Susitna-Watana Hydroelectric Project Document
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Notes: Distributed also as a posting of FERC eSubscription to Docket 14241. The enclosures contain detailed information that supplements the comments in the letter.	

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SUSITNA-WATANA HYDRO

ALASKA ENERGY AUTHORITY

October 7, 2014

James W. Balsiger
Administrator, Alaska Region
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

Re: Susitna-Watana Hydroelectric Project, FERC Project No. 14241-000

Dear Mr. Balsiger:

The Alaska Energy Authority (AEA) is in receipt of a letter from the National Marine Fisheries Service (NMFS) dated September 22, 2014,[1] in which you provide comments on portions of the Initial Study Report (June 3, 2014) (ISR) for the proposed Susitna-Watana Hydroelectric Project, Federal Energy Regulatory Commission (FERC) Project No. 14241 (Project). Your letter raises a number of what it refers to as "issues with the data," including alleged questionable data collection methods, absence of quantitative analysis, and inappropriate scale of data collection, among others. You opine that these supposed anomalies mean that "it is not plausible that the data for predictive modeling be used to describe baseline conditions or to predict potential impacts," and that "these issues must be resolved prior to conducting additional field studies." In other words, you believe we are at a standstill.

Frankly, for NMFS to take the position that the massive amount of scientific data AEA has collected and summarized in the ISR is unreliable is untenable, bordering on the absurd. As documented in the ISR, AEA was largely successful in implementing the FERC-approved study plan in 2013. This effort included, among many other studies, a large-scale field effort for fishery studies with a suite of 10 studies covering more than 200 sampling sites across more than 200 miles of river, with sampling occurring during not only the open water period but also during winter and spring periods. Your letter, however, focuses on the limited exceptions in which AEA's data collection varied from FERC-approved study plan methods during the 2013 field season. These variances, as we all know, occurred mostly due to private land access issues, and conditions in the field such as the late ice breakup in the spring of 2013. The ISR includes a detailed description of proposed modifications to the study plan to account for these variances.

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[1] Letter from James W. Balsiger, National Marine Fisheries Service, to Wayne Dyok, Alaska Energy Authority, Project No. 14241-000 (filed with Federal Energy Regulatory Commission on September 23, 2014).

Noticeably absent from your letter is any critique or analysis of AEA's proposed modifications, or any alternative method that would help achieve study plan objectives in light of the variances.

AEA also takes exception to any suggestion that it has not implemented the FERC-approved study plan in a professional manner. The fisheries field work was led by nationally renowned experts in their respective fields, representing five independent contractors, all with significant hydropower licensing and Alaska experience. The field technicians employed by these contractors are highly qualified, and many have advanced degrees from the University of Alaska-Fairbanks and University of Alaska-Anchorage. In contrast, NMFS's generalized comments either ignore the data and analysis presented in the ISR, or reflect a fundamental lack of understanding of the methodologies being relied upon by the FERC-approved study plan, which NMFS helped develop.

For example, NMFS asserts that AEA has misidentified or was unable to identify juvenile fish species in its field sampling efforts. As you should know, all field identifications of juvenile salmon are subject to error due to the inherent variations in each species' distinguishing characteristics at those life stages. Your letter claims we have an unacceptable level of error because the juveniles we identified as Chinook salmon in our samples were too large, and too many were found in sloughs or with beaver ponds. We instructed our crews to make field calls based on the physical characteristics used for distinguishing coho and Chinook salmon, not on their size or where they were found. There are several possible explanations for why larger juveniles might be found in the sloughs, including displacement during the 2012 fall flood, or during 2013 spring flooding at breakup, or as a result of ice processes. Simply to dismiss the possibility that these fish were Chinook because of where they were found would have been unscientific. You also cite an unusually large number of unidentified juveniles in our sampling. Our field crews followed instructions per AEA's Quality Assurance/Quality Control (QA/QC) measures that, when unable to make a call in the few seconds that is safe to hold a juvenile fish out of water, they should subsample in a location by photographing juveniles and collecting genetic samples and voucher specimens. The senior scientists from our study team and Alaska Department of Fish and Game staff review these photographs, genetic samples, and vouchers to verify field identification. Some unidentified salmon calls remain at some sites, but these are not material to the objectives of relevant studies (Studies 9.5 and 9.6).

Under the FERC-approved study plan (Studies 8.5, 9.5, and 9.6), the purpose of this particular data collection effort is to determine the distribution of fish species within different aquatic habitats. This information will be used as inputs to habitat models. Whether a specific juvenile salmon is correctly identified as coho versus Chinook salmon will have no bearing whatsoever on the outcome of the habitat modeling because these models will consider all life stages of all five of the Pacific salmon species present in the Susitna basin. With respect to coho and Chinook salmon, the habitat suitability criteria

for the rearing life stages of these species substantially overlap, ensuring that the model will adequately characterize the most protective habitat for both species.

Your letter also contains a number of outright errors and instances in which you ignore available information. Among these, your letter states that there was an "absence of pink salmon in any samples." However, pink salmon counts are reported in several tables in the ISR. Your letter also states that AEA did not include estimates of relative abundance, yet relative abundance is presented in the ISR in text and detailed tables of "catch per unit effort." Your letter states that fish passage criteria have not been developed—they have been developed, and reviewed with licensing participants including NMFS at the March 19, 2014 fish barriers technical meeting.

Attached to this letter is a comment-response table that addresses in detail each of the comments in your September 22 letter. I think you will agree, on careful review of our responses, that the 2013 study program provides a solid foundation of data upon which we can continue to build.

AEA remains committed to implementing the comprehensive suite of studies proposed in the FERC-approved study plan and encourages NMFS to work with us in good faith in studying the feasibility of and potential effects associated with an undertaking that is critically important to Alaskans. If you have questions or comments concerning this matter, please feel free to contact me directly at (907) 771-3955.

Sincerely,

Wayne M Dyok

Wayne Dyok
Project Manager
Alaska Energy Authority

Attachment

Cc: Distribution List
Samuel D. Rauch III
Jeff Wright
Ann Miles
Vince Yearick
Dr. Jennifer Hill
Nick Jayjack

AEA'S RESPONSE TO NMFS SEPTEMBER 22, 2014 ISR COMMENT LETTER

OCTOBER 7, 2014

Comment Page Para	Comment Number	Comment	Response
Page 4[1] Para 5	1	1) Habitat classification has not been completed;	This comment ignores the data and analysis presented in the ISR. Remote habitat classification was completed in 2013, as presented in Study 9.9 ISR Sections 5.1 and 5.2, and Study 6.5 ISR Section 5.4 and Part 2 of 3 Figures. Land access restrictions resulted in a delay to complete the field surveys to ground-truth remote classification. The variance regarding delay in the ground-truthing study component was addressed in Study 9.9 ISR Section 4.2.4. The schedule for completion of the ground-truthing surveys was presented in 9.9 ISR Section 7.2. All field work was completed in 2014 as described in the 2013 and 2014 Aquatic Habitat Mapping Field Season Completion Progress Technical Memorandum that was filed with FERC on September 17, 2014.
Page 4 Para 6	2	2) Fish passage criteria have not been developed;	AEA disagrees. With respect to Study 9.12 Fish Passage Barriers, AEA proposed leaping, depth, and velocity criteria. AEA reviewed this criterion with the Licensing Participants during Interdisciplinary Fish Barriers Technical Meeting on March 19, 2014.
Page 4 Para 7	3	3) Fish sampling study plans were not followed; sampling units were inappropriately subsampled;	This comment ignores the data and analysis presented in the ISR. The Fish Distribution and Abundance Study Plan Determination and Final Implementation Plan (filed April 1, 2013) were implemented by AEA field crew. However, as noted and explained in Study 9.5 ISR Section 4.4.4, there were variances to the plan methods that occurred during implementation, including sub-sampling GRTS panels and transects sites in the Upper River, as a result of conditions in the field. NMFS does not acknowledge the reason for the variances or AEA's proposed modifications to account for them, nor does it explain why subsampling was inappropriate in the circumstances. AEA conducted additional analysis of the data collected in the Upper River and proposed modifications in Study 9.5 ISR Section 7.1.2 to ensure that the data will meet all Study 9.5 objectives. This information also was presented in a Fish Technical Meeting on March 20, 2014 and input from stakeholders including NMFS was solicited. The modifications, as proposed in Study 9.5 ISR Section 7.2, were implemented in 2014 to collect data supplemental to the 2013 field effort. The results of the 2014 surveys were summarized in the Proposed 2015 Modifications to Fish Distribution and Abundance Study Plan Implementation Technical Memorandum filed with FERC on September

[1] Page and Paragraph Numbering:
- Partial sentences at the top of a page are considered Sentence 1.
- Partial paragraphs at the top of a page are considered Paragraph 1.
- Paragraphs are numbered by their position on a page, not within a Section.
- Paragraphs are blocks of text separated by hard returns; each heading, bullet, and item in a numbered list is considered one paragraph.

Comment Page Para	Comment Number	Comment	Response
			17, 2014.
Page 4 Para 8	4	4) Fish sampling locations did not incorporate FERC recommendations;	This comment ignores the data and analysis presented in the ISR. Fish sampling locations followed the FERC recommendations where feasible. As explained in Studies 9.5 and 9.6, there were some variances due to field conditions and land access limitations. These variances did not affect the quality or the integrity of the data collected, or the ability to meet study plan objectives.
Page 4 Para 9	5	5) Because the fish sampling did not follow the sampling plan, this resulted in an inability to estimate relative fish abundance;	AEA disagrees that variances from the sampling plan identified in Comments 3 and 4 resulted in an inability to obtain accurate estimates. See answers to Comments 3 and 4. Estimates of relative abundance are reported in Study 9.5 ISR Sections 5.1.2, 9.5, and Appendix E (Upper River Fish Observations and Relative Abundance 2013) as well as Study 9.6 ISR Section 5.1.2 and Appendix E (Relative Abundance Tables).
Page 4 Para 10	6	6) Fish seem to have been identified incorrectly;	Please see below for responses to specific comments concerning fish identification.
Page 4 Para 11	7	7) Data were collected and reported at inappropriate mesohabitat scales;	This comment ignores the data and analysis presented in the ISR. Fish Distribution and Abundance (FDA) data were collected and reported at meso- and macro-habitat scales consistent with the study plan (Study 9.5 ISR Section 4.4.2 and Study 9.6 ISR Section 4.4.2). Based on USFWS comments, Comment 7 appears to be specific to the Barrier Study (Study 9.12) and the HSI/HSC component of the IFS Study (Study 8.5). The Fish Barriers and IFS studies are collaborating, regarding target species, passage criteria, and sampling locations. This will ensure that the model outputs from IFS are useful for analysis of passage barriers.
Page 4 Para 12	8	8) Sampling sites among studies were not co-located;	This is incorrect; the sampling sites were co-located. This comment ignores the data and analysis presented in the ISR. AEA's selection of sampling sites was consistent with the River Productivity Implementation Plan. As presented in the River Productivity Implementation Plan Section 2.1: "All stations established within the Middle River Segment will be located at Focus Areas established by the Instream Flow Study (AEA 2012, Section 8.5.4.2.1.2), in an attempt to correlate macroinvertebrate data with additional environmental data (flow, substrates, temperature, water quality, riparian habitat, etc.) collected by other studies (e.g., AEA 2012, Section 5.5, Baseline Water Quality), for uses in statistical analyses, and HSC/HSI development. Furthermore sites for Fish Distribution and Abundance, Habitat Suitability Criteria, and River Productivity were all co-located within Middle River Focus Areas. In 2013, private land access restrictions prevented fish sampling in some desired locations, yet River Productivity sampling was able to be conducted because the sites for that study were located in mainstem and within ordinary high water. Maps depicting the co-locations of sampling sites among these three studies will be presented in the October 15, 2014 ISR meeting.
Page 4 Para 13	9	9) Tagging goals were not met;	This comment ignores the data and analysis presented in the ISR. Tagging goals were generally, but not precisely, met for every location and species in the Escapement Study in 2013 (9.7 Section 4.1.4). These few discrepancies do not affect the quality or the integrity of the data collected. In the Lower River, the targets were 700 Chinook salmon, 600 coho salmon, and 200 pink salmon. Actual tagging

<table>
<tr><th>Comment Page Para</th><th>Comment Number</th><th>Comment</th><th>Response</th></tr>
<tr><td></td><td></td><td></td><td>numbers were 698 Chinook salmon, 596 coho salmon, and 197 pink salmon. At the Yentna, 690 Chinook salmon were tagged as compared to the 700 fish target. In the Middle River, tagging targets were met for all salmon species except sockeye; 139 sockeye were tagged out of the 200 fish target.

For resident species tagging target in Studies 9.5 and 9.6, the study plan indicated that "the goal is to implant 30 radio transmitters per target species" and the winter movement objective specified "up to 30" fish as the target for burbot, humpback whitefish and round whitefish. In 2013, progress was made toward these goals as indicated in Study 9.6 ISR Section 4.5.2 and Study 9.6 ISR Section 4.5.2. Further progress toward the tagging goals was made in 2014 and will be presented at the ISR meeting on October 15, 2014.</td></tr>
<tr><td>Page 4
Para 14</td><td>10</td><td>10) Fish targets for HSC sampling were not met;</td><td>This comment ignores the data and analysis presented in the ISR and reflects a fundamental lack of understanding of the methodologies being relied upon by the FERC-approved study plan. The targets pertain to the total number of HSC data points collected over the entire licensing study period, not one field season. Absolute target numbers were not established for HSC data collection (see RSP 8.5.4.5.1.1.5) for the first year of study, or the licensing study period in general. The FERC-approved Study Plan noted that: "If possible, a minimum of 100 habitat use observations will be collected for each target species life stage. However, the actual number of measurements will be based on a statistical analysis that considers variability and uncertainty. While information will be collected on all species and life stages encountered, the locations, timing, and methods of sampling efforts may target key species and life stages identified in consultation with the TWG." This was discussed during several TWG meetings where it was emphasized that the approach AEA is taking in developing HSC curves will include several components, including collection of new site specific data, which is AEA's and agencies preferred approach, as well as other approaches for species or life stages infrequently encountered. AEA listed those in RSP 8.5.4.5.1.1 and included use of existing site specific data collected during the 1980s studies, use of site specific data from other similar Alaska systems, as well as professional opinion.

A summary of HSC collection efforts to date is provided below. As noted, there are a number of species for which the numbers of observations have exceeded 100, including those for Chinook salmon juvenile, Chum fry and spawning, Coho fry, Sockeye fry and spawning, Arctic Grayling fry, and whitefish fry. These species and life stage mixes reflect the majority of the target species and life stages that are central to the habitat-flow modeling for evaluating Project effects.

<table>
<tr><th>Species</th><th>Lifestage</th><th>2013</th><th>2014 Through July</th><th>Project Total</th><th>1980s Total</th></tr>
<tr><td>Chinook</td><td>Fry</td><td>54</td><td>164</td><td>218</td><td></td></tr>
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	Juvenile	38	25	63	
Chum	Fry	14	258	272	
	Spawning	348		348	333
Coho	Fry	99	181	280	
	Juvenile	56	28	84	
Pink	Fry	0	39	39	
	Spawning	59	0	59	NR
Sockeye	Fry	79	299	378	
	Spawning	181		181	81
Arctic Grayling	Fry	113	7	120	
	Juvenile	43	9	52	
	Adult	4	4	8	140
Burbot	Juvenile	2	4	6	
	Adult	17	3	20	18
Dolly Varden	Fry	20		20	
	Adult	1	1	2	2
Longnose Sucker	Fry	41	46	87	
	Juvenile	52	27	79	
	Adult	70	3	73	157
Rainbow Trout	Juvenile	5	2	7	
	Adult	6	1	7	143
Whitefish	Fry	39	73	112	
	Juvenile	39	15	54	
	Adult	29	4	33	384

Additional HSC/HSI sampling is planned for the next year of study and it is anticipated that most

Comment Page Para	Comment Number	Comment	Response
			HSC relationships will be updated. However, for species and life stages that are rarely observed, final HSC curves may be based on additional data, including utilization data from 2012 and the 1980s studies on the Susitna River. Even then, there may still be some species where few or no empirical HSC/HSI data were able to be collected. In those cases, AEA will consider other methods for developing curves. This may include the use of literature based curves, developing envelope curves (see, for example, Jowett et al. 1991, and GSA BBEST 2011), guilding (e.g., creating a combined HSC/HSI curve representing multiple species and/or life stages; see, for example, Vadas, Jr. and Orth 2001, GSA BBEST 2011), developing curves based on expert opinion/round table discussions) and the use of Bayesian statistical methods for updating data distributions (see, for example, Hightower 2012).
Page 4 Para 15	11	11) The mainstem upper river migrant fish trap was not installed;	This comment ignores the data and analysis presented in the ISR. This variance was identified in Study 9.5 ISR Section 4.1.6.2 due to lack of access to areas above the ordinary high water mark. AEA completed this task in 2014 as described in Study 9.5 ISR Section.7 and TM for Study 9.05.
Page 4 Para 16	12	12) A fish wheel was not installed, and fish were not tagged near the entrance to Devils Canyon;	This comment ignores the data and analysis presented in the ISR. This variance was described in Study 9.7 ISR Section 4.1.8.1. This change in tagging location was compensated for by increased fishwheel effort and an increase in tagging targets at the Curry fishwheels.
Page 4 Para 17	13	13) Additional problems associated with late installation and operation of migrant traps were likely influenced by environmental conditions associated with late breakup; and	Downstream migrant traps were installed and operated as indicated in the Study 9.5 ISR Section 9.5.4.4.10 and Study 9.6 ISR Section 9.6.4.4.10: "flow conditions permitting, traps will be fished on a cycle of 48 hours on, 72 hours off throughout the ice-free period." As soon as break-up and flow conditions allowed in mid-June 2013 traps were fished immediately upon installation in June through mid-October 2013. In 2014 breakup occurred earlier and migrant traps installation occurred in mid-May with traps operated immediately after installation (the Proposed 2015 Modifications to Fish Distribution and Abundance Study Plan Implementation Technical Memorandum filed with FERC on September 17, 2014).
Page 4 Para 18	14	14) Juvenile salmon distribution and abundance in 2013 were likely affected by the record fall floods in 2012.	AEA agrees that floods can affect juvenile salmonid abundance. While the fall 2012 floods did not approach the magnitude of the flood of record, they potentially distributed juvenile salmonids into lateral habitats that may not otherwise be occupied during a low water year. AEA believes that the range of hydrologic events that occur over the multi-year study period provide opportunities to better understand the response of aquatic resources to flow fluctuations.
Page 4 Para 20 – Page 5 Para 1	15	The actual implementation of the abundance sampling program did not follow the statistical models used to select sampling units. In particular, subareas (mesohabitats) within selected areas were 'randomly' selected for subsampling, and sampling was not consistent between sampling events	AEA disagrees. This comment reflects a fundamental lack of understanding of the methodologies being relied upon by the FERC-approved study plan. The random selection of meso-habitat units within GRTS selected panel sites and at transects was implemented as proposed in the Fish Distribution and Abundance Implementation Plan filed with FERC on March 1, 2013. The use of different gears consistent with habitat characteristics was implemented as proposed in the Fish Distribution and Abundance Implementation Plan filed with FERC on March 1, 2013 with

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		(different gears, different effort, different order of gears, different total area sampled, etc.). Sampling error in the fish distribution and relative abundance studies needs to be accounted for in order for these studies to accurately estimate fish distribution and abundance. Estimates of numbers of Chinook salmon that migrate above Devils Canyon need to include the assumptions, standard error, and resulting statistical confidence intervals associated with that estimate. Better descriptions of (and statistical accounting for) both sampling and non-sampling errors need to be provided. The data used to describe fish-habitat association preferences and the standard errors associated with those species and life-stage habitat correlations need to be validated, as this analysis proposes to describe macrohabitat relationships for fish. These relationships will be used to evaluate project effects, to validate instream flow habitat model predictions, and to extrapolate results from focus areas to geomorphic reaches and river segments. Ultimately these data will be used to develop protection and mitigation measures and to serve as a basis for post-project monitoring.	modification described in Study 9.5 ISR Section 4.4.4 and Study 9.6 ISR Section 4.4.4. AEA disagrees that sampling error will impact AEA's ability to meet objectives of fish distribution and abundance sampling for Studies 9.5 and 9.6. The fish distribution and relative abundance methods were implemented consistent with Studies 9.5 and 9.6 RSPs, the Fish Distribution and Abundance Implementation Plan, and FERC's SPD. As described in RSP Section 9.7.4.1.5 (Objective 1) and Section 9.7.4.6 (Objective 6), AEA planned to examine fish on selected spawning grounds (e.g., Indian River) in part to establish mark rates (proportion of fish tagged) so that inferences could be made about the representativeness of tagging across stocks. In addition, AEA stated that mark rates from these areas can be used to estimate the abundance passing the tagging sites (but not the abundance at the recovery site). If sufficient sampling can be obtained and some assumptions met, some inference can be made about relative abundance among recovery locations using the estimates of mark rates and the number of radio-tagged fish present. However, it was not an objective of this study to produce a mark-recapture estimate of the number of Chinook salmon migrating above Devils Canyon (or above the proposed dam site). In the FERC SPD (page B-13), NMFS and the USFWS requested that AEA add the additional goal of estimating the numbers of fish above Devils Canyon (and the proposed dam site) to the study. FERC did not recommend this additional goal be included in the study. Instead, FERC recommended the study be modified to require AEA to include in the 2013 ISR an evaluation of the feasibility of putting in a weir or sonar counting station at or near the dam site during the 2014 study season to count anadromous fish. In ISR Section 5.6.4, AEA used two different approaches to estimate of the number of Chinook salmon that migrated above Devils Canyon in 2013. The first approach involved expanding the peak aerial spawner count in tributaries above Devils Canyon (29 fish) by the estimated observer efficiency (46.3 percent, as observed in the Indian River; 26/0.463 = 63 fish). This expanded count should be considered a minimum number since only fish counted on the July 25-27 survey were included. Chinook salmon were also observed in tributaries above Devils Canyon on four other surveys, so it is possible that some of these fish were not present during the July 25-27 survey. Also, this approach assumed that the observer efficiency in tributaries above Devils Canyon was similar to that in the Indian River (which was 'ground-truthed' with weir counts in 2013). The second approach involved expanding the number of radio-tagged Chinook salmon detected above Devils Canyon (3 fish) by the marked fraction of Chinook salmon in the Middle River (6.3

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			percent; 3/0.063 = 48 fish). It was highly unlikely that more than three fish migrated above Devils Canyon. This approach assumed that the mark rate of fish above Devils Canyon was the same as the mark rate of fish sampled in the Indian River. Sensitivity analyses were included in ISR Sections 5.6.4 and 6.6 to illustrate how extreme, but unlikely, parameter values affected the expanded counts derived from both approaches. In summary, too few tagged and untagged fish were observed above Devils Canyon to derive a statistically valid estimate of the number of Chinook salmon that passed Impediment 3 (or the proposed dam site). Regardless, the study was not designed to produce such estimates. As proposed in the RSP, AEA used available data to make inferences about the abundance of Chinook salmon above Devils Canyon. Although lacking statistical rigor, these estimates provided insight into the order of magnitude of Chinook salmon abundance above Devils Canyon (e.g., 50-65 fish above Devils Canyon in 2013 was likely, but 100 or more was unlikely). These estimates also illustrate how difficult it would be to achieve sufficient samples sizes to derive a reasonably accurate and precise mark-recapture estimate for Chinook salmon above Devils Canyon. **Summary of passage events for large Chinook salmon (MEF ≥ 50 cm) released in the Middle River, 2012-2014. Small Chinook salmon, and large Chinook salmon released in the Lower River, were not included in this table.**

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	2012	2013	2014	Total
Tags Released at Curry	352	536	590	1,478
Number of Tags Detected Above:				
Gateway	313	445	491	1,249
Impediment 1	23	17	11	51
Impediment 2	20	13	8	41
Impediment 3	10	3	2	15
Proposed Dam Site	6	2	1	9
Percent of Tags Released Detected Above:				
Gateway	88.9	83.0	83.2	84.5
Impediment 1	6.5	3.2	1.9	3.5
Impediment 2	5.7	2.4	1.4	2.8
Impediment 3	2.8	0.6	0.3	1.0
Proposed Dam Site	1.7	0.4	0.2	0.6
Percent of Tags Past Gateway Detected Above:				
Impediment 1	7.3	3.8	2.2	4.1
Impediment 2	6.4	2.9	1.6	3.3
Impediment 3	3.2	0.7	0.4	1.2
Proposed Dam Site	1.9	0.4	0.2	0.7
Number of Tags That Approached Impediment 1 (within 1 km)	34	60	32	126
Percent of Tags Released That Approached Impediment 1	9.7	11.2	5.4	8.5
Percent of Tags Past Gateway That Approached Impediment 1	10.9	13.5	6.5	10.1

As stated in Study 9.5 ISR Section 5.1.3 and Study 9.6 ISR Section 5.1.3 data presented on habitat associations was preliminary and based only on counts and therefore have no standard error associated with these data. Once QAQC has been completed on the fish data, the analysis of fish-habitat associations will be completed with additional inputs including relative abundance, species

Comment Page Para	Comment Number	Comment	Response
			richness, and life stages supported. As stated in the RSP Section 9.6.4.3.1, Study 9.5 ISR Section 5.1.3, and Study 9.6 ISR Section 5.1.3 fish-habitat associations will be evaluated at the meso-habitat level. These data will not be used to validate the instream flow model but to further characterize at macrohabitat that are subject to flow effects at the meso-habitat level.
Page 5 Para 3	16	Data collection methods need improvement. For example, detection and recovery of PIT (passive Integrated Transponder) tags need to be improved to yield useful data to meet study goals and objectives. Location of the detection arrays did not cover the entire channel and was biased toward fish migrating down channel. Also, because too few tags were recovered, efficiency estimates could not be made.	This comment reflects a fundamental lack of understanding of the methodologies being relied upon by the FERC-approved study plan. As stated in RSP Sections 9.5.4.4.1.2 and 9.6.4.4.1.2, remote telemetry techniques were "intended to provide detailed information on relatively few individual fish." PIT tags were used to "document relatively localized movements of fish as well as growth information from tagged individuals." Due to the size of the study rivers, the necessity for installing arrays across split channels, side-channels and/or as partial coverage arrays across a portion of the main channel is described in the Fish Distribution and Abundance Implementation Plan Section 5.6.5. Furthermore, both FA-104 and FA-128, the PIT tag arrays spanned the entire channels. Data from PIT tag arrays provided limited but valuable information on fish movements. As indicated in Study 9.5 ISR Section 5.2.2.2 and Study 9.6 ISR Section 5.2.2.2, antenna arrays recorded 29,047 detections of 33 fish in the Upper River and 126,351 detections of 664 fish at Middle River arrays. These resightings provided information on local and inter-stream movements of individual for six species in the Upper River and 11 species in the Middle River as well as site-specific growth rates for individuals of several species (Study 9.6 ISR Section 5.5.1).
Page 5 Para 4	17	Misidentification of juvenile fish by species induces significant error, and application of this erroneous data would result in inaccurate conclusions. Our review of the Initial Study Report finds that a very high percentage of the juvenile salmonids were misidentified. We also question the accuracy of all juvenile fish sampling data because of the following details:	AEA disagrees. This comment reflects a fundamental lack of understanding of the methodologies being relied upon by the FERC-approved study plan. NMFS concern appears to be centered on the potential mis-identification of coho versus Chinook salmon in certain habitats that were part of fish distribution studies. Whether those identifications are correct or not has no bearing on the outcome of the habitat-modeling studies that will consider all of the Pacific salmon species. AEA has focused a substantial effort into the development of resource specific models that will link with habitat-flow based models for evaluating the effects of flow regulation below the dam on various fish species and processes both spatially and temporally. The biological inputs to the habitat models will be provided primarily via the HSC analysis that includes a suite of flow sensitive parameters associated with different species and life stages. The HSC data are being collected in accordance with the study plan and will result in a series of species specific HSC curves that will be brought into the fish-habitat modeling. At this time the plan is to run the habitat-flow models for all of the target salmonid species and life stages including sockeye and chum salmon adults/spawning, which are the species most often associated with the lateral habitats that are likely to be most influenced by Project operations, as well as coho, Chinook, and pink salmon.
Page 5 Para 5	18	• large numbers of unidentified salmonid juveniles (some of which were PIT tagged);	AEA disagrees that numbers of unidentified juvenile salmonids are significant.

<table>
<tr><th>Comment Page Para</th><th>Comment Number</th><th>Comment</th><th>Response</th></tr>
<tr><td></td><td></td><td></td><td>In Study 9.6 ISR Table 5.1-2: 865 undifferentiated Pacific salmon Juveniles in MR, five percent of all juvenile salmon, ~ half from Slough 6A. 436 fish identified after photo review and classified to species. Resulting in a total of 429 undifferentiated Pacific salmon remaining in database, 2.5 percent of total.

In Study 9.46 ISR Table 5.1-3: 78 undifferentiated Pacific salmon juveniles in LR, two percent of total.

AEA is in the process of reviewing photos from the Lower River, which should reduce the number of unidentified juvenile salmonids.

In 2013, 11 undifferentiated pacific salmon were PIT-tagged (67 reported in ISR but photo review resulted in identification of 56 of the 67); four of these 11 tagged unidentified pacific salmon met length criteria to be two-year-olds. Ten of these 11 fish have photos that are under review. In total 1,872 Chinook salmon and 2,793 Coho salmon were PIT-tagged in 2013 and Winter 2014.</td></tr>
<tr><td>Page 5
Para 6</td><td>19</td><td>• anomalous length distributions and habitat associations (e.g., juvenile Chinook 150 mm fork-length;</td><td>Summary of large juvenile Chinook and coho salmon. Based on growth modeling, juvenile Chinook and coho >100mm in May and June were presumed to be two-year-old fish and >120mm from July-April were presumed to be two-years of age. These data are not consistent with data from the 1980s and are undergoing additional analysis.
<table>
<tr><th>Location</th><th>PRM</th><th>Habitat</th><th>Chinook salmon</th><th>Coho salmon</th><th>Pacific salmon, undifferentiated</th><th>Total</th></tr>
<tr><td>DMT-Talkeetna Station</td><td>106.9</td><td>MS Susitna River</td><td>72</td><td>8</td><td>3</td><td>83</td></tr>
<tr><td>Indian River DMT</td><td>142.1</td><td>Tributary</td><td>70</td><td>4</td><td></td><td>74</td></tr>
<tr><td>FA-141-Slough 17</td><td>142.3</td><td>Upland Slough Beaver Complex</td><td>70</td><td>16</td><td>1</td><td>87</td></tr>
<tr><td>Montana Creek DMT</td><td>80.8</td><td>Tributary</td><td>37</td><td>4</td><td></td><td>41</td></tr>
<tr><td>FA-104-Slough 3A</td><td>105.7</td><td>Upland Slough Beaver Complex</td><td>15</td><td>25</td><td>1</td><td>41</td></tr>
<tr><td>FA-104-SS</td><td>105</td><td>Side Slough</td><td>14</td><td>2</td><td></td><td>16</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Comment Page Para</th><th>Comment Number</th><th>Comment</th><th>Response</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><td>PRM-63.5-US</td><td>62.5</td><td>Upland Slough Beaver Complex</td><td>9</td><td>11</td><td></td><td>20</td></tr>
<tr><td>FA-115-Slough 6A</td><td>116.2</td><td>Upland Slough Beaver Complex</td><td>6</td><td>31</td><td></td><td>37</td></tr>
</table>

Genetics samples were collected from 37 of these large Chinook and four large coho salmon, 2013. An additional 29 samples were collected from Chinook salmon >100 mm collected July 2013-April 2014. Analysis of these samples is currently underway. A total of approximately 600 Chinook salmon tissue samples have been delivered to ADF&G for analysis and can be used to determine overall Chinook salmon identification error rate if needed.

Approximately 24 voucher specimens have been collected for Chinook (10) and coho salmon (14). These fish will be used for meristic counts to determine species ID. Our ADF&G permit limited us to 10 per species but was recently modified to up to 20 Chinook and coho salmon.

31 photos of these large Chinook salmon are also available for review. Review is complete for R2 photos but need to review photos from HDR and Golder. Results of photo review will be used in combination with genetics and meristic data to evaluate accuracy of field identification.</td></tr>
<tr><td>Page 5
Para 7</td><td>20</td><td>• the large abundance of juvenile Chinook in beaver ponds;</td><td>Habitats where Chinook salmon were collected in 2013 and winter 2014. Larger Chinook salmon are defined in Comment Number 19. 681 juvenile Chinook salmon were collected from upland slough beaver complexes compared to 3,414 coho salmon. Approximately 14 percent of Chinook salmon were associated with upland slough beaver complexes. The highest habitat supporting collection was tributaries, over 21 percent of total collections. Of larger Chinook salmon, roughly a third, 100 out of 313, were associated with upland slough beaver complexes.
<table>
<tr><th></th><th colspan="2">Chinook salmon</th><th colspan="2">Coho salmon</th><th colspan="2">Pacific salmon, undifferentiated</th><th>Total</th></tr>
<tr><th>Macro Habitat</th><th>All Sizes</th><th>Larger fish</th><th>All Sizes</th><th>Larger fish</th><th>All Sizes</th><th>Larger fish</th><th></th></tr>
<tr><td>Additional Open Water</td><td>1</td><td></td><td>32</td><td>1</td><td></td><td></td><td>33</td></tr>
<tr><td>Backwater</td><td>31</td><td>1</td><td>107</td><td></td><td>3</td><td></td><td>141</td></tr>
<tr><td>Clear Water Plume</td><td>69</td><td>2</td><td>144</td><td></td><td>14</td><td></td><td>227</td></tr>
<tr><td>Main Channel</td><td>1,038</td><td>74</td><td>1,210</td><td>23</td><td>79</td><td>3</td><td>2,327</td></tr>
</table>
</td></tr>
</table>

Comment Page Para	Comment Number	Comment	Response
			Side Channel 176 12 291 1 42 **509** Para Side Channel Complex 11 1 3 **14** Side Slough 177 3 554 147 **878** Side Slough Beaver Complex 76 1 221 11 25 **322** Tributary 1,875 43 1,411 6 53 **3,339** Tributary Mouth 615 70 2,123 7 28 **2,766** Upland Slough 108 6 378 19 1 **487** Upland Slough Beaver Complex 681 100 3,414 65 131 1 **4,226** **Grand Total** **4,858** **313** 9,885 133 526 **4** **15,269**
Page 5 Para 8	21	• the absence of pink: salmon in any samples; and	This is incorrect. Pink salmon were caught during winter sampling and ELH. Winter data are provided in Study 9.6 ISR Appendix C Tables C2.2-5 and c2.2-5 and Figure C A1-17. ELH data are provided in Study 9.6 ISR Tables 5.3-1, 5.3-2, and 5.3-3.
Page 5 Para 9	22	• the disappearance of sockeye salmon from Indian River between the February draft Initial Study Report and the June draft Initial Study Report).	This is incorrect. AEA reviewed ISRs for Studies 9.5, 9.6, 9.7, and 8.5 and the numbers of reported sockeye salmon did not differ between the Draft and Final ISR.
Page 5 Para 10	23	Considering the length distributions and habitat associations reported, we have reservations also about the identification of these juvenile fish and conclude that many juvenile salmonids identified as Chinook salmon were coho salmon.	AEA disagrees. See Comment Response Number 20. Consistent with QAQC protocol's AEA is verifying fish identifications. In addition, 681 out of the 757 total Chinook salmon in habitats with beaver influence came from three sloughs: Slough 6A, Slough 17, and Slough 3B (Whiskers). The photo review, meristic, and genetic sampling are ongoing for these sites and will provide an estimate of error associated with field identifications. Based on the recent photo review for Slough 6A we are confident that Chinook and coho salmon do co-occur at this site; however, we also anticipate additional corrections to field identifications due to the phenotypic variations evident in juvenile salmon at this location. We have over 500 photos of Chinook and coho salmon that can be used for photo-based QAQC in addition to more than 550 genetic samples of Chinook and coho salmon for verification of field identification.
Page 5 Para 11 – Page 6	24	There is an absence of quantitative analysis of habitat sampling, fish distribution and relative abundance, and early life history	AEA disagrees with these assertions. This comment reflects a fundamental lack of understanding of the methodologies being relied upon by the FERC-approved study plan. As shown in the ISR sufficient data has been collected to indicate that progress has been made towards meeting study

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Para 1		data collected to date. Deviations from the Revised Study Plan (RSP) and FERC staff recommendations make developing estimates from these data difficult or even impossible. These data are the basis of the fish and habitat sampling design and must be collected appropriately for the study to yield useful information. Without better integration of historical data into assessment of current results (e.g., the data from studies collected in 2012, which used different methodology and locations), these data should not be used to assess habitat associations for salmon by species and life stage. Much of the data on species distribution, relative abundance, and habitat associations appears anomalous in comparison to available science on these species and their life stages as known through data previously collected and past studies conducted in the Susitna River and environs.	objectives in spite of variances. Furthermore, AEA has proposed modification where needed to improve data collection efforts based on a quantitative analysis of the data in the ISR. In all cases the study modifications implemented in 2014 have been shown to be successful at improving rigor of the data set as presented in Fish Distribution and Abundance Technical Memorandum filed with FERC on September 17, 2014.
Page 6 Para 2	25	One of the main objectives of radio-tagging was locating spawning locations. The proposed activity of circling over a tag that remained in the same location for a period of time was not done (mainly for salmon). For non-salmon species, it was proposed to tag some species after their spawning season and monitor the tag in the following year to locate spawning locations. It remains to be seen if this actually worked. If not, the objective of locating spawning locations was not met.	This comment reflects a fundamental lack of understanding of the methodologies being relied upon by the FERC-approved study plan. AEA met the study plan objective within Study 9.7. Aerial telemetry survey methods are stated in RSP 9.7 Section 9.7.4.2.2: "When tagged fish are within 2 km of their last seen location, the helicopter will circle at a lower altitude to pinpoint the fish location to mainstem, side channel, or slough habitats. As well, when aggregations of two or more tagged fish are found stationary (i.e., within 2 km on one or more surveys) and/or when visual observations of spawning fish are made from the helicopter, ground and boat-based surveys will pinpoint spawning locations to within 5-10 meters," and Study 9.7 ISR Section 4.2.2. "When aggregations of two or more tagged fish were found stationary (i.e., within 2 km on one or more surveys), spawning locations were more intensively tracked to achieve relatively high resolution geographic positions."

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			Aerial survey protocol with respect to identifying the position of a radio-tag adapted to the local physical environment, weather conditions, timing relative to the migration, helicopter pilots, and abundance of radio-tags, but always maintained the stated goal of achieving each position to within 300 meters. Obtaining an accurate fix on a tag did not necessarily require circling or changing altitude although those maneuvers were used; sometimes it involved hovering, changing orientation of the antenna, or simply making an additional pass at a particular location. Therefore, the adaptive protocol provided higher accuracy of positions than the original protocol. The aerial protocol was adapted to conditions during the salmon season with respect to monitoring non-salmon frequencies (RSP 9.6, Section 4.5.3.3). More specifically, "Resident tag frequencies were programmed into a receiver and scanned automatically. No manual tracking, directed searching, or identification of habitat type was conducted during the period when adult salmon were being tracked." (ISR 9.6, Section 4.5.3.3). This was done to accommodate the high number of frequencies that needed to be scanned for salmon and resident fish (i.e., it was impossible for two crew to actively monitor six to eight receivers), and "may make habitat use inferences less accurate if habitat delineations were much smaller than the resolution of the tag positions." The adapted approach was not necessary during surveys above Devils Canyon nor during the period when only resident tags were being tracked. The 2013 data on spawning and holding locations for radio tagged salmon were reported in Study 9.7 ISR Section 5.5.3. AEA notes that as part of the radio tagging surveys in the Middle River, there was cross-communication between the radio tagging teams and HSC study teams. In instances where stationary adult fish were observed, ground or boat based surveys were conducted and measurements of depth and velocity made at a number of locations to define the areas as potential spawning locations. Furthermore, telemetry tagging targets are stated in IP 9.5/9.6 Section 5.8.1 and Study 9.6 ISR Section 4.5.2.1. "Tags will be surgically implanted (see Appendix 5) in 60 fish of sufficient body size (i.e., ≥200 grams) of each target species. For each species, 30 tags will be allocated to the Upper River, and 30 tags will be allocated to the combined Middle/Lower River. To the extent possible given the constraints of field sampling conditions, …" FERC recommended (SPD at B-135) tagging 10 of a 30 tag species allocation prior to and during

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			spawning periods for Arctic grayling, burbot, Dolly Varden, humpback whitefish, rainbow trout, and round whitefish. As Study 9.6 ISR Section 4.5.3.2, AEA's implementation varied from this recommendation. However, tagging the identified species during the specified periods was conducted based on the surgeon's discretion. For 2013 and 2014, tagging resulted in the FERC recommendation being achieved for Arctic grayling and rainbow trout in the Middle-Lower River, and Arctic grayling and burbot in the Upper River (Table 1). Further, the available tags-at-large in spawning periods subsequent to tagging also achieved the FERC recommendation for burbot and round whitefish in the Middle-Lower River (Table 2). The species yet to achieve the recommendation are Dolly Varden and humpback whitefish in the Middle-Lower River, and round whitefish in the Upper River. Note that the FERC recommendation will not be met for Dolly Varden, humpback whitefish, and rainbow trout in the Upper River because there have been none of sufficient size caught (i.e., too low abundance). Activities in 2015 will target achievement of feasible targets by applying tags in June. Therefore, the approach being used is achieving the tagging targets designed to allow locating spawning locations.
Page 6 Para 4	26	We do not believe that data has been collected among individual related studies at an appropriate scale to allow fish/habitat associations to be made and extrapolated. A related concern is that fish and habitat data have not been collected at a biologically relevant scale.	This comment reflects a fundamental lack of understanding of the methodologies being relied upon by the FERC-approved study plan. The scale at which fish data were to be collected was described in the RSP Sections 8.5.4.5.1.1.3, 9.5.4.4.3, 9.5.4.4.2, 9.6.4.4.3, and 9.6.4.4.2 and in the results of data collected at these scales are presented in Studies 8.5 ISR Section 4.5.1.3, 9.5 ISR Sections 4.4.3 and 4.4.2, and 9.6 ISR Section 4.4.3 and 4.4.2. These studies followed the Study Plan for scale at which data were to be collected and no variance was implemented with respect to scale for data on fish/habitat associations. Furthermore, as fish distribution and abundance data collected at the mesohabitat level were nested within macrohabitats (Study 9.6 ISR 4.4.3) and again within Geomorphic Reaches which will facilitate use of the data by other studies. As a point of clarification, AEA is not developing fish/habitat associations so they can be extrapolated. Rather, AEA is developing HSC curve sets that will be used in the habitat-flow models for defining how Project operations may influence fish habitats (target species and life stages) within different habitat types. AEA has identified several approaches for extrapolating the results of this type of analysis to other areas of the Middle River but has not selected a specific approach pending further stakeholder review.
Page 6 Para 5	27	To assess project-caused impacts to fisheries resources (for example), the sampling effort must be at a scale relevant to Susitna River fish species and life stages and must adequately quantify baseline conditions for accurate extrapolation. In some instances, the spatial scale of data	See AEA's response to Comment 26 regarding scale. Fish sampling followed the sampling plan. In RSP Section 9.6.4.1 it stated that "winter sites will be selected based on information gathered during 2012-2013 pilot studies . . . attempts will be made to sample all Focus Areas." The winter pilot study was conducted in Winter 2013 at two Focus Areas as described in the Study 9.6 RSP Section 9.6.4.5. AEA made recommendations based upon the winter pilot study for sampling sites, as stated in Study 9.6 ISR Appendix C Section 6.1.1, and the

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		collection implemented varies inappropriately within and among studies, resulting in a mismatch between the data collected and the purpose of its collection. Additionally, the temporal scale of data collection needs improvement. The Initial Study Report indicates that winter fish sampling did not occur in all focus areas as proposed. Early spring sampling occurred only in three focus areas due to record late breakup. Initial sampling following breakup and installation of migrant traps did not occur until the middle of June (after juvenile outmigration had begun), and spring sampling for fish distribution and abundance was not conducted. Improvements need to be made to capture the full seasonality of fish life history strategies which vary considerably within a single season. (Fish move around, and the extent of that movement must be captured through sampling. A single-day of sampling is insufficient to understand the habitat associations of many different and mobile species and life-stages of fish.)	2014 Winter Study was expanded to three Focus Areas and opportunistic sampling at accessible sites outside of the Focus Areas. Results of the first year of the winter study for fish are presented in the Study 9.5 Winter Study Technical Memorandum filed with FERC on September 17, 2014. In 2013 Early Life History sampling began two weeks after winter sampling was stopped and continued bi-weekly through June with the exception that no sampling was conducted for two weeks during the dynamic break up in mid-May 2013 (Study 9.6 ISR Section 4.6). As stated in Study 9.6 ISR Section 4.6.2 ELH sampling included six Focus Areas identified to have both spawning and rearing habitat as well as additional sites in the Upper (Study 9.5 ISR 4.6.2), Middle, and Lower River (Study 9.6 ISR 4.6.5). Sample sites for these various fish study components were visited multiple times during the Winter Study (1-3 times), Early Life History Study (3 times), and Fish Distribution and Abundance Study (3 times). Some sites were visited during all three seasonal study components and ended up being sampled more than eight times in 2013. Downstream migrant traps were installed and operated as indicated in the Study 9.5 ISR Section 9.5.4.4.10 and Study 9.6 ISRs Section 9.6.4.4.10: "flow conditions permitting, traps will be fished on a cycle of 48 hours on, 72 hours off throughout the ice-free period." As soon as break-up and flow conditions allowed in mid-June 2013 traps were installed fished immediately upon installation in June through mid-October 2013. In 2014 breakup occurred earlier and migrant traps installation occurred in mid-May with traps operated immediately after installation (the Proposed 2015 Modifications to Fish Distribution and Abundance Study Plan Implementation Technical Memorandum filed with FERC on September 17, 2014). ELH sampling was conducted in 2013 during May and June in the Upper (Study 9.5 ISR Section 4.6.2, Middle and Lower (Study 9.6 ISR Section 4.62) River segments. For clarification, the spring break-up of 2013 did not reach the magnitude or the late timing of the breakup of record. AEA believes that the range of hydrologic events that occur over the multi-year study period provide opportunities to better understand the response of aquatic resources to spring break up and flow fluctuations associated with Project operations. While the harsh and dangerous field conditions associated with the spring breakup of 2013 inhibited AEA's ability to install migrant traps, data collected in spring 2013 will be combined with other data collected to evaluate the response of juvenile fish to Project operations over a range of environmental conditions. Furthermore, data on fish movement were documented with downstream migrant traps and biotelemetry as indicated in Study 9.5 ISR Sections 4.5.1 and 4.5.2, and Study 9.6 ISR Sections 4.5.1 and 4.5.2. Results for biotelemetry included a total of more than 150,000 repeat detections of tags for

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			more than 1,000 tagged fish (Study 9.5 ISR Sections 5.2.1 and 5.2.2, and Study 9.6 ISR Sections 5.2.1 and 5.2.2).
Page 6 Para 6	28	The error inherent in the inappropriate scale of data collection would be compounded by the proposal to extrapolate study results throughout the river; this would perpetuate and increase sampling errors across the entire length and width of the river and its habitats. Resource agencies are particularly concerned about this proposal to "scale up," and requested rationale for its implementation (Riverine Modeling Integration Meeting, November 2013). The ability to "scale up" is only valid when the initial sampling has been conducted accurately and at a scale relevant to resource concerns, which is not the case with studies conducted thus far.	See above Response to Comment 26 on extrapolation. Additionally, AEA provided several options for scaling up/extrapolating results of the habitat-flow models being developed during the April 15-17, 2014 Riverine Modelers Meeting (see http://www.susitna-watanahydro.org/wp-content/uploads/2014/04/2014_04_17TT_Riverine_SpatialExtrapolation.pdf). AEA intends to seek the input of the Licensing Participants prior to selecting the specific option for scaling.
Page 6 Para 8 – Page 7 Para 1	29	Review of the Initial Study Report reveals that sampling sites for the various study disciplines have not been consistently and thoroughly co-located, as laid out in the RSP as modified by FERC staff recommendations, to provide an assessment of baseline conditions of habitats relative to fish use and preference. For example, invertebrate sampling locations (River Productivity 9.8) were not co-located with fish sampling locations. Rather than addressing this issue, or NMFS's previous concerns about the number of middle river sampling locations, AEA is proposing a study modification to sample in tributaries above the dam inundation zone. At some locations, sampling of variables such as depth and velocity was appropriately co-located, but other variables that should also	AEA disagrees with the assertion that it did not follow the FERC-approved study plan with respect to co-location of sampling sites. Regarding Sentence 1: As an initial matter, the RSPs never specified the co-location of sample sites across study disciplines. It did specify the location of 10 specific Focus Areas that would be evaluated relative to the different resource disciplines (RSP 8.5.4.2.1.2). AEA disagrees with NMFS comments regarding the locations of the groundwater measurements. The Focus Areas represent areas of intensive study across resource disciplines (see approved Study Plan, Section 8.5.4.2.1.2). Detailed two-dimensional hydraulic models are being developed for each of the Focus Areas and will support analysis by other resource disciplines being conducted within those areas. The Focus Areas represent a variety of habitat types with varying complexity that factored directly into determining the types and level of detail of resource specific studies. Thus, where groundwater influence was important relative to habitat features that included riparian communities, then detailed groundwater studies and riparian investigations occurred. For those where groundwater exchange was not as important, e.g., those associated with tributaries (Focus Area 141 – Indian River, Focus Area 151 – Portage Creek) than groundwater studies were scaled back or not included as part of the overall study of that Focus Area.

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		be co-located such as groundwater exchange were not. NMFS recommends that at Focus Areas data collection for the full suite of interdependent variables should be co-located.	
Page 7 Para 2	30	The cumulative effects of deficiently implemented sampling methods, failure to co-locate sampling sites, lack of integrative links, and discrepancies in data collection scales are magnified because these data are proposed for inputs to models. Model calibration, validation and decision making processes will then be used to assess potential impacts to resources.	AEA disagrees. This comment reflects a fundamental lack of understanding of the methodologies being relied upon by the FERC-approved study plan. As describe in the ISR, AEA anticipates that the data generated will provide the necessary inputs for the models within the FERC-approved study plan.
Page 7 Para 3	31	NMFS recommends that the data issues be resolved as soon as possible. Accurate data is required to calibrate and validate proposed models; and quality data from individual studies is necessary to integrate models without amplifying errors unknowingly. Given these concerns about the data, it is not plausible to use the data for the predictive modeling that is proposed to describe baseline conditions or to predict potential project impacts.	AEA disagrees with NMFS assertion that the models cannot be used to predict potential project impacts. Those models were fundamentally designed to be able to evaluate Project effects related to flow regulation and the data that have been and will continue to be collected to support their development have been rigorously collected and checked in accordance with a stringent set of QA/QC protocols.
Page 7 Para 4	32	These issues of data integrity and data collection are based in part on studies being conducted with significant differences from the FERC-modified RSP. These issues must be resolved prior to conducting additional field studies. NMFS cannot develop appropriate recommendations for study modifications or make new study requests for the second year of study given the current issues with the studies and the data.	AEA disagrees that there are significant differences in how the studies have been implemented versus the FERC-approved study plans. AEA acknowledges that there have been some slight variances in the plans but has specified those in the ISR and noted that none of the variances will substantively affect the completion of the respective studies.
Page 7	33	During the Riverine Modeling Integration	AEA disagrees. The time frames of 0, 25, and 50 years were selected because they represent time

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Para 7		Meeting (November 2013), 25- and 50-year scenarios for predicting project impacts to the physical river channel and habitats were proposed. While those timelines are consistent with the study plan and may present a manageable timeframe for the modeling work (B. Fullerton, POC meeting, November 2013), they may not answer questions related to assessing impacts on important biological resources in a biologically meaningful timeframe. Models need to be sensitive enough to detect changes that are biologically meaningful to the species and habitats likely to be affected by project operations. As currently planned, this is not the case.	intervals that span the potential length of the FERC license, and as well are reasonable increments from which to gauge and compare changes in channel morphology (RSP 6.6, Section 6.6.4.2.2.1) that may translate into changes in fish habitat. Having time intervals at shorter increments of geomorphological modeling would be less likely to elicit substantive changes in channel morphologies and would therefore be less likely to elicit changes in the results of the habitat-flow modeling. However, the greatest potential effects of Project operations on fish and fish habitats are on the actual regulation of flows that would occur over much shorter time intervals (annual, seasonal, weekly, daily, hourly) and for which the habitat-flow models are being developed to evaluate. As described in RSP 8.5, Section 8.5.7.4.1.1, the "[t]emporal analysis will involve the integration of hydrology, Project operations, the Mainstem Open-water Flow Routing Model, and the various habitat-flow response models to project spatially explicit habitat changes over time. Several analytical tools will be utilized for evaluating Project effects on a temporal basis. This will include development and completion of habitat-time series that represent habitat amounts resulting from flow conditions occurring over different time steps (e.g., daily, weekly, monthly), as well as separate analysis that address effects of rapidly changing flows (e.g., hourly) on habitat availability and suitability. The Mainstem Open-water Flow Routing Model and habitat models will be used to process output from the Project operations model. This will be done for different operating scenarios, hydrologic time periods (e.g., ice free periods: spring, summer, fall; ice-covered period: winter [will rely on Ice Processes Model – Section 7.6]), Water Year types (wet, dry, normal), and biologically sensitive periods (e.g., migration, spawning, incubation, rearing) and will allow for the quantification of Project operation effects on the following: • Habitat areas (for each habitat type – main channel, side channel, slough, etc.) by species and life stage; this will also allow for an evaluation of the effects of breaching flows on these respective habitat areas and biologically sensitive periods (e.g., breaching flows in side channels during egg incubation period resulting in temperature change). • Varial zone area (i.e., the area that may become periodically dewatered due to Project operations, subjecting fish to potential stranding and trapping and resulting in reduced potential invertebrate production). • Effective spawning areas for fish species of interest (i.e., spawning sites that remain wetted through egg incubation and hatching). • Other riverine processes" These shorter time intervals (hourly, daily, weekly, monthly) represent those that are the most biologically meaningful in the sense that they would have the most direct and immediate effect on

Comment Page Para	Comment Number	Comment	Response
			fish and fish habitats. If warranted, it will also be possible to evaluate effects over longer time steps that encompass Project operations over several different water years.
Page 7 Para 8 – Page 8 Para 1	34	NMFS has identified a need to develop and incorporate biological input and output parameters and evaluate these under an appropriate range of operational scenarios (e.g., base load, ecological flows, load-following, run-of-river). The temporal scales (i.e., 25-and 50-year scales) that are needed 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, 5-7 years; or 2-4 years for eulachon). NMFS is concerned that the present model cannot answer the biological questions it proposes to answer.	See AEA's response to Comment 33.
Page 8 Para 2	35	Some study plan data collection efforts do not provide the information needed for the integrated modeling efforts. For example, during the November 2013 Riverine Modelling Integration meeting, it was revealed that the Water Quality Modeling study would require data on the spatial distribution of groundwater discharge to surface water bodies. Analytical or numerical groundwater flow simulation would be one way to satisfy this input requirement. However, the Groundwater Study in the Initial Study Report does not explicitly state that analytical or numerical groundwater flow simulations would be undertaken in support of the other physical process models.	AEA disagrees. This comment reflects a fundamental lack of understanding of the methodologies being relied upon by the FERC-approved study plan. The data collection effort will provide the information needed for integrated modeling efforts. AEA notes that there have been two, three day Riverine Modelers meetings designed to provide Licensing Participants with updates on model development and integration and to solicit feedback and suggestions on model refinements. The first of these was held from November 13-15, 2013, the second April 15-17, 2014. During both meetings, each of the resource modelers explained first the specific models they were working on and the model dependencies on other models or data sources, as well as the model outputs to other models. Review of the November meeting notes (http://www.susitna-watanahydro.org/wp-content/uploads/2014/02/2013.11.13Modelers_Notes.pdf) indicates questions did occur related to the Water Quality model that pertained to the integration of groundwater. These comments were addressed by noting that data from targeted grab samples as well as data from groundwater wells would be used, as well as data from other locations. Additional information was provided on the groundwater study during the April Proof of Concept meetings (http://www.susitna-watanahydro.org/wp-content/uploads/2014/04/2014_04_15TT_Riverine_Presentation-Groundwater.pdf), and more

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			recently in two Technical Memoranda (GWS and R2 2014a, http://www.susitna-watanahydro.org/wp-content/uploads/2014/09/07.5_GW_GWS_T6_TM_Aquatic_Hydro_Final_Draft_20140925.pdf; GWS and R2 2014b, http://www.susitna-watanahydro.org/wp-content/uploads/2014/09/07.5_GW_GWS_T5_TM_Riparian_Final_Draft_20140926.pdf) which describe some of the analysis leading to development of preliminary groundwater/surface water relationships in selected Focus Areas.
Page 8 Para 3	36	Model integration is at this point largely an ad hoc exercise. A stand-alone model integration study is required to allow stakeholders to develop confidence in the models, understand inputs and outputs, and have the conceptual linkages demonstrated via an interactive riverine working model. Many questions remain about the predictive capabilities of the models, particularly under integration and model assumptions. Sensitivity and uncertainty analyses need to be conducted to contribute to understanding of model limitations. The full extent of mismatch of purported integration of models is currently unknown, even to the project proponent, much less to stakeholders reviewing study results.	AEA disagrees. This comment reflects a fundamental lack of understanding of the methodologies being relied upon by the FERC-approved study plan. The model integration is not an ad-hoc exercise. The two Riverine Modelers Meetings held in November 2013 and April 2014 respectively were specifically held in response to stakeholder concerns about model integration. Review of the presentations from both of these meetings which are available on AEA's website (http://www.susitna-watanahydro.org/meetings/past-meetings/) clearly demonstrate the linkages between the models and how individual model outputs will be used in evaluating Project effects for each resource discipline, with an emphasis on effects on fish habitats. The meeting notes for the two meetings provide a clear record of the major topics discussed and stakeholder questions pertaining to model integration. Indeed, one of the comments provided at the end of the April meeting by a USGS representative suggested that the modeling and model integration efforts were moving in the right direction – "…. thought it was a great meeting and that the studies are making good progress. Feels that there has been tremendous amount of focus on where the problem areas are and are a lot further along than in November 2013." Since then, the resource modelers have continued working in a collaborative fashion on each of the respective models.
Page 8 Para 5	37	Decision Support Systems (DSS) are critical for evaluating potential impacts of the project. We believe that their development should be expedited to the extent possible without excluding input from stakeholders.	AEA agrees that DSS are important for evaluating Project effects and presented several options for this during the November modelers meetings (http://www.susitna-watanahydro.org/wp-content/uploads/2013/11/SuWa-DSS-presentation-20131115_DRAFT.pdf). As was noted in the Study Plan (RSP Section 8.5.4.8.1), the development of the DSS including selection of indicator variables will be done in a collaborative process with stakeholder input.
Page 8 Para 6 – Page 9 Para 1	38	The RSP (Instream Flow Study 8.5 RSP) includes the use of conceptual ecological models as the DSS to assess the project's impacts on a free flowing river and its resources. Also, the Fish Passage study includes use of a DSS to assess the feasibility and effectiveness of different fish passage options. It is our understanding	AEA does not consider the DSS to be a conceptual ecological model but rather a platform to reduce the complexity of information and focus attention on tradeoffs involved with decisions regarding project operations. Likewise, AEA notes that the Fish Passage Study does not include a DSS type evaluation, but rather utilization of an analytical tool to weigh various passage options. The development of both of these will be done in a collaborative framework. As to the schedule of the DSS, the major elements of this are scheduled for 2015, and will require stakeholder inputs at various intervals.

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		that AEA intends to develop the conceptual ecological model DSS using manual matrices by early 2015 (FERC 2013) and to use a modified existing DSS for fish passage (currently past due). Considering the potential of these DSSs to support critical assessments of impacts from the project, development of the DSS should be a collaborative process with mutual development of, and agreement about fundamental objectives, assumptions, critical inputs, weighting methods, and other parts of the models. Formulation of the fundamental objectives for the DSS may reveal important, time-sensitive data gaps that require modifications to existing studies or perhaps development of new studies. An example for the fish passage DSS is reservoir ice studies: we expect to be used to design tributary collectors for outmigrating juvenile fish but don't know if the model will provide that information. An example for the conceptual ecological model is the groundwater studies which we expect will allow estimation of project impacts to areas of upwelling, but project effects to upwelling are not one of the goals of that study. Therefore, we request that the schedule for DSS development be accelerated so potential data needs not currently covered in the existing study plans can be identified and added to the study plan.	
Page 10 Para 1	**39**	**Enclosure 2: NMFS Comments on the 2014 Fish Genetics Implementation Plan**	These comments were reviewed and incorporated in the Final 2014 Genetics Implementation Plan filed with the Study 9.14 ISR on June 3, 2014. A comment-response table was filed with the Study 9.14 ISR Part B Section 8. These comments are not addressed here again.
Page 14	**40**	**Enclosure 3: NMFS Initial Comments to**	AEA filed the 2015 Implementation Technical Memorandum on September 10, 2014. AEA expects

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Para 3 – Page 17, Para 1		**AEA regarding the 2014 Pilot Study for Cook Inlet Beluga Whales and Eulachon:** Beginning in early May 2014, NMFS staff were contacted and asked to meet with AEA and their contractors (hereinafter referred to collectively as AEA) to discuss AEA's plans to modify the [RSP as modified by FERC's determination] for the Cook Inlet Beluga Whale Study (Study 9.17). AEA informed NMFS staff of their intent to conduct a boat-based pilot study involving both a Cook Inlet beluga whale research effort and a eulachon research effort. Despite the very short notice from the intended start date of the research activities, NMFS agreed to provide some initial comments and preliminary recommendations to AEA. These initial comments were primarily provided to help reduce the high harassment and harm potential this pilot project could have on the endangered Cook Inlet beluga whales, and to help AEA avoid violating both the Marine Mammal Protection Act and the Endangered Species Act. These comments were not an endorsement of the pilot study, nor an acknowledgement that the pilot study would constitute the second year of the required FERC-approved study plans. These comments were sent to AEA by email on May 14, 2014, and are reproduced in Enclosure 3. As a result of these NMFS comments, AEA did make modifications to the pilot study in an effort to reduce the harassment potential to Cook Inlet beluga whales. NMFS has had multiple meetings	that through implementation of this plan along with the continued implementation of the Eulachon Study (Study 9.16), AEA will meet all Study Plan objectives. From May through August, AEA held a series of four meetings (May 7, May 22, August 7, and August 26, 2014) with NMFS personnel to discuss alternative methods for collecting data on Cook Inlet beluga whales (CIBW) and their prey. The intent of these meetings was to openly discuss and collaborate on the development of alternative study methods that could be used by AEA to better understand potential impacts of the project on CIBWs while minimizing any potential impacts of conducting the research itself. During the first meeting in May 2014, AEA described preliminary plans to test the feasibility of using boat-based surveys to document relationships between beluga whales and their prey in Cook Inlet at the mouth of the Susitna River. Upon review of a written description of the proposed methods, NMFS provided, via email, the comments also contained in this letter from NMFS to FERC. Although AEA felt there was very little risk of harassment and no chance of harm to CIBW's from the proposed boat-based survey methods, NMFS concerns were incorporated into revised pilot-study methods (discussed with NMFS during the May 22, 2014 meeting) that focused solely on beluga whale prey and included provisions to specifically avoid beluga whales. Nine surveys were conducted in June and July, 2014 as described in the 2014 Cook Inlet Beluga Whale Prey Study Implementation Technical Memorandum filed with FERC on September 26, 2014 (LGL 2014a). The surveys in 2014 were successful in detecting fish and marine mammals; however, it was decided that the boat-based surveys should not be carried out in 2015 because of concerns regarding the potential disturbance of CIBW. Documenting habitats where CIBW and their prey are closely associated may require approaching beluga whales at closer distances than deemed appropriate as well as limitations to the survey method caused by weather (see further details in the 2014 Cook Inlet Beluga Whale Prey Study Implementation Technical Memorandum filed with FERC on September 26, 2014 (LGL 2014a), and the Cook Inlet Beluga Whale Study 2015 Implementation Plan Technical Memorandum filed with FERC on September 30, 2014). AEA has provided NMFS with several documents throughout the process of discussing CIBW study methods. A description of AEA's plans to conduct limited field work in 2014 and, based on the results, submit a Cook Inlet Beluga Whale Study 2015 Implementation Plan in September 2014 was included in Study 9.17 ISR Section 7.1 and Attachment 1 (LGL and R2 2014). The two meetings with NMFS in August were primarily intended to discuss the methods that would be included in the Cook Inlet Beluga Whale Study 2015 Implementation Plan. Prior to the August 7, 2014 meeting, AEA shared with NMFS an outline and rationale for proposed methods to be included in the Cook Inlet Beluga Whale Study 2015 Implementation Plan. Preliminary results from the 2014 field work were discussed with NMFS at the beginning of that meeting and that occupied a majority of the time

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		with AEA to discuss the progress and status of the 2014 pilot study since early May. During several meetings, AEA has provided inconsistent information regarding their plans for 2015 Cook Inlet beluga studies. At this time, it is unclear which aspects of the FERC-approved study plans for Cook Inlet beluga whales AEA intends to implement in 2015, if any. Additionally, AEA has a pattern of providing information to NMFS immediately prior to a meeting (e.g., one hour in advance) or after the meeting, but has an expectation that NMFS will provide official comments during the meeting. This process has substantially limited the ability of NMFS to provide meaningful comments to AEA. Finally, while the focus of Study 9.17 is on Cook Inlet beluga whales, NMFS reiterates that the Marine Mammal Protection Act pertains to all marine mammals, regardless of any additional protections under the Endangered Species Act. Thus, harassment of any marine mammal resulting from AEA's activities is prohibited.	allotted for the meeting. AEA used the remaining meeting time to describe to NMFS the intent and content of the 2015 study outline. Because there was insufficient time to fully discuss the outline and content of the Cook Inlet Beluga Whale Study 2015 Implementation Plan, a follow-up meeting with NMFS was scheduled for August 26, 2014. Prior to the August 26, 2014 meeting, AEA provided the identical meeting materials and outline to NMFS as was provided ahead of the August 7, 2014 meeting. The rationale and content of the outline and methods to be included in the Cook Inlet Beluga Whale Study 2015 Implementation Plan were more fully discussed during the meeting on August 26, 2014 and the results of that discussion were incorporated into the Cook Inlet Beluga Whale Study 2015 Implementation Plan Technical Memorandum filed with FERC on September 30, 2014 (LGL 2014b).

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Table 1. Radio-tags released in resident fish, 2013-2014.

River Section	2013					2014					Total '13+'14	Total FERC period	Balance of 30 target
Middle-Lower	**Ma/Ju**	**July**	**August**	**Sept**	**Total**	**Ma/Ju**	**July**	**August**	**Sept**	**Total**			
Arctic grayling	11	17	1	5	34	8	0	0	0	8	42	19	-12
Burbot	2	0	5	2	9	0	0	0	5	5	14	7	16
Dolly Varden	1	6	2	0	9	0	0	0	0	0	9	2	21
Humpback whitefish	3	4	0	0	7	0	0	0	0	0	7	0	23
Lake trout	0	0	0	0	0	0	0	0	0	0	0	-	30
Longnose sucker	13	8	6	1	28	0	0	0	0	0	28	-	2
Northern pike	0	0	5	0	5	0	0	0	0	0	5	-	25
Rainbow trout	11	17	3	13	44	0	0	0	0	0	44	11	-14
Round whitefish	11	3	0	7	21	0	0	0	0	0	21	0	9

	2013					2014					Total '13+'14	Total FERC period	Balance of 30 target
Upper	**Ma/Ju**	**July**	**August**	**Sept**	**Total**	**Ma/Ju**	**July**	**August**	**Sept**	**Total**			
Arctic grayling	0	31	1	26	58	53	0	0	0	53	111	53	-81
Burbot	0	0	0	7	7	14	0	0	19	33	40	26	-10
Dolly Varden	0	0	0	0	0	0	0	0	0	0	0	0	30
Humpback whitefish	0	0	0	0	0	0	0	0	0	0	0	0	30
Lake trout	0	0	0	0	0	0	0	0	12	12	12	-	18
Longnose sucker	0	5	0	5	10	17	0	0	17	34	44	-	-14
Northern pike	0	0	0	0	0	0	0	0	0	0	0	-	30
Rainbow trout	0	0	0	0	0	0	0	0	0	0	0	0	30
Round whitefish	0	0	0	18	18	7	0	0	16	23	41	0	-11

Table 2. Radio-tags at large by month.

Mid-or-Lower-Susitna-released resident fish at large, by study month. Tags released in a given month become "at-large" in the following month.

Species	Jun '13	Jul '13	Aug '13	Sep '13	Oct '13	Nov '13	Dec '13	Jan '14	Feb '14	Mar '14	Apr '14	May '14	Jun '14	July '14	Aug'14	Sep'14	Total FERC period
Arctic Grayling	0	11	24	17	18	13	12	8	8	8	8	8	6	13	10	10	14
Burbot	0	2	2	4	4	3	3	2	2	2	1	1	1	1	1	6	10
Dolly Varden	0	1	5	6	4	4	3	3	3	3	3	3	3	2	1	1	6
Humpback Whitefish	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Lake Trout	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
Longnose Sucker	0	8	9	7	5	4	4	1	0	0	0	0	0	0	0	0	-
Northern Pike	0	0	0	3	3	3	3	3	3	3	3	3	2	2	2	2	-
Rainbow Trout	0	11	25	14	21	21	20	20	20	20	20	17	16	16	15	15	33
Round Whitefish	0	10	13	11	13	11	11	9	9	7	7	5	3	3	2	2	15

Shaded cells are FERC periods to tag a total of 10 of 30 tags.

Upper-Susitna-released resident fish at large, by study month

Species	Jun '13	Jul '13	Aug '13	Sep '13	Oct '13	Nov '13	Dec '13	Jan '14	Feb '14	Mar '14	Apr '14	May '14	Jun '14	July '14	Aug'14	Sep'14	Total FERC period
Arctic Grayling	0	0	24	19	40	36	27	25	23	22	21	18	15	57	47	47	33
Burbot	0	0	0	0	6	5	5	4	4	4	4	3	2	15	12	31	31
Dolly Varden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Humpback Whitefish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake Trout	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	-
Longnose Sucker	0	0	3	1	5	5	2	2	1	1	1	1	1	17	15	32	-
Northern Pike	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
Rainbow Trout	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Round Whitefish	0	0	0	0	18	15	12	9	6	5	5	4	3	10	9	25	9

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

September 22, 2014

Wayne Dyok
Susitna Project Manager
Alaska Energy Authority
813 W. Northern Light Boulevard
Anchorage, AK 99503

RE: FERC Project P-14241, Proposed Susitna-Watana Hydropower Project

Dear Mr. Dyok:

The Alaska Energy Authority (AEA) has requested that the National Marine Fisheries Service (NMFS) comment on portions of the Initial Study Report for the proposed Susitna-Watana Hydropower project (June 3, 2014). We also include here comments previously submitted on the 2014 Fish Genetics Implementation Plan and on the pilot 2014 Cook Inlet beluga whale and eulachon studies (May 12 and May 14, 2014). We expect that the Alaska Energy Authority (AEA) will address these issues at the upcoming meeting on the Initial Study Report in October 2014.

Briefly, our enclosed comments on the Initial Study Report's fish studies (9.5 Upper River Fish Distribution and Abundance, 9.6 Lower and Middle River Fish Distribution and Abundance, and 9.7 Salmon Escapement) identify issues with the integrity of data, the ability to effectively integrate modeled studies, and the progress and detail of the decision support systems. Model integration is a key concern, especially for assessing baselines and project impacts on the Susitna River.

NMFS recommends that the data issues be resolved as soon as possible. For NMFS to effectively review this project, the studies must accurately identify fish species, develop accurate habitat models, and use the best available science to understand anadromous fish distribution and habitat associations. Moreover, the studies require accurate data to calibrate and validate proposed models and to integrate these models without inadvertently amplifying errors. Given the current issues with the data, it is not plausible that the data for predictive modeling be used to describe baseline conditions or to predict potential impacts. Modifications, additions, and new study requests for the second year of studies cannot be developed given the current issues with the data; these issues must be resolved prior to conducting additional field studies.

In regards to the 2014 Studies and the Final Study Plan, NMFS requests that the AEA adhere to the schedule the Federal Energy Regulatory Commission (FERC) established for the Integrated

Licensing Process (ILP) for this project in their January 28, 2014 determination. In that determination, FERC ordered the AEA to submit the final Initial Study Report on June 3, 2014 and to hold a meeting in October to present the results of the Initial Study Report and discuss any proposed changes. Although the AEA has just released reports of the studies it conducted in 2014 and intends to discuss those studies at the October meeting, NMFS is not prepared to step outside the FERC-ordered process and consider those studies at this time. The limited time allocated would be more effectively spent addressing problems with the 2013 study implementation and discussing study modifications or new studies.

Any studies that the AEA conducted in 2014 cannot be construed as "Year 2 ILP Studies," because the Initial Study Report was not yet complete at the time the studies were conducted. Conducting the studies before completing the Initial Study Report precluded participants from recommending any changes to the study or making new study requests based a review of a completed Initial Study Report. As noted by FERC in an May 6, 2014 e-mail on the Implementation Plan for the Genetic Baseline Study for Selected Fish Species in the Susitna River, Alaska:

> ...to clarify, we just reviewed our Study Determination letter and confirmed that the genetics operational plans are due by April 30 of 'each year of study implementation.' Because our January 2014 letter granted AEA's request, in part, for second season studies to be conducted in 2015 rather than 2014... it follows that the genetics operational plan for the second study season is due by April 30, 2015, and not by April 30, 2014.
>
> (Nicholas Jayjack, March 6, 2014 email to Susan Walker)

Although NMFS provided courtesy reviews and comments to the AEA on 2014 studies for fish genetics (Enclosure 2) and the Cook Inlet beluga whales/eulachon pilot study (Enclosure 3) by mid-May of 2014, NMFS does not consider any 2014 study to be the second year of study under the ILP process.

We consider these concerns significant and in need of resolution for NMFS to fulfill its statutory responsibilities. In the context of this project, we construe those responsibilities as follows:

1) to identify study data gaps;

2) to make recommendations for the second year of studies (and beyond);

3) to understand the project's ability to quantify baseline and proposed project operational impacts to fish and wildlife resources;

4) to support recommendations for the protection, mitigation, and enhancement measures associated with the project; and

5) to make informed decisions pursuant to our Section 18 Fishway Prescription authority under Federal Power Act.

The ILP schedule for this project has been altered and now affords the AEA an opportunity to make necessary changes to studies for this project prior to entering the second year of study. This will allow for development and implementation of a more accurate, effective, and cost-effective plan of study for this important project.

In our November 30, 2014, FERC filing we will provide detailed recommendations to address specific concerns related to the individual Initial Study Reports of June 3, 2014. If you have questions regarding this letter, please contact Susan Walker at (907) 586-7646 or Susan.Walker@noaa.gov).

Sincerely,

James W. Balsiger, Ph.D.
Administrator, Alaska Region

Enclosures (3)

cc:
e-filed under FERC docket P-14241 as distribution to all Susitna licensing participants
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Enclosure 1: Details regarding Data Integrity, Model Integration/Proof-of-Concept and Decision Support Systems.

DATA ISSUES:

Data Collection: Quality Assurance and Quality Control, and Methodologies

NMFS is concerned with the current status and implementation of aquatic studies and believes that, unless these issues are addressed, many study objectives will not be met. Our primary concerns are as follows:

1 1) Habitat classification has not been completed;
2 2) Fish passage criteria have not been developed;
3 3) Fish sampling study plans were not followed; sampling units were inappropriately subsampled;
4 4) Fish sampling locations did not incorporate FERC recommendations;
5 5) Because the fish sampling did not follow the sampling plan, this resulted in an inability to estimate relative fish abundance;
6 6) Fish seem to have been identified incorrectly;
7 7) Data were collected and reported at inappropriate mesohabitat scales;
8 8) Sampling sites among studies were not co-located;
9 9) Tagging goals were not met;
10 10) Fish targets for HSC sampling were not met;
11 11) The mainstem upper river migrant fish trap was not installed;
12 12) A fish wheel was not installed, and fish were not tagged near the entrance to Devils Canyon;
13 13) Additional problems associated with late installation and operation of migrant traps were likely influenced by environmental conditions associated with late breakup; and
14 14) Juvenile salmon distribution and abundance in 2013 were likely affected by the record fall floods in 2012.

We are providing some additional clarification on some of these concerns.

15 The actual implementation of the abundance sampling program did not follow the statistical models used to select sampling units. In particular, subareas (mesohabitats) within selected areas were 'randomly' selected for subsampling, and sampling was not consistent between sampling events (different gears, different effort, different order of gears, different total area sampled, etc). Sampling error in the fish distribution and relative abundance studies needs to be accounted for in order for these studies to accurately estimate fish distribution and abundance. Estimates of numbers of Chinook salmon that migrate above Devils Canyon need to include the assumptions, standard error, and resulting statistical confidence intervals associated with that estimate. Better descriptions of (and statistical accounting for) both sampling and non-sampling errors need to be provided. The data used to describe fish-habitat association

preferences and the standard errors associated with those species and life-stage habitat correlations need to be validated, as this analysis proposes to describe macrohabitat relationships for fish. These relationships will be used to evaluate project effects, to validate instream flow habitat model predictions, and to extrapolate results from focus areas to geomorphic reaches and river segments. Ultimately these data will be used to develop protection and mitigation measures and to serve as a basis for post-project monitoring.

Data collection and analysis

16 Data collection methods need improvement. For example, detection and recovery of PIT (Passive Integrated Transponder) tags need to be improved to yield useful data to meet study goals and objectives. Location of the detection arrays did not cover the entire channel and was biased toward fish migrating down channel. Also, because too few tags were recovered, efficiency estimates could not be made.

17 Misidentification of juvenile fish by species induces significant error, and application of this erroneous data would result in inaccurate conclusions. Our review of the Initial Study Report finds that a very high percentage of the juvenile salmonids were misidentified. We also question the accuracy of all juvenile fish sampling data because of the following details:

- 18 large numbers of unidentified salmonid juveniles (some of which were PIT tagged);
- 19 anomalous length distributions and habitat associations (e.g., juvenile Chinook 150 mm fork-length;
- 20 the large abundance of juvenile Chinook in beaver ponds;
- 21 the absence of pink salmon in any samples; and
- 22 the disappearance of sockeye salmon from Indian River between the February draft Initial Study Report and the June draft Initial Study Report).

23 Considering the length distributions and habitat associations reported, we have reservations also about the identification of these juvenile fish and conclude that many juvenile salmonids identified as Chinook salmon were coho salmon.

24 There is an absence of quantitative analysis of habitat sampling, fish distribution and relative abundance, and early life history data collected to date. Deviations from the Revised Study Plan (RSP) and FERC staff recommendations make developing estimates from these data difficult or even impossible. These data are the basis of the fish and habitat sampling design and must be collected appropriately for the study to yield useful information. Without better integration of historical data into assessment of current results (e.g., the data from studies collected in 2012, which used different methodology and locations), these data should not be used to assess habitat associations for salmon by species and life stage. Much of the data on species distribution, relative abundance, and habitat associations appears anomalous in comparison to available

science on these species and their life stages as known through data previously collected and past studies conducted in the Susitna River and environs.

25 One of the main objectives of radio-tagging was locating spawning locations. The proposed activity of circling over a tag that remained in the same location for a period of time was not done (mainly for salmon). For non-salmon species, it was proposed to tag some species after their spawning season and monitor the tag in the following year to locate spawning locations. It remains to be seen if this actually worked. If not, the objective of locating spawning locations was not met

Scale

26 We do not believe that data has been collected among individual related studies at an appropriate scale to allow fish/habitat associations to be made and extrapolated. A related concern is that fish and habitat data have not been collected at a biologically relevant scale.

27 To assess project-caused impacts to fisheries resources (for example), the sampling effort must be at a scale relevant to Susitna River fish species and life stages and must adequately quantify baseline conditions for accurate extrapolation. In some instances, the *spatial* scale of data collection implemented varies inappropriately within and among studies, resulting in a mismatch between the data collected and the purpose of its collection. Additionally, the *temporal* scale of data collection needs improvement. The Initial Study Report indicates that winter fish sampling did not occur in all focus areas as proposed. Early spring sampling occurred only in three focus areas due to record late breakup. Initial sampling following breakup and installation of migrant traps did not occur until the middle of June (after juvenile outmigration had begun), and spring sampling for fish distribution and abundance was not conducted. Improvements need to be made to capture the full seasonality of fish life history strategies which vary considerably within a single season. (Fish move around, and the extent of that movement must be captured through sampling. A single-day of sampling is insufficient to understand the habitat associations of many different and mobile species and life-stages of fish.)

28 The error inherent in the inappropriate scale of data collection would be compounded by the proposal to extrapolate study results throughout the river; this would perpetuate and increase sampling errors across the entire length and width of the river and its habitats. Resource agencies are particularly concerned about this proposal to "scale up," and requested rationale for its implementation (Riverine Modeling Integration Meeting, November 2013). The ability to "scale up" is only valid when the initial sampling has been conducted accurately and at a scale relevant to resource concerns, which is not the case with studies conducted thus far.

Co-location of sampling sites

29 Review of the Initial Study Report reveals that sampling sites for the various study disciplines have not been consistently and thoroughly co-located, as laid out in the RSP as modified by

FERC staff recommendations, to provide an assessment of baseline conditions of habitats relative to fish use and preference. For example, invertebrate sampling locations (River Productivity 9.8) were not co-located with fish sampling locations. Rather than addressing this issue, or NMFS's previous concerns about the number of middle river sampling locations, AEA is proposing a study modification to sample in tributaries above the dam inundation zone. At some locations, sampling of variables such as depth and velocity was appropriately co-located, but other variables that should also be co-located such as groundwater exchange were not. NMFS recommends that at Focus Areas data collection for the full suite of interdependent variables should be co-located.

30 The cumulative effects of deficiently implemented sampling methods, failure to co-locate sampling sites, lack of integrative links, and discrepancies in data collection scales are magnified because these data are proposed for inputs to models. Model calibration, validation and decision making processes will then be used to assess potential impacts to resources.

31 NMFS recommends that the data issues be resolved as soon as possible. Accurate data is required to calibrate and validate proposed models; and quality data from individual studies is necessary to integrate models without amplifying errors unknowingly. Given these concerns about the data, it is not plausible to use the data for the predictive modeling that is proposed to describe baseline conditions or to predict potential project impacts.

32 These issues of data integrity and data collection are based in part on studies being conducted with significant differences from the FERC-modified RSP. These issues must be resolved prior to conducting additional field studies. NMFS cannot develop appropriate recommendations for study modifications or make new study requests for the second year of study given the current issues with the studies and the data.

MODEL INTEGRATION/PROOF-OF-CONCEPT:

Biological relevance

33 During the Riverine Modeling Integration Meeting (November 2013), 25- and 50-year scenarios for predicting project impacts to the physical river channel and habitats were proposed. While those timelines are consistent with the study plan and may present a manageable timeframe for the modeling work (B. Fullerton, POC meeting, November 2013), they may not answer questions related to assessing impacts on important biological resources in a biologically meaningful timeframe. Models need to be sensitive enough to detect changes that are biologically meaningful to the species and habitats likely to be affected by project operations. As currently planned, this is not the case.

34 NMFS has identified a need to develop and incorporate biological input and output parameters and evaluate these under an appropriate range of operational scenarios (e.g., base load, ecological flows, load-following, run-of-river). The temporal scales (i.e., 25- and 50-year scales)

that are needed 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, 5-7 years; or 2-4 years for eulachon). NMFS is concerned that the present model cannot answer the biological questions it proposes to answer.

35 Some study plan data collection efforts do not provide the information needed for the integrated modeling efforts. For example, during the November 2013 Riverine Modelling Integration meeting, it was revealed that the Water Quality Modeling study would require data on the spatial distribution of groundwater discharge to surface water bodies. Analytical or numerical groundwater flow simulation would be one way to satisfy this input requirement. However, the Groundwater Study in the Initial Study Report does not explicitly state that analytical or numerical groundwater flow simulations would be undertaken in support of the other physical process models.

36 Model integration is at this point largely an *ad hoc* exercise. A stand-alone model integration study is required to allow stakeholders to develop confidence in the models, understand inputs and outputs, and have the conceptual linkages demonstrated via an interactive riverine working model. Many questions remain about the predictive capabilities of the models, particularly under integration and model assumptions. Sensitivity and uncertainty analyses need to be conducted to contribute to understanding of model limitations. The full extent of mismatch of purported integration of models is currently unknown, even to the project proponent, much less to stakeholders reviewing study results.

DECISION SUPPORT SYSTEMS:

37 Decision Support Systems (DSS) are critical for evaluating potential impacts of the project. We believe that their development should be expedited to the extent possible without excluding input from stakeholders.

38 The RSP (Instream Flow Study 8.5 RSP) includes the use of conceptual ecological models as the DSS to assess the project's impacts on a free flowing river and its resources. Also, the Fish Passage study includes use of a DSS to assess the feasibility and effectiveness of different fish passage options. It is our understanding that AEA intends to develop the conceptual ecological model DSS using manual matrices by early 2015 (FERC 2013) and to use a modified existing DSS for fish passage (currently past due). Considering the potential of these DSSs to support critical assessments of impacts from the project, development of the DSS should be a collaborative process with mutual development of, and agreement about fundamental objectives, assumptions, critical inputs, weighting methods, and other parts of the models. Formulation of the fundamental objectives for the DSS may reveal important, time-sensitive data gaps that require modifications to existing studies or perhaps development of new studies. An example for the fish passage DSS is reservoir ice studies: we expect to be used to design tributary collectors for outmigrating juvenile fish but don't know if the model will provide that information. An

example for the conceptual ecological model is the groundwater studies which we expect will allow estimation of project impacts to areas of upwelling, but project effects to upwelling are not one of the goals of that study. Therefore, we request that the schedule for DSS development be accelerated so potential data needs not currently covered in the existing study plans can be identified and added to the study plan.

39 Enclosure 2: NMFS Comments on the 2014 Fish Genetics Implementation Plan

SUMMARY:

NMFS Fisheries geneticists; Dr. Jeff Guyon, Supervisory Research Geneticist and the Fisheries Genetics Program Manager at the Ted Stevens Marine Research Laboratory of NOAA's Alaska Fisheries Science Center and Dr. Robin Waples, Senior Scientist at NOAA's Northwest Fisheries Science Center, reviewed the "Implementation Plan for the Genetic Baseline Study for Selected Fish Species in the Susitna River, Alaska." NMFS appreciates that AEA and the Alaska Department of Fish & Game (ADF&G) incorporated most of the comments and suggestions provided to AEA in our review, and included the topics discussed with ADF&G, U.S. Fish and Wildife Service and NMFS at the technical meeting in March in the final 2014 implementation plan.

COMMENTS PROVIDED TO AEA:

This report reflects a carefully thought-out approach to sampling from natural populations to provide baseline data prior to a proposed hydroelectric project. As proposed, the project would no doubt produce a great deal of very useful information. Comments below are intended to help improve certain aspects of the experimental design and/or data analysis.

Hypotheses for Chinook salmon:

Page 3: NMFS agrees that departures from HWE [Hardy-Weinberg Equilibrium] could support hypothesis 1b (fish above Devils Canyon are derived from spawners above and below), but only if the departures are in the direction of a deficit of heterozygotes, as expected under the Wahlund effect (population mixture). However, Hypothesis 2 would not necessarily produce any such departures if all the fish above the canyon were derived from a single lower population.

Page 3: "On the other hand, low genetic divergence between fish spawning above Devils Canyon and fish spawning in aggregates below the canyon would indicate that a large proportion of the fish ascending Devils Canyon are strays or colonizers, and have not established a self-sustaining population (support for Hypothesis 2)." This conclusion cannot be supported simply from failing to find a difference. It would be necessary to conduct a power analysis to determine how large a difference (e.g., Fst value) could exist and not be detected as statistically significant. Then, it would be necessary to translate the genetic data into estimates of gene flow to evaluate what levels of connectivity are consistent with the observed data.

Sampling design:

NMFS concurs that that samples from multiple years are essential to be able to make sense of the relative magnitude of spatial and temporal differences. Three years of samples may be inadequate for this purpose, especially considering that Chinook and perhaps some of the other species have generation lengths much longer than three years.

The required sample sizes depend on the particular objective, as well as the (unknown) differences among populations. In general the numbers proposed seem reasonable. However, the logic for requiring larger samples for msat [microsatellite] analyses is inadequately explained. This may be based on the idea that larger samples are required to provide precise estimates of all the low frequency alleles involved with msats. However, that is not the objective; the objective is to use all the data to draw biological conclusions about the species of interest. From this perspective, each msat locus is worth several SNP [single nucleotide polymorphism] loci in terms of information content, as a large number of empirical studies have demonstrated.

Analyses:

Page 12-13: NMFS strongly recommends that the PIs [primary investigators] not remove putative siblings as proposed. Siblings, in fact, contribute part of the signal in genetic analyses that provides insights into biological processes. Purging them from the sample universe scrubs the data of this biological signal, particularly for small populations where siblings are common. The effects that this has on subsequent analyses cannot be easily determined, but could be substantial. This purging makes the remaining individuals more similar to what would be expected from populations that are infinite in size and hence have no relatives. Purging of a particular sample might be justified, if the sample has been collected non-randomly (that is, if it is thought to represent progeny from only a few families). However, in that case the proper amount of purging could only be determined if one knows exactly how non-random the collection is. But this will seldom if ever be known in practice. Furthermore, even if this was known and relatives were removed, the result still would not be a representative collection from the population as a whole. Therefore, the solution to non-random sampling is not purging relatives but to going back into the field and collecting a representative sample.

Page 13: "We will exclude juvenile collections from the baseline if they show significant allele frequency differences from adult collections or show deviations from HWE when pooled with adult collections." We note that age structure creates mini-Wahlund effects that could cause HW departures even in mixed-age adult samples. Likewise the same thing could happen if you combine juveniles and adults produced by different cohorts. That does not mean that combining them won't produce a more robust overall estimate of population allele frequencies.

NMFS does not agree with using the Bonferroni correction for HWE tests; there are too many overall tests and thus the criterion become too conservative. Bonferroni correction controls the probability of false positives only and the correction ordinarily comes at the cost of increasing the probability of producing false negatives, consequently reducing the statistical power of the HWE tests. Instead, we suggest starting with unadjusted tests and evaluating what fraction are significant for each locus (across all pops) and for each pop (across all loci). If the resulting proportions do not deviate much from the expected proportion (dictated by the significance level

of the test), there is no reason to reject HWE. Loci or pops that are outliers can be singled out for more detailed analysis, perhaps using Bonferroni or FDR [false discovery rate].

Minor comments:

Page 1: The project "will modify the flow, thermal, and sediment regimes of the Susitna River. . . ." The project will also affect migration and fish passage, among a host of other important effects. The description of project effects should be written to comprehensively describe all major project effects.

Page 1: "If breeding isolation (lack of migration) among populations occurs over sufficient time and population sizes are small enough, genetic drift will result in variation in allele frequencies at neutral loci (loci not under natural selection) among populations." Genetic drift will *always* result in some differences unless there is complete panmixia.

Analyses of genetic distance: it is fine to use Fst as an index of genetic distance, but it must include a correction for sample size (like W&C theta). Otherwise, small samples will tend to look like outliers.

Page 6: "For mixed stock collections, sample sizes of 200 fish or 100 fish per collection are adequate to provide stock composition estimates that are within 7% or 10% of the true estimate 95% of the time, respectively (Thompson 1987)." That might have been true for the particular study cited, but how large a sample is required will depend on the number of markers and the magnitude of divergence among populations, so this general statement is not valid.

Page 8, the numbering is off under "Sample Collection Targets."

Page 9, under "Sample Collection Targets" item #9, we understand the issues regarding sample numbers, but an adequate adult Chinook salmon sample set from above the proposed dam is needed at the end of the study to make the necessary conclusions. What happens if the goal of 100 adult Chinook salmon is not realized? This should be addressed in advance.

Page 10, Section 4.2.4.1, identifies a sample target of 200 juvenile Chinook salmon from 4 systems in or above Devils Canyon, but later in the report under section 4.5 "Data Retrieval and Quality Control" it mentions that software will be used to identify siblings and exclude all but one individual in the baseline for every set of siblings identified. As such, given the likely small population sizes above the proposed dam site, 200 juveniles from each system is unlikely to be sufficient.

Page 16, Section 4.6.5, where it says "Collections will be pooled when tests indicate no difference between collections ($P>0.01$)." While we agree that it is difficult to prove there is no difference between collections, we recommend though using a p value greater than 0.05 as more appropriate to reject the null hypothesis.

Appendix A Section 2.2 Regarding the radio telemetry studies, the potential impacts of the tag on the migration pattern of the salmon, especially for a stock that has to migrate the farthest and through a 7-mile long Class 5+ canyon must be considered and discussed. Also please address whether the tags let you know where the fish spawned (or if they spawned) or just indicate where they were when relocated, including noting the spatial accuracy of the tag signal recoveries.

Appendix B - page 1, for the Black River: Were the Chinook that were sampled two juveniles which were collected in 2013? Please confirm and identify them as juveniles if that's true.

Table B5, Is there an overall HWE test for all markers for each population?

40 **Enclosure 3: NMFS Initial Comments to AEA regarding the 2014 Pilot Study for Cook Inlet Beluga Whales and Eulachon**

SUMMARY:
Beginning in early May 2014, NMFS staff were contacted and asked to meet with AEA and their contractors (hereinafter referred to collectively as AEA) to discuss AEA's plans to modify the [RSP as modified by FERC's determination] for the Cook Inlet Beluga Whale Study (Study 9.17). AEA informed NMFS staff of their intent to conduct a boat-based pilot study involving both a Cook Inlet beluga whale research effort and a eulachon research effort. Despite the very short notice from the intended start date of the research activities, NMFS agreed to provide some initial comments and preliminary recommendations to AEA. These initial comments were primarily provided to help reduce the high harassment and harm potential this pilot project could have on the endangered Cook Inlet beluga whales, and to help AEA avoid violating both the Marine Mammal Protection Act and the Endangered Species Act. These comments were not an endorsement of the pilot study, nor an acknowledgement that the pilot study would constitute the second year of the required FERC-approved study plans. These comments were sent to AEA by email on May 14, 2014, and are reproduced in Enclosure 3. As a result of these NMFS comments, AEA did make modifications to the pilot study in an effort to reduce the harassment potential to Cook Inlet beluga whales. NMFS has had multiple meetings with AEA to discuss the progress and status of the 2014 pilot study since early May. During several meetings, AEA has provided inconsistent information regarding their plans for 2015 Cook Inlet beluga studies. At this time, it is unclear which aspects of the FERC-approved study plans for Cook Inlet beluga whales AEA intends to implement in 2015, if any. Additionally, AEA has a pattern of providing information to NMFS immediately prior to a meeting (e.g., one hour in advance) or after the meeting, but has an expectation that NMFS will provide official comments during the meeting. This process has substantially limited the ability of NMFS to provide meaningful comments to AEA. Finally, while the focus of Study 9.17 is on Cook Inlet beluga whales, NMFS reiterates that the Marine Mammal Protection Act pertains to all marine mammals, regardless of any additional protections under the Endangered Species Act. Thus, harassment of any marine mammal resulting from AEA's activities is prohibited.

COMMENTS PROVIDED TO AEA:
These initial comments are intended to provide early guidance and preliminary recommendations regarding this pilot study. NMFS intends to submit formal comments on this study proposal to FERC.

NMFS received a draft copy of the AEA's "Pilot Study of Cook Inlet Beluga Whale and Prey Species in the Susitna River Delta" on Monday May 12, 2014. AEA and their contractors intend to implement the pilot study beginning the week after NMFS received the draft study plan for review, and continue through all of June. The pilot study is submitted in lieu of the FERC-approved beluga studies (aerial surveys, video cameras, still cameras, and water surface

elevation model) for 2014. Although NMFS agreed to try and get these preliminary comments back to AEA prior to implementation of the pilot study, NMFS advises that these are not official comments, and as such do not indicate NMFS's support for or rejection of the pilot study. Furthermore, NMFS does not consider any 2014 study to be the second year of study under the ILP process. This is because the Initial Study Report is not complete, and licensing participants have not been able to recommend any changes to the study or make new study requests based on a review of the completed Initial Study Report. Our initial comments regarding the draft pilot study after an abbreviated review period are as follows:

We understand neither AEA nor its contractors will be obtaining authorizations under the federal Marine Mammal Protection Act (MMPA) for the unintentional take by harassment of marine mammals. Thus no harassment or take of any marine mammal under NMFS' jurisdiction is authorized under either the MMPA or the Endangered Species Act (ESA) and AEA and/or its contractors would be responsible for any violation of these federal laws.

The draft pilot study references LGL Alaska Research, Inc.'s ongoing boat-based surveys for Cook Inlet belugas as good documentation of Cook Inlet belugas as a result of closer proximity and longer encounter durations with the whales than by aerial surveys. While we agree that a boat survey has the potential to get closer to and spend more time with a group of marine mammals than an airplane, we do note that the referenced LGL studies have a NMFS-issued MMPA research permit and ESA authorization to allow harassment and close approaches. The level of information collected by these two different boat-based studies will not be comparable. Furthermore, we note that the LGL researchers associated with the NMFS permitted photo-identification study are not indicated as participating in this pilot study.

The pilot study has the potential to disturb or harass marine mammals due to the presence of the boat and operation of the split-beam sonar. The pilot study does suggest the implementation of the "Marine Mammal Viewing Guidelines and Regulations" as found on our website (http://alaskafisheries.noaa.gov/protectedresources/mmv/guide.htm) as an effort to reduce the potential for harassment or take. We note that many of the steps of the viewing guidelines are stated in the "2014 Pilot Study Methods" section of the draft pilot study, but add that whales should not be encircled or trapped between boats or boats and shore, and that the study needs to ensure that when approaching the whales the boat stays fully clear of whales' path of travel (i.e., the boat doesn't approach belugas "head-on"). These guidelines are intended to reduce the likelihood that marine mammals would be affected by this study, but do not guarantee no harassment or take will occur. This is a directed research project targeting Cook Inlet beluga whales, and a research permit may be necessary if the project may result in take or harassment of this endangered species or other marine mammals.

The pilot study is designed for repeated approaches to Cook Inlet beluga whales, albeit theoretically no less than 100m away. This study design increases the potential for harassment, including behavioral modifications or displacement that may not be evident from the boat, despite one of the pilot study's goals being to not cause any disturbance to the whales themselves. Given the repeated approaches, and potential for belugas or other marine mammals to not be visible below the water, implementation of the Marine Mammal Viewing Guidelines may be insufficient for preventing harassment or take. This potential for disturbance or harassment is of concern to NMFS, not only in general, but specifically during the first two weeks of June when we will be conducting our aerial surveys to assess official population abundance and distribution. Any disturbance or behavioral modification of the beluga whales associated with the pilot study may result in a reduction of our ability to accurately conduct our aerial surveys. The Susitna delta area is an important foraging area to the Cook Inlet belugas in late spring/early summer, after limited food during the winter. Any disturbance to the whales may result in reduced foraging success, and thus have population-level adverse effects.

The draft pilot study plan indicates that "if whales move away from the area where they were initially detected, an attempt will be made to obtain a depth reading and prey information at that location", but there is no information regarding how much time must pass without a beluga sighting before the survey crew moves to that location to attempt to obtain depth and prey information. There are confirmed reports that some stressed, chased, or harassed Cook Inlet beluga whales do not swim away, but rather submerge and remain on the bottom of the seafloor, which can be very shallow in Cook Inlet. If the observers do not wait a sufficient length of time, the potential exists for a beluga exhibiting this behavior to be struck by the vessel or propellers as the boat approaches the area where belugas were observed.

Given the topography and mudflats surrounding the Susitna Delta, as well as the potential that belugas will be traveling and not staying still, it is unclear how accurately or consistently the fine-scale surveys could be implemented. Should the belugas be traveling, it is possible the boat may inadvertently chase the whales group while trying to accomplish the fine scale sampling scheme as depicted in Figure 3. This could result in increased stress or harassment to the belugas or other marine mammals (i.e., seals) in the vicinity.

The draft pilot study does not provide much detail about the acoustic component of the split-beam sonar, but we understand some split-beam sonars have the potential for operating at multiple frequencies. Frequencies below 200 kHz are within the hearing range of Cook Inlet belugas, and thus noises associated with the sonar with frequencies below 200 kHz have the potential to harass belugas and other marine mammals. Noise has been identified as one of the highest threats to Cook Inlet belugas. Based on the information in the draft pilot study plan, it appears there may only be a single frequency during operation, at 206 kHz. It is unclear whether the split-beam sonar will be operated when conducting the "fine-scale sampling" triggered by

Cook Inlet beluga sightings or if it will only be operated when no belugas are sighted, or if it will be in constant operation.

In general, the pilot study plan is unclear about the primary goal of the study; is this a beluga study that has a fish component or a fish study that will record beluga sightings? The study plan states that data on prey and belugas will be "collected simultaneously", however, fish data can only be recorded after the whales leave the area, and the split-beam sonar is unlikely to be able to collect adequate fish data from over 100 m away (the minimum distance the boat will stay from the belugas and other marine mammals). Overall, while it appears this pilot study attempts to combine information regarding the distribution of beluga whales and their prey, we do have initial concerns about the harassment potential to the belugas. Although there is information on the data collection protocol sheets and software, there is no information regarding protocols should the vessel be closer to 100m of the Cook Inlet beluga whales, or if the presence of the boat or use of the split-beam sonar results in a change of behavior, disturbance, or displacement of the whales. These are indications of harassment and take, and are currently not authorized by NMFS. NMFS requests to be provided a survey schedule in advance of the first survey.