U. S. Fish and Wildlife Service Comments on the

Eklutna Hydroelectric Draft Study Plan

November 27, 2020.

The U.S. Fish and Wildlife Service (Service) submits the following comments on the Draft Study Plan (DSP) in accordance with the 1991 Fish and Wildlife Agreement.

Introduction

1.0 Introduction (p. 2). "If the Federal and State resource management agencies' comments or recommendations differ from those of the Project Owners, the Project Owners must attempt to resolve such differences giving due weight to the recommendations, expertise, and statutory responsibilities of the Federal and State resource management agencies."

Will Federal and State resource agencies be privy to Project owner comments?

Instream Flow Study

3.1.4.5 Data Collection (pp. 39-42). Selection of Target Flows

Average monthly flow pre-diversion was 346 cfs. The justification for selecting 25 cfs, 75 cfs, and 150 cfs as study flows because they can provide for an extrapolation range of 10 cfs to 375 cfs. However, average flows in July and August appear to be 800 cfs. A study flow larger than 150 cfs may be better to simulate the historical average flows in July and August. Those months correspond with up-migrating adults and up-migrating juveniles if they overwinter in Eklutna Lake. A model that better characterizes these habitat at these larger flows would likely be beneficial.

3.1.4.5 Data Collection (p. 45). Field Data Collection (PHABSIM).

USGS flow measurement guidance is to use the Two Point (2/10th and 8/10th) method for depths 1.5ft or greater, rather than 2.5ft or greater, when an ADV (Acoustic Doppler Velocimeter) as when a FlowTracker instrument is used. See Turnipseed and Sauer (2010, p. 21).

3.1.4.7 Data Analysis and Modeling (p. 47-48). PHABSIM Data Analysis and Modeling.

The Service recommends developing a short section of 2D Hydraulic Engineering Center's River Analysis System (HEC-RAS) model in the upper reach just below the Eklutna Lake Dam. The HECRAS model should be similar to the Hanson (2019) study reach. This would give a more accurate velocity and shear stress distribution that could be used to assess fish habitat and quantify off channel habitat. This could be constructed

using LIDAR with a minor amount of additional real-time kinematic GPS survey data or manual scanner to supplement the LIDAR data as most of this reach is dry.

Geomorphology and Sediment Transport Study

3.2.4.2 Field Inventory and Scour and Sediment Monitoring (p 55). Transect and Substrate Data

The transect locations should consider the effects of the access road and bridges on the channel morphology. To obtain reference data in the Hanson (2019) reach, the Service recommends transects be located upstream of the access road.

3.2.4.1 Pre-field Work (p. 54). Estimate Historic and Current Sediment Sources and Input Rates.

The Service suggests a Digital Elevation Model (DEM) difference analysis from 2016 to 2020 LIDAR in addition to "changes in the sediment source areas from the historical aerial photographs" for sediment input rates.

The Service suggests bulk density measurements and estimates in addition to "*Note that the grain size distribution of these sediment inputs will be assessed during the field portion of the study*." in order to accurately quantify tons of sediment transported.

3.2.4.2 Field Inventory and Scour Sediment Monitoring (p. 58). Sediment Source Evaluation.

The methods outlined for the erodibility assessment is unclear. Elaborate on erodibility assessment method.

The Service suggests bank pin installation for sediment source monitoring.

The Service suggests bed load sampling to calibrate the sediment transport model for quantity of sediment transported and to understand what grain size is mobile.

Eklutna River Fish Species Composition and Distribution Study

3.3.1.1 Current Distribution (p. 61). "A total of 57 juvenile Coho Salmon, 58 juvenile Chinook Salmon, and 26 Dolly Varden were captured ranging upstream to a natural fish passage barrier where rockfall has created a pinch point located 1.6 km (1 mile) upstream from the Thunderbird Creek confluence (ADFG 2020)."... However, in regards to fish observations in the Eklutna River, it is written, *"During ADFG surveys completed in September 2020, juvenile Coho Salmon were collected and observed approximately half a mile upstream of the former diversion dam site and adult Coho Salmon were observed in the Eklutna River upstream of the Thunderbird Creek confluence (Personal communication Ron Benkert, September 25, 2020)."*

The former diversion dam is located approximately 1 mile upstream from the confluence with Thunderbird Creek. This statement suggests the referenced pinch point is in close proximity to the former diversion dam. However, based on text within the document, the pinch point is not a barrier as per citation (*Personal communication Ron Benkert, September 25, 2020*). The observations made by ADF&G suggests juvenile coho salmon

occupied habitat 0.5 miles upstream of the former diversion dam site. Based on the information provided, the occurrence of a 'natural fish passage barrier" does not appear correct based on the most recent information.

3.3.1.1 Escapement (p. 61). "The run strength of adult salmon in Eklutna River is not well known as few escapement surveys have been conducted."

What type and how many escapement surveys constitute "a few"? Please state with citations for ease of reference.

3.3.1.1 Spawning (p. 62). "Salmon spawning has been observed in the lower Eklutna River from the upper limit of tidal influence to the 1929 diversion dam and the accessible stretch of Thunderbird Creek (NVE, unpublished data)."

What species of salmon were observed? The narrative suggests spawning salmon have been observed up to the old diversion dam, however subsequent stream reach descriptions do not mention any occurrence of spawning fish between the Thunderbird Creek confluence and the old diversion dam. Please clarify.

3.3.1.1 Rearing (p. 62). "Juvenile Coho and Chinook Salmon generally reside in river systems for 1 to 2 years before they migrate to the ocean. Some portion of Chinook Salmon juveniles also may leave natal streams as sub yearlings and overwinter in larger water bodies downstream."

Juvenile Coho and Chinook salmon exhibit highly complex rearing strategies during freshwater residency periods, including extensive movements between summer and winter rearing areas. In describing these life history traits, the document does not discuss this behavior pattern or rearing and seasonal refugia areas, as well as the importance of maintaining connectivity between these habitat types at critically important times of the year. The Service recommends a discussion on movement patterns of juvenile Coho and Chinook salmon and the importance of maintaining connectivity between these habitats.

3.3.3.1 Periodicity (p. 63). Table 3-3 Summary of seasonal salmon use of Eklutna River habitat.

Please use an alternate color template for shading bars within this figure. Current color scheme makes it difficult to read.

3.3.1.3 Habitat (p. 65). Table 3-5 Summary of the Eklutna River habitat by reach (NVE 2020).

The table does not accurately represent the number of reaches proposed in the Eklutna Study Plan and should not be interpreted as representative of habitat conditions found within the eight stream reaches designated for fish species and distribution studies. Please clarify the narrative of the caption to avoid confusion.

3.3.3 Study Area (p. 66). "The study area for the Adult Salmon Survey task includes an approximately a 4-mile reach of the Eklutna River starting just upstream of the beaver complex

and zone of tidal influence extending up to and approximately one-half mile past the documented fish barrier downstream of the former lower diversion dam site."

The Service suggest expanding adult foot surveys to encompass all stream reaches that contain water at the time of sampling. The perceived barrier is not a fish barrier to juveniles as per personal communication Ron Benkert (as stated in the study plan). If juvenile salmon are capable of passing the "barrier", it is not improbable that under certain flow conditions adult salmon may also migrate upstream past the "barrier".

3.3.4.1 (p. 66). Methods to Support Task 1, Eklutna River Fish Community.

The methods for sampling juvenile salmonids indicate a min/max stream sampling length but do not specify starting points within specified geomorphic reaches where sampling events will occur. Please clarify.

Geomorphic reaches established for sampling fish assemblages and distributions within the Eklutna River are not equivalent lengths. Shorter stream reaches have wider wetted widths and will likely result in a greater sampling of the longitudinal length in the reach. However, reaches located in the upper sections of the Eklutna River generally have smaller wetted widths (DSP, Table 3-5, p. 65), but are greater in longitudinal length than are lower reaches (DSP, Figure 3-14, p. 67). The decreased sampling length within a greater longitudinal length of stream may miss sampling "hotspots" of fish densities (Foley et. al, 2018, p. 254; Kiffney et. al, 2011, entire).

The Service recommends using a sampling of 40 times the bankfull width instead of the wetted width. NVE (2020) used bankfull width to determine an average channel width as is reported in Table 3-5 (DSP, p. 65). The study plans methods indicate wetted-width shall be used as a measure of stream width for determining a sample length within each geomorphic stream reach. The average measures in Table 3-5 (and representative reaches in Figure 3-15) suggests a greater length of stream will be sampled, than sampled if wetted-width was used as a metric, as wetted-width is often less than bankfull width. Wetted channel width is that portion of the stream covered in water which fluctuates with hydrologic changes. Bankfull channel width is the channel that contains bankfull discharge and fills a stable channel to the elevation of the active floodplain.

The Service recommends sampling for juvenile salmonids in Thunderbird Creek in addition to Eklutna River. Conditions in Thunderbird Creek may offer refugia and a source population for individuals occupying habitats within the Eklutna River. Similarly, juvenile salmonids emerging from the gravel in Eklutna River, may migrate to more favorable conditions within accessible areas, including Thunderbird Creek.

3.3.4.1 (p. 68). Methods to Support Task 1, Eklutna River Fish Community.
"...or in the event that electrofishing is not effective (e.g., high turbidity or low conductivity) or restricted by permit stipulations."

Sampling for juveniles using electrofisher backpacks during July and September will coincide with seasonal adult salmon use of Eklutna River habitats (TU 2018; as cited in DSP; Table 3-3, p. 63). Sampling may not occur in all reaches previously known to support adult salmon. Turbid waters of the Eklutna River may prevent observation of adults in the area during an electrofisher backpacker sampling event. Therefore, sampling via backpack electrofisher may not occur. What measures are included to ensure sampling occurs within these areas or that existing methods (i.e., seine, Gee style minnow traps) will adequately sample areas intended for backpack electrofishing?

(P. 68). "Ancillary data including fish condition, sex, if determined, and any injuries or mortalities observed will be recorded on field forms or tablets".

What values will be used to describe "fish condition"? What is the purpose for this data and how does it relate to the Goals and Objectives of the Study?

(P. 70). "ADFG recommended target voltage settings for juvenile salmonid sampling in cold water will be used as a reference at the onset of sampling (Buckwalter 2011)".

Please clarify settings for use with backpacker electrofishing methods. The Study Plan document identifies electrofisher settings will be consistent with guidelines established by numerous sources including NMFS (2000), Smith-Root (2009) and ADFG (Buckwalter 2011). The cited reference, Buckwalter (2011) does not include the recommended setting for backpack electrofisher sampling. Table 1, Buckwalter (2011, p. 8) identifies electrofisher data variables collected during sampling.

(P. 70). "Start and stop times will be recorded to quantify sampling effort between surveys."

The Service recommends recording the time of applied electricity (i.e., electrofisher on-time) rather than start and stop times as a means to quantify sampling effort between surveys. Recording the electrofisher on-time from the Smith-Root backpack unit after completing the survey for each stream reach will allow for a more accurate and precise comparison of sampling effort.

(P. 70). "In the event that electrofishing cannot be used in certain areas, seining will be paired with minnow trapping."

The Service recommends the inclusion of "time of year" with this narrative. The DSP identifies sampling events occurring in May, July, and September. Sampling for juveniles using electrofisher backpacks during July and September is likely to coincide with the presence of adult salmon within certain reaches of the Eklutna River (DSP; Table 3-3, p. 63). Therefore, use of electrofisher backpacks will be prohibited for sampling when adults are present, and likely, throughout all reaches previously known to support adult salmon.

Please provide methods for how paired seine and minnow trap sampling will occur.

(P. 70). "Beach seines are an effective method to capture a range of fish species and life stages in a multitude of slow-water habitats."

What measures are included with seine net sampling techniques to minimize disturbance or damage to salmon redds within stream reaches being sampled? The Eklutna River is a turbid system and visibility to the substrate may not occur in all areas sampled with seine net gear. Lead lines or poles may scour the substrate and dislodge salmon eggs buried within the substrate. Please clarify.

(P. 71). "A standard suite of physical habitat data and descriptive information will be collected where fish sampling occurs within each geomorphic reach. These parameters have been modified from the USFS Aquatic Habitat Tier One survey (USFS 2001, Chapter 20). Channel morphology characteristics will be documented at the reach scale and will include..."

Please provide a detailed description of the parameter changes made to the USFS Aquatic Habitat Tier One Survey (USFS 2001, Chapter 20). The methods described in the study plan are lacking sufficient detail. For example, it is unclear how many individual measurements shall be recorded within a channel type for calculating the average bankfull width of a given channel type process group. Similarly, it is not specified how many measurements within a reach will be used to determine or calculate the bankfull maximum depth. Given the sampling protocol of only sampling 40 times the wetted-width, the true value may not be represented given this sampling method. Please clarify sampling methods.

The Draft Study Plan suggests "*Channel morphology characteristics will be documented at the reach scale*". Please quantify the reach scale. Reaches 1 – 11 identified within this study of the DSP are not a singular standard length, but of varied lengths based off of geomorphological features of the Eklutna River.

The Service would like clarity on the spatial scale referred as "meso-scale" habitat units. It is unclear what physical characteristics define USFS meso habitats identified within the Draft Study Plan. The FSH Chapter 20 does not specify meso habitat types as identified within the Draft Study Plan. Please provide citation or defining elements for each of the mentioned meso habitat units.

(P. 71). "Location of the downstream and upstream endpoints will be collected using a GPS receiver (latitude/longitude in decimal degrees in the WGS84 datum)."

Please specify where the start points for sampling begins and ends. It is unclear if reach end points occur at a distance (in meters) upstream, 40 times the stream bank wetted width, as recorded at the start of the stream reach. Please specify within the methods.

How will average wetted width, wetted depth, maximum pool depth be determined, that is, from among how many readings? Please specify.

3.3.4.2 Methods to Support Task 2 Adult Salmon Surveys.

(P. 72) Adult salmon and carcass surveys will be conducted weekly from early July to late October and will cover an approximately 4-mile reach of the Eklutna River starting at the ARR bridge."

Determining species of salmon during foot surveys will be difficult and prone to error, especially (1) early in the run before fish have developed distinctive spawning coloration, and (2) during periods of high flow/turbid water. In addition to the proposed foot surveys to document the temporal and spatial distribution of salmon spawning, installing and operating a video weir would facilitate species identification while also providing a census of salmon abundance that could be used to track recovery of salmon populations with more precision that abundance indices will allow.

Stream reaches delineated for adult salmon redd surveys do correspond to study reaches established for other studies of the Study Plan, including reaches for documenting resident and juvenile salmonid anadromous fish communities. Please clarify how comparison with prior survey efforts supports the Goals and Objectives (DSP, p. 66) of the Eklutna River Fish Species Composition and Distribution Study. The Service recognizes the importance of comparative analyses with baseline data however it is unclear how this data will be used given the stated Goals and Objectives. Suggest reworking the Goals and Objectives to include a comparative baseline analysis or modifying the sampling reaches for conformity to other studies within the Study Plan.

The Service recommends clarifying the approximate linear distance for proposed adult surveys occurring on the Eklutna River (~3.5 miles). Although it is outlined in bullet form in the text that follows, the narrative suggest approximately 4 miles of the Eklutna River will be sampled. According to the Study Plan description, 0.5 miles occurs within Thunderbird Creek.

The Service recommends performing adult salmon surveys throughout the entirety of the Eklutna River for all sampling periods.

Please clarify how redd longevity, sample or "test" redds, and observer efficiency will be determined.

(P. 72). "In addition to GPS locations of spawning areas, aerial photos and surveys maps will be used to record notes about fish observations and behavior during each survey."

Please clarify how "areas" will be determined (e.g., presence of a single redd, multiple redds).

(P. 73). "Carcass samples (heads) will be collected from Chinook and Coho salmon encountered and delivered to ADFG for otolith analysis."

The Study Plan notes heads from carcasses will be delivered to ADFG for otolith analyses. What exactly will they be analyzing and how does this relate to the Goals and

Objectives outlined on page 66? For small runs like those on the Eklutna River, it is possible that a sizable proportion of the escapement could be strays from other rivers around upper Cook Inlet or from hatchery-produced runs returning to nearby streams (e.g., Chinook or coho salmon released at Ship Creek or Eklutna Tailrace), thus confounding efforts to understand and track Eklutna River's in-situ productivity. The Service recommends exploring the possibility of screening the escapement using the genetic stock IDs developed by ADF&G and/or hatchery otolith markings.

3.3.5 Reporting

(P. 74). "The study report will contain details on methods completed for the two Eklutna River fish tasks as well as results."

The Service would like to review a revised version of the Study Plan based upon 'details" of methods proposed for inclusion in the final report. The Service suggests including detailed methods within the Study Plan for Technical Working Group Review and prior to Study Plan implementation.

Macroinvertebrate Study

General Comment:

This study could be more focused on understanding the prey base available for stream-rearing juvenile salmon (see Willacker, J. et. al. 2007).

3.*4.2 (p. 77). "The primary goal of the macroinvertebrate study is to characterize the current macroinvertebrate community along the longitudinal profile of the Eklutna River below the existing dam at Eklutna Lake."*

The Service suggests increasing the number of sample sites to include areas within the upper reaches of the Eklutna River. If this is not feasible, the Service suggests spreading the existing number of sample sites to cover a greater length of the longitudinal profile within the Eklutna River. If the goal of the study is to characterize the macroinvertebrate community in a longitudinal profile, sampling should occur in more than three of the thirteen stream reaches established for this study. The majority of the proposed sample sites occur within the lower reaches of the Eklutna River. The Service recognizes upper sections of the Eklutna River may be dewatered at certain times of the year thus rendering these areas unsuitable for sampling.

Water Quality Study

The Service has no comment on the proposed water quality study.

Stream Gaging Study

3.6.3 Study Area (p. 87).

The Service recommends installing a stream gauge at the upper dam to verify the actual discharge during the study releases. In the long term, a permanent stream gauge should be installed here to continuously monitor release flows.

Lake Aquatic Habitat Fish Utilization Study

General comment:

A characterization of the forage base potentially available to juvenile sockeye salmon rearing in Eklutna Lake would strengthen this study. Seasonally available prey biomass could be compared to estimates from other sockeye salmon nursery lakes around Cook Inlet and elsewhere to put Eklutna Lake's potential for salmon production into context.

3.7.3.3 (p. 98). Task 3 Eklutna Lake Tributary Sampling.

(P. 93). "While Eklutna Creek and its forks are lower gradient, they are turbid with glacial sediment and likely have low productivity."

The Service suggests a habitat reconnaissance for clear water habitats within the east and west forks of Eklutna Creek. Glacial systems often contain clear water side channels associated with the mainstem braid plain which provide important spawning habitat for Pacific Salmon and may provide important rearing habitat (USFWS 2009).

3.7.4 Methodology.

(P. 101). "During summer survey events, each potential spawning area will be revisited to collect...specific conductance (microsiemens per centimeter) at the surface and just above the substrate."

Please clarify if the described measurement "just above" is based on the professional opinion of the data collection crew?

If a YSI instrument is used, will the probe be placed on the substrate or suspended above it by field staff?

(P105). "Ancillary data including fish condition, sex, if determined, and any injuries or mortalities observed will be recorded on field forms or tablets."

What values will be used to describe "fish condition"? What is the purpose for this data and how does it relate to the Goals and Objectives of the Study?

(P. 106.) "Start and stop times will be recorded to quantify sampling effort between surveys."

The Service recommends recording the time of applied electricity (i.e., electrofisher on-time) rather than start and stop times as a means to quantify sampling effort between surveys. This allows for a more accurate and precise comparison of sampling effort.

Lakeside Trail Erosion Study

The Service has no comment on the proposed lakeside trail erosion study.

Hydro Operations Modeling Study

The Service has no comment on the proposed hydro operations study.

Infrastructure Assessment Study

The Service has no comment on the proposed infrastructure assessment study.

Engineering Feasibility and Cost Assessment Study

The Service has no comment on the proposed cost assessment study.

Hydropower Valuation Study

The Service has no comment on the proposed hydropower valuation study.

Recreation Study

The Service has no comment on the proposed recreation study.

Wildlife Study

The Service has no comment on the proposed wildlife study.

Wetlands and Riparian Habitat Assessment

The Service has no comment on the proposed wetlands and riparian habitat assessment.

Cultural Resource Study

The Service has no comment on the proposed cultural resource study.

Fish Hatchery and Tailrace Assessment

The Service has no comment on the proposed fish hatchery and tailrace assessment.

References:

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Kiffney, P.M., C.M. Greene, J.E. Hall, and J.R. Davies. 2011. Tributary streams create spatial discontinuities in habitat, biological productivity, and diversity in mainstem rivers. Canadian Journal of Aquatic Sciences 63:2518-2530.

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