



# SUSITNA-WATANA HYDRO

## Meeting Notes Water Resources Technical Workgroup Meeting February 14, 2013

**LOCATION:** Z.J. Loussac Library – Public Conference Room  
3600 Denali Street  
Anchorage AK

**TIME:** 8:30 a.m. – 5:00 p.m. (AKDT)

**SUBJECT:** Open-water Flow Routing, Habitat Mapping, and Focus Areas

**GoTo MEETING:** <https://www3.gotomeeting.com/register/580613094>  
1-800-315-6338 Code 3957#

**Goal:** Review information filed with FERC on January 31, 2013

**ATTENDEES:** Joetta Zabloutney R2, Alice Shelly R2, Bob Mussetter Tetra Tech, Bill Fullerton Tetra Tech, Phil Hilgert R2, Kirby Gilbert MWH, Kathryn Toews McMillen, William Ashton DEC, Leslie Jensen ARRI, Roy Ireland AKDNR, Dara Glass CIRI, Jeff Davis ARRI, Stormy Haught ADFG, Rebecca Long Coalition of Susitna Dam Alternatives, Steve Smith Geovera, LLC, Michael Lilly GW Scientific, Brian Bjorkquist AEA, Michael Baffrey Dept. of Interior, Dudley Reiser R2, Jan Konigsberg Alaska Hydro Project, Dan Reichardt GW Scientific, Ham Wells ABR Inc, Krissy Plett DNR, Paul Dworjan URS, Kevin Fetherston R2, Robert Burgess ABR, Rob Plotnikoff Tetra Tech, Harry Gibbons Tetra Tech, Wayne Dyok AEA, Matthew LaCroix EPA, MaryLouise Keefe R2, Catherine Berg USFWS, Gabe Kopp HDR, Betsy McGregor AEA, Ken Hogan FERC, Michael Buntjer USFWS, Bob Henszey USFWS, Jay Stallman Stillwater Sciences, Fred Winchell Lois Berger Group, AJ Keith Stillwater Sciences, Dirk Peterson Stillwater Sciences, Brian Lance NMFS, Scott Crowther Ratepayers, Robin Beebee HDR

**ON PHONE:** Stuart Beck R2, Jennifer Curtis EPA, Hallard Shepard Center for Water Advocacy, Steve Cantalia FERC, John Haapala MWH, David Turner FERC, Ethan Bell Stillwater Sciences, Laura Arendall R2, Dan Appol USGS, Chris Johnson Holmquist USGS, Greg Auple USGS, Kim Sager DNR, Steve Padula McMillen, Paul Makowski FERC

Per FERC's 1/17/2013 letter, AEA was requested to follow a unique study plan determination schedule on 14 of the 58 proposed 2013 studies, mainly those related to water resources. This schedule was in response to pending AEA deliverables including the fish distribution and abundance implementation plan, river productivity implementation plan, open flow routing model results, Focus Area and study site locations, and habitat mapping results. Drafts of these documents were filed with FERC on 1/31/2013 and finals will be filed on 3/1/2013. Matt Love explained that today's meeting was scheduled to discuss the information provided in these documents and to receive any comments or concerns from licensing participants. The agenda, documents, and supporting presentations can be

found on the meetings page at <http://www.susitna-watanahydro.org/>. These meeting notes are intended to supply information and significant consultation not included in the provided materials.

### **Hydrology (Bill Fullerton, TetraTech)**

Bill Fullerton presented the hydrology model results comparing present conditions and post-Project conditions under the maximum load following operation scenario 1 (Max LF OS-1) without any Project enhancement and mitigation measures. As part of the Geomorphology Study, it was possible to conduct this stream flow assessment early in the 2012 study season using the data available at the time, providing a preliminary understanding of Project effects on hydrology. Bill Fullerton explained that this model was intended as an initial conservative assessment of potential Project operations and was utilized in the open-water flow routing model. The results illustrate the maximum load following scenario with the reservoir at maximum operation (discharge being approximately 15,000 cfs) at maximum generation (600 megawatts [MW]). This scenario is conservative and not realistic for anticipated Susitna-Watana Hydroelectric Project operations; load demands are anticipated to be distributed amongst several Railbelt hydroelectric projects including Bradley Lake, Cooper Lake and Eklutna.

The graphs represent pre- and post-Project conditions at four locations: the proposed dam site, Gold Creek, Sunshine Station (downstream of the Three Rivers Confluence), and Susitna Station (downstream of the Yentna River). The attenuation of the potential Project effects by the influences of the large river tributaries is apparent when viewing the monthly average flow comparison charts.

Rebecca Long expressed concern in the distribution of monthly average flows modeled in the Max LF OS-1 scenario, specifically at the proposed dam site and Gold Creek.

The Annual Flow Duration is illustrated on slides 10-11. These graphs average the daily flows and do not account for load following. When viewing the annual flow duration and flood frequency results, it is important to consider the variable scale on the Y-axis and the expanded scale for the flood frequency for Susitna Station.

Bob Henszey asked what the possibility would be that maximum load following would be requested of the Project (i.e., the frequency and duration with which other power suppliers on the Railbelt have been unable to provide power). Wayne Dyok estimated that it may occur once in every 10 years. He added that this historic data are being researched and AEA would be able to provide a more accurate response in the future.

Michael Buntjer asked why slide 14 shows that the differences in annual peak flow from current conditions to post-Project are higher than at the dam site. Bill Fullerton explained that in most cases the peak is shifted in time, often to several weeks or months later in the hydrograph. The reduction in flow on the day of the pre-Project peak can be on the order of 30,000 to 40,000 cfs or more under the post-Project condition. The reduction reported for the post-Project peak is typically less than the reduction in flow on the day of the pre-Project peak since the post-Project peak occurs on a different day than the pre-Project peak. Consequently, the reduction in downstream peak flows can be greater than the reduction in peak flow at the dam site.

### **Open-water flow routing results (Stuart Beck R2)**

Stuart Beck explained the open-water flow routing results of the 2012 study. The PowerPoint can be found at [http://www.susitna-watanahydro.org/wp-content/uploads/2013/02/SuWaOpenWaterFlowRoutingModel\\_Ver1\\_20130201.pdf](http://www.susitna-watanahydro.org/wp-content/uploads/2013/02/SuWaOpenWaterFlowRoutingModel_Ver1_20130201.pdf). The results presented are considered the first version of the open flow routing model results. Updated versions will be provided as additional data is collected. The open-water flow routing results are based on transects surveyed in 2012 throughout more than 100 miles of the Susitna River. The area of Devils Canyon was not surveyed due to safety concerns. For areas of the river where cross-sections were not surveyed, interpolated data was incorporated into the model at intervals of approximately 1,000 feet. The interpolated sections' morphology was modified when necessary by adjusting the bottom elevation and width. These areas will be further explored in the 2013 field efforts to better calibrate the model. The results extend to Project River Mile (PRM) 80 and indicate that Project effects could extend below this point, confirming extending the study area downstream of PRM 80 for water-related resources.

Slide 12 shows the flows measured in 2012. Additional flows will be targeted in 2013 to fill in any gaps at locations lacking a particular flow collected.

Slide 18 shows that by shifting the hydrograph of a downstream location to match that of an upstream location, the time for a peak to travel downstream can be calculated.

In slide 32, the pre-Project and Max LF OS-1 are very similar in August and September. This is when the reservoir is at maximum capacity and overflow would be occurring.

Rebecca Long questioned the validity of calibrating the model with 1984 data. Stuart Beck explained that he was being consistent with the calibration data used by John Haapala in the hydrology model. This year was chosen because it represented the average annual and average monthly flow conditions.

Matthew LaCroix asked what period of the year that diurnal glacial melt is detectable. Stuart answered that this is usually in lower flow conditions without peaking, and likely occurs in May through September.

Jeff Davis mentioned that the Deshka River, a large brown water tributary of the Susitna River, is a critical spawning river that supports a large fishery. He has recently conducted a study concluding that there is a negative correlation between water temperature and Chinook salmon presence. Jeff Davis suspects that if a change in volume at the basin of the Deshka occurs due to the Project, temperature would be affected in the backwater habitat at the confluence.

#### **Downstream extent of Project impacts (Dudley Reiser R2)**

Dudley Reiser explained the decision criteria for studies' efforts in the Lower River segment of the Susitna River. These criteria have been previously presented in TWG meetings as well as in Section 8.5 (Instream Flow Study) of the RSP filed with FERC 12/14/2013. Dudley Reiser explained that the open-water flow routing model results have confirmed that the Project will affect the hydrology to some extent downstream of PRM 80. Because of this, effort will be added for some water-related resources in the Lower River. The approach will be different than what is currently proposed for the Middle River because the geomorphology, channel complexity and other conditions are drastically different than those of the Middle River.

Jay Stallman asked if there is a Technical Memorandum being provided that explains the predicted Lower River effects. Kevin Fetherston said that there is currently no hard data in the Lower River beyond PRM 80 because the model was applied with a downstream limit at PRM 80. As stated in the RSP, extensions of the Lower River efforts will be added where needed and refined if necessary in 2014, based on additional data collected in 2013. Dudley Reiser added that the 3/1/2013 FERC filing will include Lower River sites selected for 2013 studies, based on the current knowledge.

#### **Habitat mapping results in Middle River (Gabe Kopp HDR)**

Gabe Kopp presented the Middle River Habitat Line Mapping results (presentation available at [http://www.susitna-watanahydro.org/wp-content/uploads/2013/02/MR\\_Habitat\\_Line\\_Mapping\\_Compressed.pdf](http://www.susitna-watanahydro.org/wp-content/uploads/2013/02/MR_Habitat_Line_Mapping_Compressed.pdf)). The 2012 habitat mapping study was preliminary and used videography to identify habitat frequency and abundance along the mainstem of the Susitna River in a limited timeframe and without substantial ground-truthing. Ground mapping will be performed in 2013-2014 to refine the preliminary habitat mapping results. The hierarchical classification system, as illustrated in slides 6 and 7, was created in 2012 as part of the Instream Flow Study with input from the Fish and Aquatics study leads. This system provides a quantitative way to determine the representativeness of sample sites. When classifying the river, it must be done to the same level of habitat for the entire study area for comparison purposes. In regard to the main channel, the most detailed level of mapping that AEA could confidently apply with the videography results was to the mesohabitat level. Off-channel habitats could be confidently classified to the macrohabitat level; Focus Area off-channel habitats will be mapped by field crews to the mesohabitat level during the 2013 field season. Edge habitat lengths were calculated for each habitat section by doubling the thalweg.

Jeff Davis asked what criteria were applied when determining the river reach boundaries. Bill Fullerton explained that the 2012 technical memorandum Initial Geomorphic Reach Delineation and Characterization, Middle and Lower

Susitna River Segments, to be filed on 3/1/2013, will include values and morphology details used to determine the boundaries of the geomorphic reaches.

Matthew LaCroix asked if the same classification system will be applied when documenting habitat types in the field. MaryLouise Keefe confirmed this. Matthew LaCroix asked if there was a correction factor if the ground-truthing does not confirm the habitat type determined in the Habitat Line Mapping Study. MaryLouise Keefe does not anticipate significant changes because the videography was taken in ideal conditions with optimum resolution. Gabe Kopp said that this approach has been used in previous FERC projects and ground-truthing did not radically alter the habitat classifications.

Betsy McCracken asked how microhabitats will be addressed in the classification system. Dudley Reiser answered that microhabitat parameters, such as that considered in habitat suitability criteria (HSC), will be measured in the field. Methods and parameters are explained in the RSP Section 8.5, and target species identification will be completed per the schedule provided in the RSP.

Jan Konigsberg asked if the sites are being mapped to the mesohabitat level in the winter as well as in summer. Gabe Kopp explained that the flow may change the mesohabitat type at a particular location. However, the underlying geomorphic structure of the river will not likely change with varying flows, and that is what is essentially being mapped at low flow conditions. The habitat classification system is using mesohabitat classifications as a way to represent the underlying geomorphic structure.

Jeff Davis voiced disagreement with some aspects of the classification types and terminology presented by AEA. He feels that his disagreements are not sizeable, but because the classification system is the basis for the studies, his disagreements may develop into a larger issue at the time of analysis. He would like further consultation on this issue.

#### **Defining Focus Areas (Dudley Reiser R2)**

Dudley Reiser presented information from the draft Focus Area document filed with FERC on 1/31/13. The presentation is available at [http://www.susitna-watanahydro.org/wp-content/uploads/2013/02/SuWa\\_R2\\_Focus-Area-Presentation\\_20130212.pdf](http://www.susitna-watanahydro.org/wp-content/uploads/2013/02/SuWa_R2_Focus-Area-Presentation_20130212.pdf). These Focus Areas will also be included in the final Focus Area report to be filed with FERC on 3/1/2013. The current locations of Focus Areas were determined with consensus from all water resources leads. Dudley Reiser clarified that studies have additional data collection sites outside of the Focus Areas. The purpose of the Focus Area approach is to have areas of multidisciplinary study for a more complete understanding of the ecosystem and its driving factors.

Jeff Davis asked how data will be assessed relative to the site locations. He voiced concern that the sample sites are based on a longitudinal scale. He feels that locations may be utilized by fish depending on the location's proximity to spawning habitat or food source rather than how far upriver they are. Jeff Davis mentioned that the Focus Areas are located without emphasis on areas where the majority of salmon have been documented. Dudley Reiser said that the distribution of fish is not currently known, and that substantial discussion had been made during earlier TWG meetings about the need for collecting data in areas that were known to contain fish as well as areas where no fish were found. He added that areas not currently known as spawning habitat are important to study, because they may become important habitat areas post-Project. Jeff Davis requested additional Focus Areas in Middle River Reaches MR-6, MR-7, and MR-8 to provide more replication where fish spawning is currently known to occur. MaryLouise Keefe warned that our current knowledge of fish spawning habitat may not be as thorough as believed. She is confident that the current balanced approach for Focus Area selection will confirm where fish are and are not. Dudley Reiser said that all Focus Area locations are flexible and adaptable. If 2013 data imply that adjustments are needed in order to sufficiently capture fish distribution and habitat use, this will be done in 2014. A uniform and nonbiased approach is needed for the start of the study program.

Bob Henszey asked if the team would have enough years to collect the necessary data if Focus Areas are adjusted for 2014 studies. Dudley Reiser explained that the development of habitat-flow sensitive models can be developed over a one year time frame so that if adjustments are made in 2013 and additional data are collected in 2014 there would still be sufficient time at the end of 2014 and the beginning of 2015 to analyze data and develop appropriate models.

Jeff Davis suggested that increased sites and frequency of data collection in 2014 could catch variability to resolve the possible time constraint.

Alice Shelly presented a statistical approach used to ensure that representative sampling of the habitats present is being achieved with current locations of Focus Areas and other sample sites. Jeff Davis mentioned that if the classification were to change due to his disagreements, the level of representation might change as well. Alice Shelly added that representativeness will be evaluated continuously as more data are available, but the approach for evaluating representativeness would not change.

Michael Buntjer requested that additional Focus Areas be placed in MR-7. He feels that this reach is very complex and long and is underrepresented by Focus Areas. Dudley Reiser explained that current Focus Area locations were determined using best professional judgment from all resources and currently available data. Each Focus Area is placed to best evaluate relationships among resources. Each resource is independently supplementing the Focus Areas with sample sites elsewhere. Because of this, Dudley Reiser anticipates being able to extrapolate data from areas with flow-sensitive attributes within Focus Area sites to other areas with similar attributes. MaryLouise Keefe suggested moving a Focus Area from MR-2 to MR-7. Jeff Davis voiced Eric Rothwell's request that 5-6 replicates of each macrohabitat be encompassed in Focus Areas. Matthew LaCroix added that reach MR-8 seemed important for the riparian resource. He suspects it would be equally important for fish use and requested an additional Focus Area in MR-8 and in the lower extent of MR-7. Further consultation will be conducted to discuss the Focus Area locations.

Phil Hilgert reminded attendees that the area where most Project-induced flow effects will occur is immediately downstream of the proposed dam site. Currently, this is considered an area of relatively low species numbers and usage. There may be additional species and usage post-Project. Phil Hilgert asked that everyone consider the potential change in fish and habitat distribution when considering Focus Area site locations.

Dudley Reiser explained that there are many ways to study a system such as this and that it is crucial that everyone agree on the adequacy of the proposed approach.

Dara Glass requested that the elders of CIRI communities be asked for their input on Focus Area locations with respect to knowledge of fish use.

Bob Henszey and Michael Buntjer asked for further explanation on the Focus Area selection process. Dudley Reiser referenced Table 8-6 in the RSP, which describes the rationale for each Focus Area location. Betsy McGregor added that the TWG meeting in the fourth quarter of 2012 discussed this information. Materials are located at <http://www.susitna-watanahydro.org/>.

### **Focus Areas in context of Overall Sampling Approach**

#### *Riparian Instream Flow (Kevin Fetherston R2)*

Kevin Fetherston presented the Riparian Instream Flow approach to Focus Areas. This presentation can be found at [http://www.susitna-watanahydro.org/wp-content/uploads/2013/02/2\\_14\\_13\\_SuWa\\_R2\\_RIFS\\_ClusterAnalysis\\_Presentation.pdf](http://www.susitna-watanahydro.org/wp-content/uploads/2013/02/2_14_13_SuWa_R2_RIFS_ClusterAnalysis_Presentation.pdf). He began by explaining that the sampling approach for riparian studies is different from that of fish-related studies. This is mainly due to the fact that plants are immobile, with the exception of seed dispersal and establishment periods. Kevin Fetherston continued by presenting the framework and approach proposed in the Riparian Instream Flow Study and Riparian Vegetation Study for 2013 and 2014.

The lateral modeling boundaries are based on areas affected by hydrology. This includes the groundwater-surface water interaction. The presentation explained the cluster analyses variables, preliminary results, samples, and mapped transects included in 2012 studies. The riparian studies apply a Focus Area system unique to the water-related studies, which was included in the presentation.

Bob Henszey asked if a technical memorandum will be provided with the riparian results. Kevin Fetherston said that riparian studies will be producing Initial Study Reports.

An ADNR representative requested that fire influences and the influence that the Project may have on fire be addressed in the riparian studies.

*Riparian Vegetation (Aaron Wells ABR)*

Beginning at slide 29 of the Riparian Instream Flow presentation, Aaron Wells explained the sampling strategy applied in 2012 (slide 30) as well as the mapping approach (slide 35) used in the Riparian Vegetation study. Photographs shown throughout the presentation illustrated some plant communities observed and what could be inferred from soil pits. Aaron Wells clarified that Level III of the Vierick classification system will be applied when characterizing plant communities.

Aaron Wells explained that the plant communities' relationship with geomorphology was being represented (slide 34) and that vegetation complexity was used to determine Riparian Focus Area locations. He added that he is in the process of classifying the Lower River areas.

Matthew LaCroix asked if the study is typing gravel only in partially vegetated areas or if it is also doing so in bare gravel. He explained that his concern is based on the topic of seedling establishment. Aaron Wells said that an independent study of seedling establishment will characterize active gravel bars. Matthew LaCroix asked for confirmation that the saturated habitats would be studied. He added that these habitats may be saturated due to groundwater interaction. Aaron Wells said that wetlands will be captured in the study.

*Aspects of Focus Areas Pertaining to Other Resources (Alice Shelly)*

Alice Shelly continued the Focus Area presentation ([http://www.susitna-watanahydro.org/wp-content/uploads/2013/02/SuWa\\_R2\\_Focus-Area-Presentation\\_20130212.pdf](http://www.susitna-watanahydro.org/wp-content/uploads/2013/02/SuWa_R2_Focus-Area-Presentation_20130212.pdf)) at slide 25. She explained the representativeness of Focus Areas after selecting them using the systematic random approach proposed. Alice Shelly then compared the statistics of this approach to that of a completely random selection of Focus Area locations. The results, as summarized in slide 31, reveal the systematic approach as the most appropriate.

Paul Dworian explained that the Baseline Water Quality Study is sampling at 39 sites outside of the current Focus Areas. Sampling within Focus Areas is in support of the fisheries and modeling needs. These resources will dictate what water quality data are needed for their study. Paul Dworian mentioned that the thermal imaging results will influence the locations of piezometers. He said that the results of the 2012 thermal imaging study are excellent, meaning that it was an effective method for capturing groundwater influence in the Middle River.

Jeff Davis voiced concern that there were not enough sampling sites to capture variability of water quality parameters. Paul Dworian explained that a large amount of mixing occurs throughout the system. Dudley Reiser said that more locations will be sampled, if necessary, to capture variability within the side channel habitats.

Paul Dworian clarified that methylmercury will be sampled throughout the Susitna River, but focused efforts will be applied to the inundation zone. This is because the reservoir would be where most changes are anticipated.

Robert Plotnikoff said that a modified QAPP will be filed on March 1, 2013 based on DEC's comments to the organization of the information.

Discussion ensued about the Focus Areas. Dudley Reiser indicated that the currently proposed Focus Areas encompass 18% of the Middle River Segment of the Susitna River. Focus Area boundaries will be modified or additional sample sites will be selected to adequately capture all habitat types present.

**Geomorphology (Bill Fullerton Tetra Tech)**

Bill Fullerton explained the Geomorphology presentation (<http://www.susitna-watanahydro.org/wp-content/uploads/2013/02/TWG-Geomorphology-Presentation.pdf>). 1-D modeling will be applied to the entire Middle River Segment and 2-D modeling is anticipated within the Focus Areas. Slide 17 presents the Lower River efforts anticipated in the Geomorphology studies.

### **General Discussion**

Clarification was requested regarding the use of HRM vs. RM vs. PRM. Joetta Zabloutney explained that HRM (historic river mile) and RM (river mile) represent the river mile system used in any study other than the current Susitna-Watana Hydro Project. PRM (Project river mile) represents a river mile system specific to the Susitna-Watana Hydro Project. The PRM system for the Susitna River was primarily constructed by digitizing the wetted width centerline of the main channel from 2011 Matanuska-Susitna Borough digital orthophotos. Project River Mile 0.0 was established as mean low water, or what is otherwise called “ordinary low water”, of the Susitna River confluence at Cook Inlet. A centerline corresponding to the channel thalweg was digitized upstream to the river source at Susitna Glacier using data collected as part of the 2012 flow routing transect measurements. The PRM system places the dam site (although geographically in the same location) at RM 187.1, as opposed to RM 184. For human relations purposes, the dam site will continue to be at RM 184 to avoid any confusion. The difference in river mile assignment for the same location is due to the thalweg meander of the Susitna River since the 1980s and where river mile 0.0 starts; PRM 0.0 was established as mean low water whereas the 1980s RM 0.0 is undefined.

Bob Henszey asked Joetta Zabloutney if she could update the maps provided at the 2012 site reconnaissance to include PRM rather than RM.

Dara Glass announced to the attendees that surface rights land ownership has changed recently on what is classified as CIRI-owned lands. Accordingly, there are currently six Village Corporation landowners involved in the Project study area. The 2013 land access permits are not yet issued and negotiations for land access are currently underway.

Matt Love informed attendees that licensing participants may submit comments to FERC on the outstanding study plans and items filed with FERC on 3/1/2013 by 3/18/2013.