Table 6.4-1. Summary of consultation on Geomorphology study plans.

Comment Format	Comment Date	Licensing Participant Name	Licensing Participant Affiliation	Comment	Response
General					
Memo	08/07/2012		NPS	Limiting downstream scope of this and other studies to Talkeetna is unfounded. Until results of the instream flow, ice, fluvial geomorphology, fish, and other studies are available, cannot say how far downstream project's measurable effects on visual, auditory resources will go. Vehemently disagree w/ this premature decision, which contradicts statements elsewhere in this and other PSPs acknowledging need to rely on the results of other studies.	The Fluvial Geomorphology Modeling Study area downstream limit is currently identified at RM75; however, components of the Geomorphology study extend to RM 0 or to RM 28. The initial determination of the downstream limit was based on based on a bed load sediment balance using USGS data from the 1980s. As additional information and analyses are performed, the downstream limit of the Fluvial Geomorphology Study will be extended further downstream if the studies indicate potential for the Project to affect the of the channel morphology below RM 75. Section 6.6.3.2 discusses the process, criteria and schedule for establishing the downstream limit of the Fluvial Geomorphology Modeling Study.

Comment Format	Comment Date	Licensing Participant Name	Licensing Participant Affiliation	Comment	Response
TWG Mtg.	08/17/2012	Matt Cutlip / Betsy McCracken	FERC / USFWS	D/S Limit of study – What is it, how and when will it be determined. Would it be in the ISR if not reached in RSP? Each study needs to identify the D/S extent and put a mechanism in place to modify the boundaries if needed.	The downstream limit of the Fluvial Geomorphology Modeling is proposed at RM 75, which includes the upper 23 miles of the Lower River. Portions of the Geomorphology Study will extend further. The reach delineation and evaluation of historic channel change extend to RM 0. Comparison of 1980s and current aquatic habitat extend to RM 28. The initial extent of the detailed study area was determined based on a bed load sediment balance using USGS data from the 1980s. Additional discussion of the sediment balance and the potential influence of the Project are discussed in Section 6.5. More detailed sediment balance and evaluation, within in a geomorphic framework, of potential Project along with hydraulic routing to determine downstream Project effects on stage and discharge are being performed in 2012 and early 2103 to further evaluate the downstream modeling limits. The results of the 1D sediment transport modeling to RM 75, will be evaluated to determine if the detailed study area needs to be extend further downstream. The process, criteria and schedule for determining the downstream extent of the detailed study area are presented in Section 6.6.3.2

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TWG Mtg.	08/17/2012	Jeff Davis	ARRI	Is the Eulachon Study tied to Geomorph Study?	In the sense that the geomorphology of the Susitna River helps define the habitat for the eulachon; The Geomorphology Study is tied to the Eulachon Study. Initial evaluation of the potential for the Project to affect the geomorphology of the Lower River has indicated it is unlikely that Project effects will extend into the Lower River downstream of Sunshine (RM 84). To be conservative, the downstream limit for the Fluvial Geomorphology Modeling Study has been initially set at RM 75. If, as the studies progress, additional analysis and information suggest the Project may impact the morphology D/S of RM 75, the study limit will eb extended D/S. Section 6.6.3.2 discusses the process, criteria and schedule for establishing the downstream limit of the Fluvial Geomorphology Modeling Study.

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Email	08/23/2012	Joseph Klein	ADF&G	For the eulachon and boating studies, similar information is needed on what is the study area.	The currently identified downstream study limit for the Fluvial Geomorphology Modeling Study is RM 75. Initial evaluation of the potential for the Project to affect the geomorphology of the Lower River has indicated it is unlikely that Project effects will extend into the Lower River downstream of Sunshine (RM 84). To be conservative, the downstream limit for the Fluvial Geomorphology Modeling Study has been initially set at RM 75. Therefore, in terms of the potential for boating to be affected by changes in the geomorphology as a result of Project operations and construction will not extend below RM 84. This would be the D/S limit of interaction of the boating Study with the Geomorphology Study. Based on the initial assessment Project effects on geomorphology would not extend downstream into the habitat for eulachon. If, as the studies progress, additional analysis and information suggest the Project may impact the morphology D/S of RM 75, the study limit will be extended D/S Section 6.6.3.2 discusses the process, criteria and schedule for establishing the downstream limit of the Fluvial Geomorphology Modeling Study.

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Letter	09/07/2012	Betsy McCracken	USFWS	If the physical studies boundary is terminated at river mile 75, there will be no ability to relate or integrate biological data to those studies (e.g., geomorphology, ISF, ice processes, flow routing). Resource agencies management goals would effectively not be addressed below river mile 75, if project effects are not assessed to the mouth of the river.	In terms of the Fluvial Geomorphology Study, the downstream study limit was set at RM 75 because initial evaluation of available sediment transport information indicated that the Project would not affect the morphology fo the Susitna River downstream of Sunshine Station (RM 85). If the Project does not affect the morphology below RM 75, there will be no impact on the resource agencies goals from this aspect of the physical environment. If, as the studies progress, additional analysis and information suggest the Project may impact the morphology D/S of RM 75, the study limit will eb extended D/S. Section 6.6.3.2 discusses the process, criteria and schedule for establishing the downstream limit of the Fluvial Geomorphology Modeling Study.
Email	09/07/2012	Betsy McCracken, Fishery Biologist	USFWS	Instream Flow, Habitat Utilization, Geomorphology PSPs do not fully address USFWS' resource mgmt. concerns. During 3 days of ILP study meetings, sequencing and integration of proposed biological resource studies and physical processes was not described; significant outstanding info needed.	To address USFWS resource management concerns, AEA has expanded the discussion and figures in Section 6.5.6 and 6.6.6 to show the integration and interdependency of the Geomorphology Study and Fluvial Geomorphology Modeling studies with biological resource and other physical process studies.
Email	09/07/2012	Betsy McCracken, Fishery Biologist	USFWS	Necessary to describe the integration of inter-related studies, how that integration will result in a comparison of baseline biological info, resulting effects to biological resources caused by project operations.	AEA has revised Section 6.5.6 and 6.6.6 to provide more detail on how the integration of inter-related studies will address baseline biological information and allow for an assessment of potential project effects.

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Email	09/07/2012	Betsy McCracken, Fishery Biologist	USFWS	Do not believe current Instream Flow, Habitat Utilization, Geomorphology PSPs will yield sufficient info to allow USFWS to adequately assess proposed SuWa Project impacts to US fish, wildlife resources, and to develop adequate PMEs.	The Geomorphology Studies are integrated with the Instream Flow and Habitat Utilization studies as well as numerous other studies. The Geomorphology Study has been specifically designed to provide the Instream Flow studies with information on potential Project effects to the Geomorphology of the Susitna River that would result in changes to the physical habitat. Section 6.6.4.1.2.1 provides examples of the issues that the Fluvial Geomorphology Modeling Study was designed to address.
E-mail	09/07/2012	Betsy McCracken	USFWS, Anchorage Field Office	USFWS has repeatedly articulated concerns about lack of study sequencing, connectivity, integration between biological studies, other proposed engineering and physical processes studies. Need for collection of adequate temporal and spatial baseline biological, fish habitat data to provide direct input to some of proposed physical modeling efforts. Many USFWS concerns are related to temporal mismatch of biological data collection w/ forward momentum of physical modeling efforts.	To address USFWS resource management concerns, AEA has expanded the discussion and figures in Section 6.5.6 and 6.6.6 to show the integration and interdependency of the Geomorphology Study and Fluvial Geomorphology Modeling Studies with biological resource, other physical process studies and the engineering studies (Operations Modeling and Soils & Geology).

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E-mail	09/07/2012	Betsy McCracken	USFWS, Anchorage Field Office	Study results must be quantifiable to: assess potential losses to aquatic resources, habitats; review SuWa Project under relevant fish, wildlife resource conservation authorities; inform fishway prescription authority (Sec. 18 FPA); eventually develop recommended protection, mitigation, enhancement.	The Study Plans for the Geomorphology Study (Section 6.5) and Fluvial Geomorphology Study (Section 6.6) have been developed to provide the biological resources and other physical process studies with evaluation of potential changes in the geomorphology of the Susitna River that can be used to support determination of habitat indices under with Project conditions. For instance, the 1D and 2D bed evolution models will identify if the substrate size changes below the dam or if downcutting results in less connectivity to lateral habitats. The 2D modeling at focus areas can identify the potential change in the rate of sedimentation and floodplain building which will provide information for the IFS Riparian study to quantify potential changes to riparian plant communities. of potential changes in channel and floodplain morphology to support their assessments of potential habitat losses.
Geomorphology Study (Section 6.5)					
TWG Mtg.	08/17/2012	Jeff Davis	ARRI	Will the studies be able to identify how sediment passed out of Middle effects the Lower Reach?	Yes. The sediment dynamics between the Middle River and the Lower River will be evaluated in Section 6.5.4.3 as part of the sediment balance calculations as well as in the 1D modeling effort in Section 6.6. The latter effort will include modeling to at least RM 75. The former effort looks at the sediment balance to Susitna Station (RM 28)

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TWG Mtg.	08/17/2012	Jay Stallman	Stillwater / FERC	It would be useful to further define the stratification system on a local and reach scale.	The first two levels of the stratification system are the river segment and geomorphic reach. These are described in section 6.5.4.1. The remaining 3 levels are described in the Fish Studies. The stratification system includes river segment, geomorphic reach, macroscale habitat (main channel and lateral habitats), mesoscale habitat, and microscale habitat levels. Additional information on the geomorphic reach characterization system has also been provided in Section 6.5.4.1 including an initial reach delineation and identification of geomorphic reach types.
TWG Mtg.	08/17/2012	Eric Rothwell	NMFS	Add proposed sediment measurement stations to map to identify locations where USGS is collecting 2012 Data	Figure 6.5-5 has been added to RSP showing the Susitna River above Tsusena Creek, the Susitna River at Gold Creek/ above Talkeetna, the Susitna River at Sunshine and the Chulitna River near Talkeetna gages.
TWG Mtg.	08/17/2012	Jay Stallman	Stillwater / FERC	Will bank erosion be evaluated?	Yes. Bank erosion will be evaluated using the historical aerial photo analysis and by comparison of the 1980s cross sections with cross sections surveyed in 2012 at the same locations (See Sections 6.5.4.4). The volume of sediment from bank erosion will be included in the sediment balance describe in Section 6.5.4.3.2.2.

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TWG Mtg.	08/17/2012	Jay Stallman	Stillwater / FERC	Will sediment budget look at sizes?	Yes. The sediment budget will consider sediment in at least three size ranges, fines or wash load (silts and clays), sand, and coarse sediments (gravel and cobble). The balance will also consider in terms of bed material load and suspended load. The RSP includes additional details and clarification of the sediment budget calculations including a distinction of the initial sediment budget developed to support the initial determination of the downstream study limit and a more detailed sediment budget to assist in developing the sediment supply for the fluvial morphology modeling effort. The details of the sediment balance have been revised and are presented in Section 6.5.4.3.
TWG Mtg.	08/17/2012	Jeff Davis	ARRI	Explain the use of effective discharge in the geomorphology study	Effective discharge discussion in Section 6.5.4.3.2.4 was expanded to further describe its use in the overall assessment of potential channel change as a result of Project alterations to sediment transport capacity and discharge. Effective discharge is one means of identifying the potential for increase or decrease in channel dimensions as a result of alteration of flow and sediment transport capacity.
TWG Mtg.	08/17/2012	Jeff Davis	ARRI	Tributaries dump a good amount of sediment during storm events. Are they being accounted for in the Study?	Yes. Tributaries are included in the detailed sediment transport balance described in Section 6.5.4.3.2.2 and as a source of sediment supply in the 1D and 2D modeling efforts. The discussion of determination of tributary sediment supply is described in Section 6.6.6.4.1.2.6.

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TWG Mtg.	08/17/2012	Jeff Davis	ARRI	Is the scale of the LWD study such that the influence of LWD on aquatic habitat in the sloughs be determined (4th of 4 parts)?	Yes, the scale will be sufficient to assess the influence of LWD on aquatic habitat in the sloughs. The following wording is included in the LWD study component described in Section 6.5.4.9: "Observations and discussion of how large woody debris is currently functioning in the Susitna River, including a discussion of interactions with riparian and aquatic/fish habitat, geomorphic processes (sediment transport/channel forming processes), ice processes, and flows."
TWG Mtg.	08/17/2012	Eric Rothwell	NMFS	Will the reservoir erosion study look at the potential different dam designs (heights)?	Yes. The reservoir geomorphology study component (Section 6.54.8) will consider the reservoir inundation zone and a band 100 feet above the high water and covers all potential reservoir heights being considered.

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Fluvial Geomorphology Modeling Below Watana Dam Study (Section 6.6)					
TWG Mtg.	08/16/2012	Jay Stallman	Stillwater / FERC	Will the geomorphology effort model different operational scenarios and come up with new channel patterns?	Yes. Both the 1D and 2D sediment transport models will be run to evaluate operational scenarios. Section 6.6.4.2 provides a description of time frame for each model. The 1D model will provide a 50 year simulation of the overall aggradation/ degradation response of the system, including general changes in bed material composition, under both baseline (existing) and project conditions. Due to computational limitations, the 2D model cannot reasonably be run for a 50-year period; however, runs will be made for individual (i.e., seasonal) hydrographs for both baseline and project conditions, and the results will be used to assess how changes in flow and sediment regime under project conditions will affect bed evolution. Although specific, long-term changes in bed topography and channel patterns cannot be made, the trajectory of these changes can be inferred from a combination of the short-term 2D results and the long-term 1D results.

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TWG Mtg.	08/17/2012	Jeff Davis	ARRI	Can the model look at spawning habitat modification for chum (referring to the specific chum spawning area identified for the Whiskers Slough Site in the 1980s)?	Yes. The 2D sediment transport model is capable of simulating the physical processes at the resolution necessary to identify changes in hydraulic conditions and bed material (substrate) in areas such as the chum spawning site identified in the 1980s study at the Whiskers Slough site. To model these areas, a finer mesh will be used. Specific areas to provide a finer mesh size to investigate specific aspects of local hydraulics, bed material and sedimentation processes will be evaluated and determined for each of the focuses sites through coordination with the Instream Flow Study Fish, Instream Flow Study Riparian, Groundwater Study, Ice Processes Study and Fish Study and in collaboration with the relicensing participants. Discussion of varying the mesh site to focus in on specific areas of interest such as spawning areas and lateral habitats has been added to Section 6.6.4.1.2.3

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TWG Mtg.	08/17/2012	Matt Cutlip	FERC	During the general discussion on site selection, it was indicated that AEA will need to justify use of 6 sites (or whatever number)	The process, schedule and criteria for selection of the focus areas id provided in Section 8.5.4.2 of the Fish Instream Flow study. Section 6.6.4.1.2.4. describes the role of the Geomorphology studies in the selection process. The site selection process is a collaborative effort between the Instream Flow Study Fish, Instream Flow Study Riparian, Groundwater Study, Fish Study and Ice Processes Study and coordinated with the relicensing participants. It is noted that the fluvial geomorphic analysis presented in Section 6.5 and the 1D sediment transport modeling presented in Section 6.6 will be performed for the entire detailed study area (currently proposed as RM 184 to RM 75 excluding Devils Canyon).

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TWG Mtg.	08/17/2012	Jay Stallman	Stillwater / FERC	Need more detail on specific geomorphic data to be collected at the sites.	AEA has modified to Section 6.6 to describe the field data collection program that will be conducted in 2013. Section 6.6.4.1.2.8 has been added to present the field data collection effort. The field data collection effort described in this section covers the collection of data for both the Geomorphology Study (Section 6.5) and the Fluvial Geomorphology Modeling Study (Section 6.6). Major activities at focus areas will include bed material sampling, bathymetric and cross sectional data collection, mapping of geomorphic features, and characterization of physical process at each focus areas. Additional data will be collected outside the focus areas such as cross sections to supplement the 2012 data available for the 1D model, additional bed material samples for the 1D model, and identification and/or verification of controls and other geomorphic features identified from aerial photographs and available mapping. Data will be collected in conjunction with field efforts being performed by the Instream Flow Fish, Instream Flow Riparian, Groundwater, and Ice Processes Study.
TWG Mtg.	08/17/2012	Jay Stallman	Stillwater/ FERC	USFWS and NMFS request pebble counts in their Study Plans. We need to have more detail as to where and when we will do pebble counts	The requested detail on bed material sampling has been included in the description of data collection added to Section 6.6.4.1.2.8. Bed material samples will be collected at both the Focus Areas as well as at other locations in the study area.

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TWG Mtg.	08/17/2012	Henszey/ Davis / Steele	USFWS/ ARRI / ADNR OPMP	General discussion on the mesh size for the 2D model with questions concerning: what will the size be? Will field results influence it? When will size be selected?	The 2D sediment transport model selected for the focus areas will have a variable mesh size. This will allow a finer mesh to be applied to areas in which the scale of the feature being modeled (for example side or upland sloughs) requires a finer mesh size than other areas of the model. Larger mesh sizes can be used in the main channel to allow for more efficient execution of the model. However, even within the main channel, a finer mesh can be applied to provide higher resolution in areas such as spawning sites. More detail on the use and selection of the 2D model mesh size is provided in Section 6.6.4.1.2.3
TWG Mtg.	08/17/2012	Eric Rothwell	NMFS	Will additional cross section be selected at areas that aren't hydraulic controls and added to the 1D model? This question was brought up since the hydraulic routing model data collection likely concentrated on hydraulic controls, but these may not be the best features for describing sediment transport processes.	Yes. AEA will collect additional cross sections to supplement the cross-sectional data collected in 2012 to support the hydraulic routing model development. Cross section sites will be chosen in conjunction with the Instream Flow Study Fish, Instream Flow Study Riparian, Groundwater Study and Ice Processes Study. These additional cross sections are discussed as part of the field work described in Section 6.6.4.1.2.8
TWG Mtg.	08/17/2012	Jay Stallman	Stillwater / FERC	How will the 2D model be calibrated?	Yes. AEA has included additional discussion of the calibration of the 2D fluvial geomorphology model in Section 6.6.4.1.2.5. This includes discussion of the calibration of hydraulics (velocity, depth and flow distribution) and sediment transport conditions.

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Email	08/23/2012	Joseph Klein	ADF&G	Will 2D modeling include side channels and sloughs within study area?	The decision to apply 2D modeling will be evaluated at focus area in coordination with the IFS-Fish, IFS-Riparian and groundwater studies. 2D modeling of side channel and sloughs will be utilized at the focus areas as appropriate when complex hydraulic conditions exist that are more accurately and effectively analyzed with 2D hydraulic and sediment transport modeling. Section 6.6 describes the application of 2D modeling of fluvial geomorphology.
Email	09/11/2012	Bob Henszey	USFWS	RISF-5 Characterize the Role of Sediment Deposition in the Formation of Soils: The proposed soil sampling techniques are included in Section 6.6.4.3.1.5, but based on these techniques it is unclear how the USFWS requested objective to characterize the role of sediment deposition in the formation of floodplain and riparian soils, and how sediment deposition affects the rate and trajectory of plant community succession. This objective should investigate the rate of deposition, depth of sediment, and soil profile development required for natural floodplain plant community succession, and then use the predicted sediment deposition characteristic from the Fluvial Geomorphology Study to predict the effects of Project operation on floodplain plant communities.	The Fluvial Geomorphology Modeling Study will assist the Instream Flow Riparian Study in determining the potential effect of the Project on the rate of sediment deposition in the floodplain. This will include modeling of the sedimentation process at the focus areas for both existing conditions and for various operational scenarios. Information developed from the Instream Flow Study Riparian on existing rates of floodplain deposition will be adjusted based on comparison of the frequency of inundation and alteration of sediment delivery under with Project scenarios. This will provide an assessment of the change in the rate of floodplain building under Project conditions. This aspect of the Fluvial Geomorphology Modeling in discussed in Section 6.6.4.1.2.8.