United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
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In Reply Refer to:
FWS/R7/SAFWFO

Ms. Samantha Owen
Senior Regulatory and Licensing Consultant
McMillen Jacobs Associates
1101 Western Avenue, Suite 706
Seattle, Washington 98104

Subject: Draft Technical Memorandums Eklutna Lake Aquatic Habitat, Water Quality, and Potential Options for Fish Passage (Service file number 2022-0074477)

Dear Ms. Owen:

Thank you for providing the draft Technical Memorandums (TMs), November 8, 2022, regarding summaries of the Eklutna Lake Aquatic Habitat, Water Quality and Trophic Status, and examples of engineering options for fish passage. The TMs and dam spillway options were presented at the Technical Working Group (TWG) meeting on November 9, 2022.

Draft Technical Memorandums

Lake Aquatic Habitat and Fish Utilization

The Lake Aquatic Habitat and Fish Utilization TM presents a summary of data collected in Eklutna Lake tributaries in 2022, a preliminary discussion of potential spawning habitat in tributaries to Eklutna Lake, and a description of samples collected for infectious hematopoietic necrosis virus analysis.

Page 3: Section 1.2, references two culverts in Tributary 4 that are likely fish passage barriers and that culvert removal in the area may occur in the future. Please clarify if removal of these culverts would be part of the Eklutna Project mitigation or something else.

Page 4: Section 1.2, mentions additional habitat and spawning surveys that were completed in 2022 on the West Fork of Eklutna Creek by the Native Village of Eklutna. Discussions during the TWG noted the Native Village of Eklutna expects to have draft data on the West Fork in December of 2022 and they plan to finish the collections on the East Fork next year. We support the suggestions made during the TWG to include this information.

Page 7: Section 1.4.1.1, mentions that no macroinvertebrates were observed in the mainstem glacially-turbid habitats. During the TWG meeting, the Native Village of Eklutna mentioned

they observed macroinvertebrates in the tributary to the West Fork. We support suggestions made during the TWG to include this information.

Page 7: Section 1.4.1.1, acknowledges that some factors influencing spawning habitat quality were not studied, such as groundwater-surface water interactions. It also mentions that other turbid glacial river systems with productive salmon populations often contain clear-water habitats where spawning and rearing are concentrated. During the TWG meeting the Native Village of Eklutna mentioned finding a potential groundwater resurgence point where the stream seemed to come out from rocks, and they discovered larger Dolly Varden char (*Salvelinus malma*) in the vicinity. We support suggestions made during the TWG to include this information.

In addition, we understand that spawning habitat was the focus of this TM, and that rearing habitat survey results were discussed in the Year 1 Interim Report (Kleinschmidt Associates 2022). We would like to emphasize that while some stream reaches may not provide ideal spawning habitat, they may support productive rearing habitat.

Eklutna Lake Water Quality and Trophic Status

The Eklutna Lake Water Quality and Trophic Status provides a summary water temperature, pH, dissolved oxygen, total phosphorus, chlorophyll *a*, and Secchi Depth (measures of water clarity) in Eklutna Lake to determine the trophic status index value.

Pages 4 to 5: Section 4 and Figures 4-3 and 4-4, describe how water temperatures in the basins of the pond and lake remained unique even when they were connected in September of 2021and 2022. There were questions during the TWG meeting about how much of the pond and lake are shallow. This is important because shallower areas allow more sunlight which can result in more phytoplankton and zooplankton. The TWG also questioned if a future scenario of more static lake levels may result in greater areas of vegetated shoreline. Please discuss how lake and pond depths may be impacting fish habitat and lake productivity.

Page 10: Section 4.3, stated, the glacier runoff from the primary tributaries is causing turbidity in the lake that limits sunlight penetration and primary productivity. The rate of glacier-melt and subsequent turbidity levels in the lake will likely change as the glacier recedes (Sass et al. 2017), and levels of suspended glacial sediment and primary productivity in the lake may also change. Furthermore, Alaska has several examples of productive glacier-fed lakes, including Kenai Lake and Skilak Lake, and sockeye salmon (*Oncorhynchus nerka*) are known to rear in oligotrophic lakes. We request comparisons of similar glacier fed lakes in Alaska.

Furthermore, during the TWG meeting there were discussions surrounding the Eklutna Lake system going decades without marine derived nutrients and if this could have contributed to the lack of nutrients in the lake. We recommend further analysis of how the lack of marine derived nutrients may be impacting productivity in the lake system.

It appears productivity in Eklutna Lake has been impaired because of alterations to natural processes. The dam structure is preventing flushing flows from moving sediment through the system, and is preventing marine derived nutrients from getting into the system. The large variances in lake levels are inhibiting shallow habitat vegetated shorelines from producing nutrients. We would like to see more analysis on the impacts that the dam and fluctuating lake levels have had on the Eklutna Lake habitat and nutrients. The lake system could be compared to other functioning systems in Alaska such as Kenai Lake and Skilak Lake.

Preliminary Engineering for Fish Passage

During the potential engineering solutions portion of TWG meeting, we learned that natural river system fish passage measures were determined to be not feasible and were not considered further. However, we are interested in exploring what some natural channel options could look like, and what the costs and benefits of those options would be. For upstream fish passage some scenarios could include dam removal, a constructed natural bypass channel, and a hybrid scenario with a bypass channel supported by trap and haul during low lake levels. With these options elevated lake levels may no longer be possible, however pumped energy storage to uphill reservoirs could provide a means for storing water for Eklutna when energy is more abundant (Williams et al. 2020). Downstream fish passage scenarios could include dam removal both with and without lake fluctuations, resulting in a more run of the river scenario for power generation. We are interested in other options to facilitate outmigration such as a multi-level intake structure with a conduit around the dam (Hansen et al. 2017), and use of induced turbulence or injection of dissolved oxygen to attract outmigrants to safe passage routes (Perry et al. 2005; Biomark 2022). We request focused meetings to discuss dam engineering options. We would like to see more options based on fish passage and biological factors such as seasonal migration, timing, and other fish and aquatic habitat needs. During the TWG meeting graphs were provided illustrating the 10-year average water surface elevation overlain with water surface elevation per measure proposed. We would like to provide more in-depth analysis based on the biological needs of fish; to do this we request the last few years of actual head/pond fluctuation be provided on a daily scale instead of the 10-year average.

Thank you for the opportunity to review and comment on the draft TM. We look forward to working with you on fish passage options. For more information or if you have any questions, please contact Senior Fish and Wildlife Biologist Wildlife Conservation, Ms. Jennifer Spegon at (907) 271-2768 or via email jennifer_j_spegon@fws.gov, or Senior Fish and Wildlife Biologist Ecological Services, Ms. Carol Mahara at (907) 271-2066 or via email carol_mahara@fws.gov and reference Service file number 2022-0074477.

Sincerely,

Carol Mahara

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Date: 2022.11.22 15:51:51 -09'00'

Acting
Branch Chief, Ecological Services

Literature Cited

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Sass, L., M. Loso, J. Geck, E. Thoms, and D. McGrath. 2017. Geometry, mass balance and thinning at Eklutna Glacier, Alaska: An altitude-mass-balance feedback with implications for water resources. Journal of Glaciology, 63(238), 343-354. 12 pp. doi:10.1017/jog.2016.146

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