Alteration and destruction of this pristine habitat would have far reaching implications for recreational and commercial fisheries that are not considered in the DEIS. Stream crossings in the Bristol Bay headwaters attendant to Pebble Mine will significantly impair watershed connectivity. Recent assessments of the potential impacts of the proposed 138 km of access roads with 64 associated stream crossings concludes that salmon spawning migrations will be impeded at 36 of these crossings (Kravitz and Blair 2019). Juvenile salmonid movement will also likely be reduced by culverts (Davis and Davis 2011). Stream crossings and modifications lead to reduced water quality and velocity, spread of fungal diseases, degraded riparian species, altered stream substrates, increased erosion and sedimentation resulting in buried spawning and rearing gravels, channel fragmentation, lost spawning habitat, and decreased egg survival (Trombulak and Frissell 2000; WDFW 2003; Gibson et al. 2005; Kemp and Williams 2008). The DEIS conclusions that salmon passage would be only temporarily affected are not supported by recent research (Kravitz and Blair 2019). Instead, projections indicate that almost 90% of culvert-impeded streams contain restricted upstream habitat, 30% of which will be blocked entirely or partly even after project closure ultimately resulting in reduced or extirpated salmon populations (Kravitz and Blair 2019).

The DEIS also likely underestimates the impacts of altered subsurface flow on salmonids by being inconclusive on whether or not groundwater flows were present in the mine vicinity (see Groundwater PAGE | 3.17-19). Regional ecology and geography suggest otherwise. The Nushagak district, hydrologically connected to the mine project, is responsible for 78% of the commercially harvested Chinook Salmon in Bristol Bay even according to the DEIS. Chinook Salmon, even more so than Sockeye Salmon, establish redds in areas where groundwater mixes with surface discharge (Neumann and Curtis 2016). Their preference for spawning habitat of this type and their affinity for the Nushagak indicates that these habitat conditions have been overlooked or underestimated by the DEIS. The upwelling water protects eggs from freezing and aids in swifter incubation (Curry et al. 1995). Additionally, establishing upwelling in these streams may be a critical (yet unknown) factor in assessing the impact of the proposed mine because evidence suggests waters from an upstream reservoir do travel to downstream waters (Geist et al. 2011).

Focusing only on the rivers and estuaries immediately connected to the proposed mining district and pipeline across Cook Inlet ignores their cumulative impacts on the entire Bristol Bay and Cook Inlet ecosystems. In other words, the DEIS makes a common reductionist engineering error by focusing on a few pieces rather than entire ecosystems (Hansen et al. 1999; Hecht et al. 2007).

Mine Tailings Failures: The DEIS does not account for the very real possibility of a catastrophic mine tailings failure. A tailings storage facility at the Pebble Mine could have as high as a 20% probability of failure over a 100-year life of the mine—and such a failure would release millions of tons of toxic waste into the Nushagak River, its floodplains, and eventually Bristol Bay (Wobus 2019; DeMarban 2019).

The design for the Pebble Mine tailings storage facility provides for a centerline construction method with earthen tailings and a facility made of non-acid generating waste rock. There is no guarantee that the plan will not be altered to use the less safe upstream construction method, steepening of the facility levee slopes, or increasing the use of acid-generating rock or insufficient amounts of coarse material, all changes commonly made elsewhere that have led to catastrophic tailings storage facility failures (Bowker and Chambers 2017; WMTF 2019). Any tailings storage facility associated with the Pebble Mine will be in a geologically and hydrologically sensitive area, the mine waste will contain acid- and selenium-generating rock, and the tailings storage facility may eventually be 226 meters high, making it one of the tallest tailings storage facilities in the world, all characteristics that make the tailings facility more susceptible to failure.

Three recent tailings storage facility failures reinforce the high risk of mining in the Bristol Bay headwaters and the specific risk of attempting to retain tailings and contaminated water behind an unstable earthen tailings storage facility in perpetuity. The Mount Polley Mine in British Columbia and the Fundao, and Feijo mines in Brazil all experienced tailings facility failures in similar mining situations causing impacts such as human deaths, contaminated drinking water, destruction of aquatic life, and fisheries impacts. The frequency and magnitude of tailings storage facility failures has doubled over the last 50 years (Santamarina and Torres-Cruz 2019). These tailings storage facility failures coupled with the sensitivities of salmonids to dissolved copper underscores the need for this possibility to be taken seriously in the DEIS.

2. Impacts to fish and their habitats are not supported by the data or analysis provided.

Water Temperature: We find that the conclusions of likely effects of temperature changes resulting from treated water discharges are not supported by the data and analysis provided. For example, the analysis ignores the influence of local adaptation, which USEPA (2014) noted was critical to consider. Local adaptation is responsible for much of the variation observed among Pacific Salmon populations in behavior, development and growth rates, physiological and biochemical features, and life history traits (Taylor 1991). The DEIS fails to recognize the significance that small changes in water temperature can have on the time (McCullough 1999) and size (Beacham and Murray 1990) at emergence of alevins. Additionally, the DEIS does not consider how effects compound over fish life-history by limiting its analysis to a single life-history stage in isolation of the subsequentstages. The DEIS also claims that projected changes in water temperatures are not anticipated to alter aquatic invertebrate assemblages, a major food source for juvenile salmon. This assertion is not supported by any data.

Copper: Dilute copper concentrations can have far-reaching behavioral and pathological effects on fish, especially in low ionic strength waters such as those in southwest Alaska. It impairs salmonid olfactory function (Hansen et al. 1999; Baldwin et al. 2003; Sandahl et al. 2006) making them more susceptible to predation (McIntyre et al. 2012), and reduces their ability to locate their natal streams to spawn. Dilute copper contamination can and does eliminate salmonids by altering migration, fish and macroinvertebrate assemblages, and a threshold shift in the percentage of game fish (Woodward et al. 1997; Daniel et al. 2015). Therefore, we find that the DEIS does not adequately address the potential impacts from uncaptured mine waste water because it is unrealistic to assume that all mine-influenced water will be captured. This is particularly problematic in the seismically active, rich surface-ground water connections, and fractured geology of the project area. Mining, through the release of dilute copper concentrations, promises to degrade streams throughout the basin, affecting the anadromous and resident fish species using those habitats for migration, spawning, and rearing (Chambers et al. 2012; USEPA 2014).

3. Critical information is missing.

It has been difficult to find the actual data upon which the DEIS is based. Apparently those data are buried deep in attachments to appendices of the Pebble Project Environmental Baseline Document, or in an on-line or paper document library that is continually being added to and not clearly referenced in the DEIS. Such data burial does not meet basic scientific standards for scientific peer-review, let alone public review. The inaccessibility of relevant data for a project of this magnitude in a region of global significance is inexcusable.

Based on our limited ability to review, we find critical information lacking in the DEIS, which prevents a full evaluation of the potential impacts of the proposed Pebble Mine. For instance, the DEIS is incomplete in its discussion of numerous topics, including:

- impacts of copper in fugitive dust on aquatic life;
- threats and impacts of aquatic invasive species to the Bristol Bay region due to new transportation corridors into previously undisturbed areas;
- seismic risks and impacts of earthquakes on all built infrastructure and impacts of resulting failures on the natural environment;

- risk assessment of atmospheric river events;
- impacts of urbanization and industrialization of the site; and
- polluted wastewater disposal and monitoring plan in the event of a spill or storage facility failure.

We recommend that these topics be incorporated into the DEIS and made available for public review before USACE finalizes the EIS.

Most importantly, the Pebble Limited Partnership has failed to make available a post-operation reclamation plan, an economic feasibility study, and calculation of surety guarantees to cover the total costs of perpetual waste water, waste rock, and tailings treatments as required by Alaskan law (AS 27.19.040) and responsible investment institutions (Alaska Statutes 2019; Brown 2019; Responsible Investor 2019). It is difficult to assess the long-term and indirect effects of a large mine action such as the Pebble Project without an assessment of the proposed reclamation activities, schedule, materials, planning, and monitoring. The proposed types and methods of reclamation have a huge potential to affect conditions in the watershed both during and after mining ceases. These components should be completed and made available for public review before USACE moves forward with the Record of Decision.

Furthermore, we urge USACE to re-visit the socio-economic and ecological sections in USEPA (2014) and Woody (2018), which provide critical data for decision-makers about the costs, benefits, and risks to public salmon resources from proposed mining activities in Bristol Bay. AFS professionals, with mining experience, participated in the review of both documents in all phases and we believe the authors conducted a comprehensive, rigorous, professional synthesis incorporating the best available science.

In conclusion, as fishery scientists and resource managers, we are concerned that the DEIS will clear the way for a project whose impacts to highly valued fisheries and the watershed were not adequately evaluated and therefore cannot be adequately considered, reduced, or mitigated. We do not believe the impacts and risks to fish and fish habitat have been fully described and we disagree with many conclusions reached based on the available data and ecological knowledge. Bristol Bay's unimpaired watersheds and sustainable commercial, recreational, and subsistence fisheries represent an exceptionally rare resource of national and global importance. The potential scope of the project is so vast that it would forever alter the Bristol Bay region and its fisheries resources, including the extraordinarily prolific and all-wild salmon fisheries. Consequently, until an acceptable scientific evaluation can be completed and reviewed, we recommend the No Action Alternative as the best path forward.

Thank you for your consideration. If you have any questions, please contact Drue Banta Winters at dwinters@fisheries.org or 301-897-8616 x202 or Joel Markis at president@afs-alaska.org or 907-747-7760.

Sincerely,

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