

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Aquatic and Terrestrial Resources Study Planning Meetings
January 25, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Water Resources Study Planning Meeting, January 25, 2012, 9 a.m. – Noon

Attendees:

| Organization | Name |
|------------------------------|--------------------------|
| AEA | Betsy McGregor |
| USFWS | Mike Buntjer |
| USFWS | Betsy McCracken |
| USFWS | Jennifer Spegen |
| USFWS | Bill Rice |
| NMFS | Susan Walker |
| NMFS | Eric Rothwell |
| BLM | Ben Kennedy |
| BLM | Tim Sundlov |
| BLM | Mike Sondergaard |
| NPS | Cassie Thomas (by phone) |
| ADF&G | Joe Klein |
| ADF&G | Joe Giefer |
| ADF&G | Ron Benkert |
| ADF&G | Jack Erickson |
| ADF&G | Richard Yanusz |
| ADF&G | Lowell Fair |
| ADNR | Courtney Smith |
| ADNR | Gary Prokosch |
| ADNR | Kim Sager |
| FERC | David Turner (by phone) |
| The Nature Conservancy | Corrine Smith |
| Natural Heritage Institute | Jan Konigsburg |
| Alaska Conservation Alliance | Kate McKeoun |
| Knik Tribe | Theo Garcia |
| Knikatnu, Inc | Tom Harris |
| Long View Associates | Steve Padula |
| Long View Associates | Randall Filbert |
| Northern Ecological Services | John Morsell (by phone) |
| R2 Resource Consultants | Dudley Reiser |
| R2 Resource Consultants | MaryLou Keefe (by phone) |

| Organization | Name |
|---------------------------------|------------------------|
| Craig Addley | Cardno ENTRIX |
| Lynn Noel | Cardno ENTRIX |
| ABR/GW Scientific | Dave Brailey |
| URS | Paul Dworian |
| HDR | James Brady |
| HDR | Michael Barclay |
| HDR | Bob Butera |
| HDR | Erin Cunningham |
| Tetra Tech | Rob Plotnikoff |
| Tetra Tech | Christy Miller |
| DOWL HKM | Jessica Christianson |
| LGL Alaska | Michael Link |
| Normandeau Associates | Robert McDonald |
| E-Terra | Lars Gleitsmann |
| ARRI | Jeff Davis |
| Northwest Hydraulic Consultants | Dave Andres (by phone) |
| Northwest Hydraulic Consultants | Darren Ham (by phone) |
| Crowther | Scott Crowther |
| Van Ness Feldman | Matt Love (by phone) |
| Nuvista Light & Power | Chuck Casper |

Presentations

- John Haapala (MWH): Reservoir and Flow Routing Model Transect Data Collection
- Craig Addley (Cardno-ENTRIX): WQ-S1 Review of Existing Water Temperature Data and Models
- Craig Addley (Cardno-ENTRIX): Determine Bedload and Suspended Sediment Load by Size Fraction at Tsusena Creek, Gold Creek, and Sunshine Gage Stations
- Craig Addley (Cardno-ENTRIX): Geomorphic Assessment of Middle River Reach Using Aerial Photography
- Craig Addley (Cardno-ENTRIX): Document the Breakup and Formation of River Ice on the Susitna River
- Craig Addley and Woody Trihey (Cardno-ENTRIX): Geomorphic Assessment of Project Effects on Lower River Reach

Flow Routing Model Transect Data Collection

Eric Rothwell (NMFS) stated that channel roughness values used in the routing model should be based on independently verified and current site-specific information and potentially vary longitudinally in the system. Bill Rice (USFWS) agreed, noting that site-specific substrate/geological characteristics should be used to develop values of Manning's roughness coefficient. Eric Rothwell, Bill Rice, and Joe Klein (ADF&G) emphasized the need to account



for accretion flow and the effects of ice dynamics when developing the routing model, noting that the model must be well calibrated to be useful. John Haapala (MWH) stated that MWH would apply appropriate roughness values and would account for accretion flow, likely by using spot measurements to verify accretion estimates developed during the 1980s. Craig Addley (Cardno-ENTRIX) agreed, stating that an evaluation of the effects of load following on habitat downstream of the Project could only be accomplished with an accurate routing model. Dave Andres (Northwest Hydraulic Consultants) stated that it would be useful to install pressure transducers (i.e., to measure water surface elevation) as soon as possible in 2012 so that stage-flow relationships throughout the river could be developed. Dave stated that these instruments, because they would produce continuous data and could be operated during the winter when ice is present in the river, would be superior to staff gages.

Dave Andres (Northwest Hydraulic Consultants) also expressed concern with the use of a HEC-RAS model, stating that a HEC-RAS model would suffice in summer but would not properly account for flow routing when there is ice in the river. Dave stated that the CRISSP model would function under winter conditions and would also work in summer when the river is free of ice. Craig Addley (Cardno-ENTRIX) reminded the workgroup that John Haapala was reviewing the 2012 efforts related to flow routing and that as 2013-2014 study plans are developed, there would be an opportunity to incorporate other modeling options.

Eric Rothwell (NMFS) stated that it would be important for AEA to explain in its study planning documents how studies would dovetail and input from one study or modeling effort would supply input to other studies or models. Eric stated that in addition to identifying linkages, it would be necessary to ensure that assumptions made at one level of study or modeling would remain valid when results or input are used in a subsequent phase of analysis or modeling. Craig Addley (Cardno-ENTRIX) replied that AEA was aware of the importance of the integration identified by NMFS and that AEA's contractors would identify and describe all such linkages as part of their development of the 2013-2014 study plans.

Betsy McCracken (USFWS) asked if the transects used for the development of the hydraulic routing model corresponded to those used for habitat modeling. Craig Addley (Cardno-ENTRIX) replied that transects for the two efforts were not equivalent. Craig explained that routing model transects would be used to provide continuous stage-flow relationships, via interpolation, for the entire river corridor. Transects for other purposes, e.g., fish habitat, would be established separately to address specific objectives. However, the stage-flow relationships provided by the routing model at a given location would serve as an input in the development of time-series analyses for other modeling efforts, for example fish habitat.

Water Temperature Data and Models

Joe Klein (ADF&G) stated that temperature modeling would need to account for Project effects not only in the mainstem but also in sloughs and side channels. Joe asked if AEA could specify the locations/habitat types of proposed monitoring locations. Betsy McGregor (AEA) and Woody Trihey (Cardno-ENTRIX) replied that Table 2 of the WQ-S1 study plan identified

the proposed mainstem temperature monitoring sites to be used for the 1980s SNTMP model evaluation, but noted that temperature monitoring locations for the larger study program had yet to be identified and would be addressed in the 2013-2014 study plan. Joe Klein added that the temperature model would need to be capable of estimating the proposed Project's effects on groundwater upwelling, which in turn would affect conditions in sloughs and potentially in salmonid spawning areas.

Geomorphology, Bedload/Suspended Sediment, and Ice Processes

Darren Ham (Northwest Hydraulic Consultants) stated that it would be infeasible for field crews to measure bedload at high flows and asked how AEA planned to account for high-flow bedload dynamics. Craig Addley (Cardno-ENTRIX) stated that the technical contractors would assess logistics associated with field measurements of bedload, and if safety becomes an issue, modeling would be used to extrapolate high-flow bedload based on measurements made at lower flows and what is known about the relationships of coarse sediment movement generally. Craig stated that the technical contractors would gather as much information as possible to calibrate the sediment routing model. Woody Trihey (Cardno-ENTRIX) stated that bedload measurements could be made at some stations, e.g., Gold Creek, and that the sediment rating curves from these stations could be used to extrapolate the upper portions of curves at other stations. Darren Ham (Northwest Hydraulic Consultants) suggested sampling gravel bars for sediment size distribution as a surrogate to using bedload measurements to estimate transport. Dudley Reiser (R2) added that it would be important to measure sediment transport in areas used by salmonids for spawning.

Michael Barclay (HDR) stated that a primary assumption of instream flow analysis is that the channel remains the same under changing flow conditions and stated that potential changes in channel morphology would need to be factored into instream flow modeling. Craig Addley (Cardno-ENTRIX) agreed and said that AEA would use the results of its geomorphology modeling to account for any potential channel changes when modeling the relationship between flow and habitat for aquatic biota.

Michael Barclay (HDR) asked if the purpose of the geomorphic assessment of middle river reach was to assess whether the channel was in a state of equilibrium. Craig Addley (Cardno-ENTRIX) confirmed that comparing existing and 1980s geomorphic data would allow AEA to characterize the stability of the reach under unregulated flow conditions and added that the study may also provide insight into what other data from the 1980s studies might still be applicable under current conditions.

Joe Klein (ADF&G) stated that AEA should assemble a list of floods that have occurred since the 1980s data were collected to help interpret any channel changes that are observed when comparing aerial imagery of current and historic channel conditions.

Referring to the G-S4: Geomorphic Assessment of Project Effects on the Lower River Channel study, Eric Rothwell (NMFS) noted that aerial photography of the lower river would be used to assess pre- and post-Project flow effects in summer, when the reservoir would be filling, which

is expected to be when the proposed Project would have the greatest effect on flows. Eric cautioned that Project impacts on winter flows and flow-related variables in the lower river should not be overlooked. Woody Trihey (Cardno-ENTRIX) stated that the 2012 study was only a screening exercise and that geomorphic assessments conducted in 2013-2014 would be aimed at assessing Project effects over a wide range of flows during all four seasons.

Joe Klein (ADF&G) asked what effect daily Project operations are expected to have on flows in the lower river. Woody Trihey (Cardno-ENTRIX) replied that flow effects in the lower river due to daily Project operations would be muted relative to those in the middle river, and perhaps undetectable, noting that winter flows downstream of the confluence with the Chulitna and Talkeetna rivers ("three rivers confluence") are 2.0-2.5 times greater than those upstream of the confluence. Woody added that the presence of ice in the lower river would likely further obscure the effects of flow changes related to daily Project operations in winter. Sue Walker (NMFS) noted that the PAD indicates that daily winter releases at the dam could vary between 3,000 cfs and 10,000 cfs. Sue stated that this represented significant variability and AEA would need to document the effect of such flow changes throughout the river system.

Bill Rice (USFWS) asked how many lower river geomorphology transects had been established and evaluated during the 1980s studies. Woody Trihey (Cardno-ENTRIX) replied that four transects had been established in the area of the three rivers confluence because it was (and is) a highly dynamic area. Woody stated that given the dynamic nature of the area, conditions at these transects would need to be resurveyed as part of the current study program. Woody said that no geomorphology transects were established downstream of the three rivers confluence.

Dave Andres (Northwest Hydraulic Consultants) stated that it would be essential to fully document freeze-up and ice break up processes to set the stage for the collection of data to be used to develop and calibrate an ice dynamics model. Dave added that comparing ice dynamics to flow gage records would greatly enhance AEA's ability to interpret observed ice dynamics in 2012. Woody Trihey (Cardno-ENTRIX) stated that it would be beneficial for specialists with a variety of backgrounds to be involved in the documentation of ice formation and breakup, including fisheries and riparian vegetation specialists in addition to physical scientists.

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- Jack Erikson: (ADF&G) ADF&G Conceptual Plan for 2012
- Craig Addley (Cardno-ENTRIX): Distribution and Middle River Habitat Utilization

ADF&G Conceptual Plan for 2012 and Fish Distribution and Middle River Habitat Utilization

Woody Trihey (Cardno-ENTRIX) noted that based on ADF&G's 2010 data, the percentages of coho and chum salmon upstream of the three rivers confluence were similar to what was observed in the 1980s. Jack Erickson (ADF&G) replied that ADF&G had not yet compared data from the two periods, but it would not be surprising if current run apportionment of coho and chum salmon was similar to what had been observed in the 1980s.

James Brady (HDR) asked how ADF&G had arrived at a sample size of 50 tagged chum/coho for supporting the middle river habitat use study. Betsy McGregor (AEA) replied that 50 radio-tagged fish was not a recommended sample size, but only a number selected to illustrate how many fish ADF&G would need to radio tag in the lower river to provide 50 fish for tracking in the middle river (i.e., upstream of the three rivers confluence) and to illustrate the incremental cost of tagging those fish. Gary Prokosch (ADNR) asked if ADF&G would be tagging fish in the middle river reach for AEA. Jack Erickson (ADF&G) replied that any fish tagged upstream of the three rivers confluence would be tagged by AEA's consultants, because ADF&G will already be operating at capacity in conducting its own programs in the lower river.

Sue Walker (NMFS) asked if ADF&G could mobilize early enough in 2012 to tag Chinook for a basin-wide distribution study. Jack Erickson (ADF&G) replied that it would be possible but challenging given environmental conditions early in the season. Sue Walker asked if ADF&G planned to use sonar for assessing Chinook movements, and Jack Erickson stated that ADF&G's 2012 efforts would neither assess movement per se nor apportionment/abundance but would be aimed at documenting Chinook distribution. DIDSON would be employed, however, to identify potential recapture locations.

Michael Barclay (HDR) asked to what degree ADF&G would be attempting to document spawning locations of Chinook. Jack Erickson (ADF&G) stated that identifying spawning locations was not one of ADF&G's 2012 objectives. Betsy McGregor (AEA) stated that in 2012, AEA would track Chinook radio tagged by ADF&G in the lower river through the mainstem Susitna River to identify mainstem spawning locations and potentially collect HSC data. Betsy stated that in 2013-2014 AEA would continue to track Chinook tagged by ADF&G as well as Chinook tagged above three rivers by AEA.

Michael Link (LGL) stated that gear selectivity of fish wheels would bias the sample of radio-tagged Chinook toward fish of a certain size range. Mike also questioned whether it would be possible to obtain 400 Chinook from the existing recapture wheels. Jack Erickson (ADF&G) stated that he thought ADF&G would be able to obtain and tag the target sample size of Chinook and that size variability would be sufficient to provide for a representative sample. Betsy McGregor (AEA) stated that AEA's collection of Chinook for radio tagging in 2013-2014 may not rely solely on fish wheels and that AEA intended to capture and track enough fish to be confident that study results accurately represent Chinook distribution and activity in the middle river and above.

MaryLou Keefe (R2) questioned whether the number of fish tagged would be representative of the overall population. Craig Addley (Cardno-ENTRIX) replied that tracking of radio-tagged Chinook was a first step and that other means would be evaluated to locate Chinook spawning sites, both within side sloughs and the mainstem, to provide information needed to conduct instream flow modeling.

Joe Klein (ADF&G) stated that in areas where side-scan sonar data suggest Chinook are spawning but turbidity precludes positive identification during spawning, it would be necessary to excavate the substrate to verify that Chinook eggs/alevins are in the gravels.

MaryLou Keefe (R2) asked for confirmation that AEA intended to model habitat-flow relationships of all salmon life stages in the mainstem, sloughs, and side channels. Craig stated that all relevant fish species, lifestages, and habitats would be addressed as part of the instream flow analysis.

Jan Konigsburg (NHI) questioned whether handling and tagging of Chinook in the lower river could result in individuals that are less able to ascend Devils Canyon and thereby underestimate the extent to which Chinook use the river upstream of the canyon. Woody Trihey (Cardno-ENTRIX) stated that during the 1980s, many fish had received disk and Floy tags (which involved minimal tag-related stress) and that few of these tagged fish passed through Devils Canyon. Most of the tagged fish entered tributaries downstream of Devils Canyon.

Jack Erickson (ADF&G) stated that an alternative approach to estimating the number of adult Chinook passing upstream through Devils Canyon would be to conduct genetic analyses of juvenile Chinook collected upstream of the canyon reach. Results of the genetics sampling could be used to back-calculate the number of adult spawners that produced the juveniles. Tom Harris (Knikatnu, Inc) asked if otolith analysis might be used to assess the origins of Chinook juveniles found upstream of Devils Canyon. Craig Addley (Cardno-Entrix) replied that genetics analyses would likely be more effective for this purpose. Betsy McGregor (AEA) stated that otoliths from Dolly Varden and humpback whitefish would be analyzed in coordination with ADF&G to assess whether individuals in the middle and upper river have an anadromous or resident life history.

Tim Sundlov (BLM) noted that jetboat operators routinely observe adult Chinook in eddies in Devils Canyon, confirming that some level of upstream migration into the bottom of the reach is occurring regularly.

Michael Barclay (HDR) asked if AEA planned to track radio-tagged Chinook in tributaries to the middle river. Betsy McGregor (AEA) said that some of the Chinook tagged by ADF&G might be tracked in middle river tributaries by AEA's contractors, but there would be no attempt to document habitat use in below Devils Canyon tributaries except in the tributary mouths immediately adjacent to the mainstem.

Jack Erickson (ADF&G) cautioned that the tracking of radio-tagged fish with fixed and mobile receivers throughout the licensing study period would generate an enormous dataset, which would require much time to process. Michael Link (LGL) stated that AEA would likely benefit from hiring an information management specialist and that software is available to allow for efficient QA/QC and interpretation of such large datasets.

James Brady (HDR) asked how technical contractors would arrive at final sample sizes for radio-telemetry studies, questioning whether numbers of fish would be determined collectively by the Aquatic Resources Workgroup. Betsy McGregor (AEA) stated that the first step would be for AEA to consult with ADF&G to determine how many fish could reasonably be tracked, given the limitations of the number of unique codes per frequency then to coordinate with the workgroup before arriving at a final number.

Sue Walker (NMFS) acknowledged that studies related to adult Chinook would be logistically complicated but stressed that sample sizes and methods would need to be sufficient to address the main objective, which is characterizing the range of flows under which adult Chinook can migrate through Devils Canyon.