# United States Department of the Interior

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In Reply Refer to:
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Ms. Samantha Owen
Senior Regulatory and Licensing Consultant
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1101 Western Avenue, Suite 706
Seattle, Washington 98104

Subject: Eklutna Hydroelectric Project Draft Technical Memorandum for Instream Flow and Fish Barrier Analysis, and Potential Engineering Solutions for Year-round Flows (Service file number 2022-0074477)

Dear Ms. Owen:

Thank you for providing the draft technical memorandum dated September 28, 2022, regarding preliminary results for the Eklutna River Instream Flow and Fish Barrier analysis, as well as the example flow release scenarios. The technical memorandum and potential engineering solutions for providing year-round flows to Eklutna River were presented at the Aquatics Technical Working Group (TWG) meeting on September 28, 2022.

The Instream Flow Study was initiated in 2021 in accordance with the May 2021 Final Study Plans (MJA 2021), a description of methods and information collected is summarized in the Year 1 Interim Report (Kleinschmidt Associates 2022). Subsequently, three models were created for Eklutna including a Hydrologic Engineering Center's River Analysis System (HEC-RAS) one-dimensional model, Physical Habitat Simulation (PHABSIM), and a barrier analysis for five potential fish migration barriers. The intent of the technical memorandum was to summarize results of the PHABSIM modeling and barrier flow analysis, describe how those models could be used, and provide examples of Eklutna Lake flow release scenarios.

The U.S. Fish and Wildlife Service (Service) appreciates the extensive work that went into the Instream Flow Study and habitat modeling so that species specific habitat-flow relationships can be estimated at the transect, reach, and river levels. We offer the following comments on the draft technical memorandum and potential engineering solutions for providing year-round flows to Eklutna River, presented at the TWG meeting on September 28, 2022.

**Draft Technical Memorandum**

Figure 2-7 on page 11 shows the seasonal use of Eklutna River by Chinook Salmon (*Oncorhynchus tshawytscha*), Coho Salmon (*O. kisutch*), and Sockeye Salmon (*O. nerka*) based on the estimated periodicities depicted in Trout Unlimited (2018) and U.S. Army Corps of Engineers (USACE 2011). However, during the TWG meeting we learned that field crews observed discrepancies with these timing windows. We request this new information be used to update the periodicity chart and any subsequent analysis.

Figure 2-9, Table 2.1, the PHABSIM extrapolation range is 10 to 375 cubic feet per second (cfs) based on test flow releases of 25 to 150 cfs (MJA 2021). Most of the habitat-flow relationship curves produced via PHABSIM modeling, in Appendix A, show a distinct peak within the extrapolation range, but four transect-based curves (Reach 5 TR1 Juvenile, Reach 8 TR 1 Juvenile for Chinook, Reach 11 TR7 Spawning, Reach 11 TR7 Juvenile) and one reach-based curve (Reach 11 Spawning for Chinook) do not. When these specific curves are normalized, 90 percent of maximum weighted useable area is based on the maximum of the extrapolation range (375 cfs) instead of maximum gains for the species and life stage. Given that the peaks would likely be higher if the extrapolation range could have been larger, we request clarification of how these curves were integrated into the information presented in Figure 2-9 and the flow levels in Table 2-1. If larger calibration flows had been possible, how much different could these values have been?

Section 2.7, while we recognize that flushing flows and channel geomorphology will be discussed in subsequent meetings, we reiterate that PHABSIM model results are predicated on the assumption of channel maintenance. Maximum weighted useable areas reflect the proportion of modeled available habitat by species and life stage across the range of flows. However, in the absence of channel-forming flow events, or if channels are restored or otherwise physically altered, the amount of salmon habitat available within the study reach will change over time and the model results may longer be applicable. We therefore request that PHABSIM model results be revisited as decisions are made regarding flushing flows. Due to the lack of flow over the last decades, we expect major changes throughout the river. We are concerned that taking a single snapshot in time will not forecast potential habitat in the Eklutna River system. The information should be used in conjunction with the sediment transport model, channel alterations, and a restoration plan.

Section 2.7 of the technical memo says the scenarios presented in the analysis should only be used for example purposes to illustrate that the PHABSIM model could work. We agree and would not want the example inputs to be viewed as options or alternatives. During the engineering portion of the TWG, and in section 2.6.1, four flow release levels and three flow release locations (with two additional modifications) were provided as examples for the model: 1) releasing flows at the dam through the current spillway; 2) releasing flows at the dam through the current spillway, but also excavating a channel through the upstream pond to lower the lake levels required to reach the spillway; 3) tying into Anchorage Water and Wastewater Utility (AWWU) infrastructure, creating a bypass at river mile 11; 4) tying into AWWU infrastructure, creating a bypass further downstream near river mile 5.5; and 5) diverting Lach Q'atnu Creek. Of these five example scenarios, only two (items 1 and 2) provide continuous surface flows from the lake. We would like to see more scenarios that include returning flows to all river reaches, and we look forward to working together to develop these scenarios.

**Discussion**

Hydroelectric development has impacted the entire length of Eklutna River, and the study plans have been examining those impacts on fish and wildlife (including spawning grounds and habitat) to inform options for protection, mitigation, and enhancement measures. We understand that a variety of alternatives need to be considered so the impacts to fish and wildlife, electric rate payers, municipal water utilities, recreational users, and adjacent land uses can be analyzed and compared. The AWWU release example captured options for minimal cost to rate payers and utilities while still offering some improvement to habitat over current condition; however, we are concerned this type of scenario would not address habitat at the upper reaches of the river or fish passage into the lake. We would like to see scenarios analyzed that capture maximum improvements for fish habitat over the current condition so that those costs and benefits can also be documented and considered. For example, we recommend including scenarios with modified or new infrastructure that could accommodate year-round flows, flushing flows, and fish passage. We look forward to discussions about ideas and their feasibility.

Recognizing the importance of maintaining owner investments and instream habitat gains, we also look forward to future discussions of flushing flows. Preliminary barrier analysis results are impossible to discuss without a consideration of channel geomorphology, local geology, and flushing flows. Cross sections taken at existing fish passage barriers in geologically unstable reaches with high colluvial sediment inputs do not represent permanent river characteristics. A functioning river has a flow regime that is in balance with sediment inputs. Current Eklutna River flows are not in balance with sediment inputs; the river requires more instream flow to route the sediment it receives from the watershed. The surveyed barrier reaches represent sediment aggradation. Marginal releases to maintain a prescribed minimum depth throughout these reaches will provide short term fish passage gains. In the absence of flushing flows, however, continued sediment inputs will increase aggradation and produce additional barriers. As opposed to modeling various flow releases over an existing ephemeral cross section, a sediment transport analysis should be conducted to explore the amount of water and stream power necessary to route the native sediment at a rate that maintains fish passage and habitat over time. Sediment transport analysis will inform decisions regarding the magnitude and timing of flushing flows necessary for channel maintenance.

Thank you for the opportunity to review and comment on the draft technical memorandum. For more information or if you have any questions, please contact Ms. Jennifer Spegon at 907-271-2768 or at jennifer_j_spegon@fws.gov, or Ms. Carol Mahara at 907-271-2066 or at carol_mahara@fws.gov and reference Service file number 2022-0074477.

Sincerely,

DOUGLASS COOPER

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Douglass M. Cooper
Branch Chief, Ecological Services

**Literature Cited**

Kleinschmidt Associates. 2022. Year 1 Interim Report. Prepared by D. Reiser and M. Gagner and prepared for Chugach Electrical Association, Matanuska Electric Association, and Municipality of Anchorage. January 2022.

McMillen Jacobs Associates (MJA). 2021. Proposed Final Study Plans. Eklutna Hydroelectric Project 1991 Fish and Wildlife Agreement Implementation. Prepared for Chugach Electrical Association, Matanuska Electric Association, and Municipality of Anchorage.

Trout Unlimited. 2018. Eklutna River Workshop, Summary of Outcomes, Recommendations, and Future Needs. June 2018.

United States Army Corps of Engineers (USACE). 2011. Eklutna River Aquatic Ecosystem Restoration Technical Report. Joint Base Elmendorf-Richardson, Alaska. November 2011.