# Susitna-Watana Hydroelectric Project Document
# ARLIS Uniform Cover Page

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| **Title:**<br>Letter from Socheata Lor to Wayne Dyok, October 8, 2014, providing U.S. Fish and Wildlife Service's comments on the Initial Study Report for the Susitna-Watana Hydroelectric Project<br><br>*[Title devised by cataloger.]* | **SuWa 303** |
| **Author(s) – Personal:**<br>Socheata Lor (writer of cover letter) | |
| **Author(s) – Corporate:**<br>U.S. Fish and Wildlife Service. Anchorage Fish and Wildlife Field Office | |
| **AEA-identified category, if specified:** | |
| **AEA-identified series, if specified:** | |
| **Series (ARLIS-assigned report number):**<br>Susitna-Watana Hydroelectric Project document number 303 | **Existing numbers on document:**<br>20151005-5355 (FERC posting) |
| **Published by:**<br>U.S. Fish and Wildlife Service, Anchorage Fish and Wildlife Field Office | **Date published:**<br>September 22, 2014 |
| **Published for:**<br>Wayne Dyok ; Alaska Energy Authority | **Date or date range of report:** |
| **Volume and/or Part numbers:** | **Final or Draft status, as indicated:** |
| **Document type:**<br>Letter with attachments | **Pagination:**<br>4, 4, 2 pages |
| **Related work(s):**<br>Comments to: Initial Study Report. (SuWa 223) | **Pages added/changed by ARLIS:** |
| **Notes:**<br>Distributed also as a posting of FERC eSubscription to Docket 14241.<br>The attachments contain detailed information that supplements the comments in the letter. | |

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SUSITNA-WATANA HYDRO

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FISH AND WILDLIFE SERVICE
Anchorage Field Office
605 W. 4th Avenue, Room G-61
Anchorage, Alaska 99501-2250

In Reply Refer To:
FWS/AFES/AFWFO

SEP 22 2014

Mr. Wayne Dyok
Susitna-Watana Project Manager
Alaska Energy Authority
813 West Northern Lights Boulevard
Anchorage, Alaska 99503

FERC Project P-14241, Susitna-Watana Hydropower

Dear Mr. Dyok:

The U. S. Fish and Wildlife Service (Service) is providing comments on the Alaska Energy Authority's (AEA) June 3, 2014, Initial Study Report (ISR) for the proposed Susitna-Watana Hydropower project (Project). We provide AEA with our preliminary findings of concern so that they may be meaningfully considered prior to and discussed at the October, 2014 ISR meeting. The Service intends to provide full and detailed comments on these and other topics by the November 30, 2014, Federal Energy Regulatory Commission's (FERC) filing deadline.

As per the FERC Integrated Licensing Process (ILP; 18 CFR 5.15 (c)(2)), the ISR meeting scheduled in October, 2014, provides an opportunity for AEA and licensing participants to discuss the 2013 studies and identify potential modifications to study designs based on the first year's data collection. The process allows for review and recommendation of changes to sampling methodologies implemented by first year studies to ensure study objectives, as specified in the FERC-approved Revised Study Plans (RSP), are met. Our filing to FERC by November 30, 2014, will formalize our comprehensive comments and recommendations after AEA has had the opportunity to address our concerns during the October, 2014 ISR meeting.

The Service has identified three topics of significant concern: 1) data collection and reporting, 2) effective model integration, and 3) development of decision support systems (DSS). These three topics are closely tied together because precise and accurate data provide inputs to models that are used to support Project decision-making.

In these preliminary comments, the Service identifies data collection and reporting concerns (Attachment I) and recommends the data issues be resolved as soon as possible. Without robust data from individual studies, we are concerned the data do not meet study objectives, that model validation will be hindered, and model integration may lead to incorrect conclusions. Given the magnitude of our concerns related to data collection and reporting, we believe it may not be

possible to yield plausible model predictions describing baseline conditions or to predict potential impacts. It is important that these issues be resolved prior to conducting additional field studies.

Much of the data collected under FERC approved study plans are proposed for use in fish habitat models, and the development of those models are based on changes to channel geomorphology and hydrology. Relationships among hydrologic models should be validated and models calibrated for the Susitna River system before their use in fish habitat models. Likewise, relationships among fish habitat models should be validated, and models calibrated for the Susitna River system prior to their use in estimating Project effects under various operational scenarios. To our knowledge there is currently no specific model integration process proposed that will ensure sound relationships among models and their accurate calibration for the Susitna River system. The Service believes that development and implementation of rigorous model integration procedures is critical to our review of this project and we discuss our preliminary concerns in detail (Attachment II).

A DSS is one of the end products of the studies, where data and models from the studies are ultimately used to help make decisions on the effects of the Project on natural resources. We understand AEA intends to develop a DSS using a manual matrix method by early 2015 (FERC 2013). As the DSS plays such an important role in the assessment of Project impacts, the Service requests its development be a collaborative process so that the fundamental objectives, assumptions, critical inputs, weighting methods, and other parts of the model are mutually agreed upon. Furthermore, we are concerned that the timeline for DSS development is lagging other efforts. The ILP process is founded under the principal of early identification of potential issues and conducting studies needed to fill information gaps (FERC 2014). Data gaps may be revealed once the fundamental objectives for the DSS are formulated. Until the DSS development process occurs, it is uncertain all the data needed to implement the DSS has been gathered. Because the DSS is not scheduled for development until 2015, it is distinctly possible that crucial new data needs may be revealed when updated study reports are filed by AEA in 2016 (as per the ILP extension approved by FERC on January 28, 2014). However, going forward, the Service believes the development of a collaboratively designed DSS is of great importance to this Project and recommends that, if practicable, the timeline for its development be accelerated.

Finally, FERC established a new schedule for the proposed Susitna-Watana hydroelectric project ILP in their January, 2014 determination. In that determination, FERC ordered AEA to submit final ISRs on June 3, 2014, for stakeholder review, to hold a meeting in October, 2014, to present results of those ISRs, and to discuss AEA proposed changes to the studies or those proposed by other licensing participants. During a meeting with the Service and National Marine Fisheries Service on September 2, 2014, AEA stated its intent to release reports from 21 new or continued studies conducted in 2014, with intent to discuss results at the October 15, 2014, ISR meeting. On September 17, 2014, AEA filed 10 of 21 reports to FERC. Because the data were gathered outside timelines specified by the FERC-ordered process, and given the limited review

time the Service will have, we will be unable to consider and comment on those study reports in advance of the October, 2014 ISR meeting. Furthermore, we recommend AEA dedicate the limited time at the October, 2014, ISR meeting to discuss concerns related to 2013 studies, as reported in the June 3, 2014, ISR. Additionally, an email on May 6, 2014, copied to the Service by FERC, indicated that studies carried out by AEA in 2014 were conducted outside of the ILP process and would not be considered "second year" studies. This is procedurally very important because neither the Service, nor other licensing participants (Non-Governmental Organizations (NGO) Participants 2014), will have the opportunity to fully review or comment on the design and implementation of the 2014 studies. The Service will be unable to meaningfully contribute to the discussion of the 2014 studies and urge AEA to not discuss any work conducted in 2014 at the ISR meeting. Instead, we suggest the interim results gathered between study years (i.e., 2014 data collection) be discussed at the next quarterly Technical Workgroup meeting, once we have had sufficient opportunities to review those additional data.

**Summary**

This letter describes some of the Service's concerns with studies reported in the June 3, 2014, ISR, and we are providing them to AEA prior to the November 30, 2014, FERC filing deadline so some issues can be discussed and resolved in a timely manner. The concerns address: 1) data collection and reporting, 2) ability to recommend further studies under the FERC ILP licensing process, 3) development of valid models to assess baseline conditions and effects from Project operations on fish and wildlife resources, 4) capacity to formulate recommendations under section 10(j) of the Federal Power Act for protection, mitigation, and enhancement measures associated with the Project, and 5) formulation of informed decisions pursuant to our Section 18 Fishway Prescription authority under the Federal Power Act. We believe the modified ILP schedule for the Project affords AEA the opportunity to make necessary changes to studies prior to entering the second year of study. The Service believes this review process accommodates the development and implementation of more accurate, effective, and cost-effective plans of study for the Project.

Thank you for the opportunity to submit these comments in advance to the October, 2014 ISR meeting. We hope they are useful to AEA and will generate valuable conversations at the meeting. If you have questions, please contact Ellen Lance (907) 271-1467.

Sincerely,

Socheata Lor, Ph.D.
Anchorage Field Supervisor

Cc: Sarah Goad, AIDEA
Betsy McGregor, AEA
Nicholas Jayjack, FERC
Joe Klein, ADFG, Sport Fish Division
Jeanne Hansen, NMFS
Sue Walker, NMFS
Mike Bethe, ADFG, Habitat Division
Matthew LaCroix, EPA

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[NGO Participants] Wood, M., W. Wolff, J. Konigsberg, M. Wood, R. Schryver, J. Seebach (collectively the NGO Participants). 2014. Initial Study Report Meeting, Susitna-Watana Hydroelectric Project (P-14241). Letter filed with FERC, September 16, 2014.

[USFWS] U.S. Fish and Wildlife Service. 2013. Letter to FERC Re: Alaska Energy Authority's Revised Study Plan for the Susitna-Watana Hydroelectric Project No. 14241-000. March 18, 2013.

**Attachment I. Data Issues**

Below we discuss our preliminary concerns relating to deviations from study plans, quality assurance and control, and statistical practices and procedures for the 2013 study year.

Deviations From Study Plans – Deviations from established sampling designs occurred in some studies for various reasons, and in some cases resulted in reduced sample size or compromised reliability of data. Below we provide examples.

- As currently planned, some two-year studies cannot be completed because access to all Focus Areas (FAs) was not granted until after the first study year (e.g., ISRs 8.5, 9.6, 9.7, 9.9). For example, a fish wheel was not installed and fish were not tagged near the entrance to Devil's Canyon (e.g., ISR 9.7).

- Anomalous weather conditions prevented or delayed fieldwork on aquatic studies (e.g., ISR 8.5), resulted in late installation of migrant traps, which were likely influenced by environmental conditions associated with late breakup (e.g., ISR 9.6). Moreover, juvenile salmon distribution and abundance measured in 2013 were likely affected by the record fall floods in 2012 (e.g., ISR 9.6).

- Sampling has not been *temporally* adequate across all seasons. ISR 9.6 reports winter fish sampling did not occur across all FAs as proposed; early spring sampling occurred only in three FAs; initial sampling following breakup and installation of migrant traps did not occur until the middle of June, and therefore, spring sampling for fish distribution and abundance was not conducted (e.g., ISRs 7.5, 8.5, 8.6). The extent to which fishes move must be described through sampling; multiple sampling days across all seasons are required to capture the full seasonality of a fish's life-history strategy, which varies considerably within a single season. A single-day of sampling is insufficient to understand the habitat associations of different fish species with differing mobility and life-stages.

- Sample site selections for integrated studies were inconsistently co-located. For example, invertebrate sampling locations (ISR 9.8) were not co-located with fish sampling locations (ISR 9.6). Failure to co-locate sampling sites risks the magnification of data discrepancies, and because the data will be used as inputs for predictive models, may jeopardize the validity of the models.

- Detection arrays did not cover the entire channel and tagging efforts did not allow for detection of fish migrating upstream, therefore the data were biased and efficiency estimates cannot be calculated. Detection rate and recovery of passive integrated transponder (PIT) tags is insufficient to yield useful data to meet study goals and objectives (ISR 9.6).

- Fish targets for fish Habitat Suitability Curve (HSC) sampling were not met (e.g., ISR 8.5), therefore, power to assess fish habitat-preferences and relationships is reduced.

- Data collected on fish habitat for the Fish Passage Barrier Study (ISR 9.12) and the HSI/HSC component of the fish and aquatic Instream Flow Study (ISR 8.5) were gathered at incompatible spatial scales to meet the study objectives.

Quality Assurance and Control Concerns - Below we preliminarily provide some discrete examples where the Service has data quality concerns. Poor data quality has a rippling effect throughout this assessment process because extrapolating inaccurate results throughout the river would amplify errors across the river and associated habitat.

- Water quality samples were qualified as either estimated or rejected by the analytical laboratory due to quality-related failures (ISR 5.5). Issues included failure to deliver samples to the laboratories within the method-specified temperature range; failure to meet procedure specified holding times; contaminated or missing field, trip, and method blanks; and Chain of Custody and bottle labeling discrepancies. AEA proposed to apply a correction factor to the 2013 data to render it useable, but provided no details on how that would be done.

- There is evidence that juvenile salmon may have been misidentified. A comparison of juvenile fish collections from the Susitna River in the 1980s (Alaska Department of Fish and Game 1983 as cited by R2 Consultants in the Fish Population Summary Document), local Alaskan rivers (Alaska Department of Fish and Game, unpublished data; Davis et al. 2013), recent studies on the Susitna River (Kirsch et al. 2014), and nearby tributaries (Miller et al. 2011), signal substantial differences in total fork length distribution and habitat associations among juvenile salmon from that which is expected. Large numbers of unidentified salmonid juveniles (some of which were PIT tagged), anomalous length distributions and questionable habitat associations decrease our confidence in the accuracy of species identification. For example, juvenile Chinook salmon measuring 150 mm fork-length were reported, juvenile Chinook salmon were reportedly most abundant in beaver ponds, there was absence of pink salmon in any samples, and a disappearance of sockeye salmon from Indian River between the February draft ISR and the June draft ISR. We have strong reservations about the identification of these juvenile fish, and suspect many juvenile salmons identified as Chinook salmon may be coho salmon.

- Information used to describe fish/habitat preferences were gathered using professional best judgment, literature, and limited field data, but were not confirmed with an adequate sample from the Susitna River system (ISR 8.5). Fish/habitat data gathered from the Susitna River is necessary to identify preferential use of the habitats. It is vital that these data are accurate as they will be used to: 1) develop Habitat Suitability Indices (HSI) and Habitat Suitability Criteria (HSC); 2) describe fish-macrohabitat relationships, which may be used to evaluate project effects; 3) validate the Instream Flow Study (8.5) habitat model predictions; and 4) extrapolate results from FAs to geomorphic reaches and river segments. Ultimately the data will be used to develop protection and mitigation measures and to provide a basis for post-project monitoring.

- The Service is concerned about AEA's proposal to "scale up", and requests rationale for its implementation (Riverine Model Integration Meeting 2013). "Scaling up" is only

appropriate when the sampling is conducted accurately, in a random fashion throughout the population, and at a scale relevant to resource concerns. To assess impacts from the Project on fish resources, sampling effort must be at a scale relevant to Susitna River fish species at various life stages in order to adequately quantify baseline conditions with the accuracy required for accurate extrapolation. For example, incorrect fish identification and would lead to imprecise and inaccurate extrapolation of species-specific habitat associations.

Statistical Practices and Procedures – Based on our preliminary reviews, we note (below) failures to report standard statistical procedures and calculations required for complete analyses.

- Standard error was not reported for stated relationships between species of juvenile salmonids at various life stages and their habitat (e.g., ISRs 9.5, 9.6). A robust assessment of statistical results must include calculations for standard error.

- Assumptions for the estimating numbers of Chinook salmon migrating above Devils Canyon were not clearly specified and the standard error of that estimate was not reported (e.g., ISRs 9.6, 9.7).

- Sampling and non-sampling errors were not clearly stated (e.g., ISR 9.7). Sampling error is the error resulting from sampling only a part of the population and not the whole population. Non-sampling errors are those errors resulting from selection bias, systematic non-representativeness of samples, and transcription or recording errors. Sampling error is usually quantified and reported with confidence intervals or standard errors and related to *precision* of the estimates. Non-sampling errors are harder to recognize, yet very important, and more closely related to the *accuracy* of the estimates. Sampling errors must be clearly accounted for in statistical analyses to assess data reliability and interpret results.

- Consistent fish sampling methods were not applied (i.e., different gear types used, different effort was applied within and across sampling units, concurrent use of non-compatible gear types within a sampling unit). This resulted in inability to estimate sampling error because (e.g., ISR 9.6) inconsistent sampling methods resulted in individual datasets that are not comparable.

- No power analysis was reported (ISR 9.14), and it is unclear how sample size for both adult and juvenile Chinook salmon was determined. Based on the number of genetic markers sampled and the magnitude of genetic divergence measured in the population documented thus far, a power analysis would inform determination of the number of samples needed to provide a robust estimate of genetic diversity. Furthermore, three years of samples may not be adequate to characterize genetic diversity among a species with a life cycle of five to seven years; this limitation must be addressed in the study results.

- Samples from presumed siblings were proposed for removal from the genetic analyses (ISR 9.14). Only if the samples have been collected in a non-random way may this method be justified. Purging related animals as proposed will bias the results. Furthermore, ISR 9.14 proposes to exclude samples from juvenile Chinook salmon if they show significant differences in allele frequency from adult Chinook salmon. Using all data will produce a more robust estimate of allelic frequencies across the entire population.

- Using a Bonferroni adjustment on the tests for Hardy-Weinberg Equilibrium (ISR 9.14) will increase the risk of a Type-2 error and reduce the statistical power of the test to detect a difference. Furthermore, estimates of genetic distance using $F^{st}$ must include a correction for sample size otherwise small samples tend to look like outliers (ISR 9.14).

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Riverine Model Integration Meeting. 2013. AEA meeting minutes. November 2013.

**Attachment II. Model Integration**

Model integration is the manner in which all of the physical studies interact to assess baselines and Project impacts on the Susitna River. Within the ISRs, methodologies for model integration are not transparent and it is not possible to determine if model integration will identify project impacts with any degree of certainty.

As previously stated by the Service (USFWS 2013), we are concerned that time allotted to develop methods for model integration is inadequate. Prior to the release of the June 3, 2014, ISRs, a three-day Riverine Modeling Integration Meeting (RMIM) was held (November 13-15, 2013). The goal of this meeting was to provide a forum to review and discuss various riverine-related modeling and study integration efforts (AEA Instream Flow Study-Technical Team [ISF-TT] Riverine Modeling Integration Meeting Agenda, 2013). A collaborative meeting such as this one was a good effort toward developing meaningful model integration methods and the Service encourages AEA to continue this type of cooperative work.

During the RMIM, 25 and 50-year scenarios for predicting project impacts to the physical river channel and habitats were proposed. While those timelines are consistent with what is specified in RSP and may present a manageable timeframe for the modeling work (B. Fullerton, Personal Communication, November, 2013), they may not be sufficient to assess impacts to fish and wildlife resources in a biologically meaningful way.

The Service is concerned the modeling capability to answer biological questions is not sensitive enough to detect biologically meaningful changes to species and habitats likely to be affected by project operations. We recommend that modelling capabilities be developed that incorporate biological inputs and deliver outputs that are validated under an appropriate range of operational scenarios (e.g., base load, ecological flows, load-following, run-of-river). The temporal scales (e.g., 25, 50-year) must have biological relevance. For example, 5, 10 and 15 year operational scenarios should be considered to demonstrate the model's ability to detect generational impacts to fish populations and habitat persistence (e.g., Susitna River Chinook salmon; five to seven years).

Data collected for some studies do not provide the information needed for the proposed integrated modeling efforts. During the RMIM, for example, it was revealed the Water Quality Modeling study (ISR 5.6) would require data collected on the spatial distribution of groundwater discharge to surface water bodies. Analytical or numerical groundwater flow simulation would be one (of several) ways to satisfy this input requirement. However, the Groundwater Study (ISR 7.5) does not explicitly state analytical or numerical groundwater flow simulations would be undertaken in support of the other physical process models.

As a follow up to the RMIM, a Proof of Concept (POC) meeting was held April 15-17, 2014. This meeting was to: 1) confirm successful integration of models and associated metrics in a single FA (Slough 128); 2) examine the modeling process rather than focus on the actual POC results; and 3) clarify many questions related to the integration of multiple models. The discussions of modeling processes at the POC meeting was considered valuable by the Service, but not fully effective in demonstrating successful model development and integration; many

questions regarding model development and integration were unanswered. To develop greater stakeholder confidence in the models, the Service recommends conducting a formal model integration meeting to: 1) establish a model development process, 2) develop an understanding of inputs and outputs, 3) demonstrate conceptual linkages, 4) demonstrate the predictive capabilities of the models, and 4) conduct sensitivity analyses to better understand model limitations and reduce uncertainty.

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