



# SUSITNA-WATANA HYDRO

## Meeting Notes Instream Flow Study Technical Team (IFSTT) Conference Call June 11, 2013

**LOCATION:** Teleconference

**TIME:** 9:00 am – 10:00 am (AKDT)

**SUBJECT:** IFS TT Meeting #4

**GOAL:** Discuss license participant's comments regarding HSC data collection. This was a follow-up to IFSTT Meeting on May 17 and subsequent HSC posting on May 22.

**PARTICIPANTS:** Alice Shelly R2, Betsy McGregor AEA (partial), Dudley Reiser R2, Jeff Davis ARRI, Joe Klein ADF&G, Laura Arendall R2, Mike Buntjer USFWS, Mike Gagner R2, Phil Hilgert R2, Sue Walker NMFS, Greg Auble USGS, Chris Holmquist-Johnson USGS, Leanne Hanson USGS

### MAJOR TOPICS AND DISCUSSION POINTS

This teleconference was scheduled as a follow-up to the IFSTT meeting on May 17<sup>th</sup> and to go over comments received from license participant's on the revised HSC presentation that was posted on May 22<sup>nd</sup> (see attached). Dudley Reiser noted that the objective of the meeting was to step through the comments received from Alaska Department of Fish and Game (ADFG – J. Klein email of June 4, 2013), and the Services (National Marine Fisheries Service [NMFS] and U.S. Fish and Wildlife Service [USFWS]) (transmitted – E. Rothwell email of June 4, 2013) regarding the May 22<sup>nd</sup> revised HSC presentation. D. Reiser explained that although there had been a request to postpone this discussion until E. Rothwell could participate (Eric had a conflict with June 11), it was important to have the call since R2 was going to commence HSC field studies the following week and therefore wanted to go over the recent comments on the proposed HSC sampling. D. Reiser also noted that this call was going to be limited to HSC topics.

#### ADFG June 4<sup>th</sup> Comments (see attached)

Comments received from ADFG were discussed first. Mike Gagner (R2) stepped through and addressed each of J. Klein's comments. Specific points of note:

- Regarding habitat mapping: R2 used HDR macrohabitat mapping with each mainstem habitat type divided into 500m segments, each off-channel habitat type was segmented into 200m segments. HSC sampling segments were then randomly selected from within those segments. Mike Gagner described the HSC sampling design, explaining there was a balance between a random sample and selecting known fish locations within randomly selected segments.
- Joe Klein would like to see an end-of-season summary of sampling, indicating the fast and slow water component. R2 agreed with this.
- It was asked if this design was random enough to support a statistical analysis (e.g., means, standard deviations and confidence intervals). Alice Shelly responded that the purpose of the HSC sampling is to

define a curve/distribution of observations, not abundance estimates. A confidence interval can be calculated on the curve, but not on individual parameters. She noted that the purpose of the data being collected is to develop HSC curves for use in the habitat modeling.

- Joe Klein indicated he felt the proposed sampling design would result in sampling of a reasonable proportion of the habitat types, but asked whether there would be room for a mid-course correction if needed; e.g., possibly increased sampling? Mike Gagner indicated R2 would be open to a mid-course correction in sampling if warranted.
- Joe Klein requested that single maps of each FA be developed that collectively portray the full array of studies that will be conducted in each. This will allow for a better understanding of interdisciplinary study integration. Dudley indicated a series of maps were being developed to show this and that some of these would be presented at the next (June) TWG meeting.

Mike Buntjer asked why the proposed HSC sampling for 2013 was not proposed for all FAs. Dudley indicated that recent land issues had developed and that the upper three FAs encompassed large portions of ANCSA lands, for which AEA was still working on access agreements. Until appropriate permissions have been obtained for those areas, some of the proposed studies would need to be postponed. He mentioned, however, that the remaining seven FAs were all going to be studied in accordance with the FERC-approved study plan. In addition, certain studies, including fish distribution and early life studies are going to proceed in all ten FAs, provided all activities are confined to the portion of the river below the Ordinary High Water (OHW) mark, which is under jurisdiction of the State of Alaska. Dudley clarified that in terms of the proposed HSC sampling, this was targeting five of the FAs. He indicated that this was subject to revision and that further consideration would be given to expanding the HSC sampling to all seven FAs that are not within ANCSA lands.

Sue Walker (NMFS) asked if Dudley knew which villages were associated with the upper three FAs. Dudley indicated he did not know specifics regarding ownership of the ANCSA lands. Dudley suggested referring further discussion on this issue to AEA.

After reviewing Joe Klein's comments, the discussion shifted to Eric Rothwell's (NMFS) comments (included below). Eric Rothwell was unable to attend due to a previous commitment. Dudley stepped through and acknowledged each of the comments. Jeff Davis asked how variability in habitats would be addressed and it was explained that this variability would be addressed with repeat sampling. Once the survey quadrats are established, they will be sampled twice a month starting in mid-June and extending through September. Each site should have 3-5 different survey dates. Jeff noted that some of Eric's comments had been stated earlier in other comments and had not yet been addressed. He mentioned that the Services would be looking to the ISR to see if these comments had been addressed. Sue Walker asked whether AEA was going to prepare a formal response to the NMFS and ADFG written comments. Betsy McGregor (AEA) indicated that AEA was not planning on providing formal comments. Betsy noted that the studies are in the implementation phase, and that AEA and contractors are busy planning for field studies.

Sue Walker stated that the agencies will be in the field for two days after the June TWG.

### **ACTION ITEMS**

The following ACTION ITEM was identified:

<b>Action Items</b>	<b>Date</b>	<b>Responsibility</b>
1) Prepare maps of Focus Areas illustrating combined resource studies. An initial set will be presented at the June TWG.	6/24-6/25	All water resource groups?



# SUSITNA-WATANA HYDRO

## Agenda and Schedule Instream Flow Study Technical Team (IFSTT) June 11, 2013

**LOCATION:** TELECONFERENCE

**TIME:** 9:00 am – 10:00 am (AKDT)

**SUBJECT:** IFSTT Meeting #4

**GoTo MEETING:** <https://www4.gotomeeting.com/register/286346527>  
1-800-315-6338 CODE 3957#

**Goal** Discuss license participant's comments regarding HSC data collection. This is a follow-up to IFSTT Meeting on May 17 and subsequent HSC posting on May 22.

### Agenda Items

**9:00 – 9:05** Introductions

**9:05 – 10:00** Discuss comments on HSC data collection from ADFG and NMFS

**From:** Klein, Joseph P (DFG) [<mailto:joe.klein@alaska.gov>]

**Sent:** Tuesday, June 04, 2013 10:56 AM

**To:** Dudley Reiser

**Cc:** Haught, Stormy B (DFG); McGregor, Elizabeth A (AIDEA); susan walker; [Michael.Buntjer@fws.gov](mailto:Michael.Buntjer@fws.gov); Berg, Catherine; eric Rothwell; [arri@mtaonline.net](mailto:arri@mtaonline.net); Christopher Holmquist-Johnson; Leanne Hanson

**Subject:** Instream Flow TWG - ADF&G Comments on May 17 & 22 PPTs

Dudley-

We appreciate the instream flow and specifically Habitat Suitability Criteria (HSC)/Habitat Suitability Indices (HSI) information presented at the May 17 meeting with updates provided on May 22. This is helpful information for understanding sampling protocols and it was also appreciated including site locations of other variables being sampled (e.g. water quality and groundwater).

Overall, we agree with the sampling approach and protocols presented for field activities this summer as discussed below with the caveat a thorough, focused sampling effort is needed throughout the open-water season to adequately sample fish use and habitats.

The information was provided in a PowerPoint (PPT) formats which is a difficult format to review and provide comments on. The information really needs to be organized and converted into a study plan format, perhaps as an addendum/appendix to the 2012 Instream Flow Planning Study Document dated March 19, 2013 which already includes general study plan information for 2013-14 as well as other pertinent information needed for review (e.g. periodicity tables and maps). With field studies starting up, this can be a low priority but an important task to complete nonetheless. It would be intended that future revisions/more detail could then be added to the plan as it becomes available and would provide a better method for tracking changes.

Specific comments are provided below:

- It was stated sampling would focus on priority fish species identified in a table (slide 4 May 17 PPT) with high, moderate and low priority. We concur with the list and rank of priority species identified. We will re-evaluate this list and ranking following results from the field season.
- It was stated that a representative range of macrohabitats as well as habitat conditions (slow and fast velocity, deep and shallow) should be sampled. We agree with this approach and the use of quadrat sampling with the revised quadrat size (50m instead 100m) and increased number of sample sites in off-channel habitats. We understand that quadrat locations may be modified in the field and assume that all sampling will occur within defined quadrats – this should be stated or clarified if not correct.
  - On slide 3 of May 22 PPT, it is not clear why the mainstem macrohabitat types are divided into 500-meter segments and off-channel macrohabitats into 200-meter segments?
  - On Slide 16 of the May 17 PPT, it states availability measurements will be collected at FA-113 (Oxbow I) and FA-141 (Indian River) – will these data be collected from field measurements or obtained from the 2-D hydraulic model similar to FA-104 (Whisker's Slough) and FA-128 (Skull Creek)?
- Sampling effort was stated as 6-8 visits from June – September (8 days each effort) within 5 Middle River Focus Areas (104-Whisker's Slough, 128-Skull Creek, 138-Gold Creek, 141-Indian River, & 144-Slough 21). It was stated these areas contain a high diversity of macrohabitats with known fish use. We agree with the selection of sampling areas but also note that FA-115 (Lane Creek/Slough 6A) would also be a good candidate

sample site if time and resources allow. Given the large study area, remoteness and logistics, and the phenology of fish species and life stages in the Susitna River, we are concerned that the sampling effort for collecting a sufficient number of HSC/HSI observations may be difficult. We appreciate the recognized need to closely monitor field sampling activities and making mid-season adjustments if needed.

- Review of the recent FA maps with macrohabitats delineated reiterates the importance that further review & updates are needed. We believe a key component to these updates will be field identification of what water level side channel, side slough, and upland slough habitats become overtopped, as discussed by NMFS and FWS at the May 17 meeting.
- All sample studies that are being conducted in each FA need to be shown on the habitat maps (e.g. instream flow, groundwater and water quality sites) and should be labeled appropriately. On slide 8 of the May 22 PPT, blue transect lines are shown but are not explained in the legend. It is assumed these are for water quality based on the May 17 PPT but they are located in different locations and the “star” symbols showing data collection locations are missing. From a habitat sampling perspective, it is preferred these other study collection sites occur within instream flow quadrats.
- It is not clear what depth of water will be recorded for water velocity to document fish spawning redds (i.e. mean column or nose of fish).
- Water quality parameters sampled should include dissolved oxygen (on one slide it was included on another it was not).
- Substrate composition parameters sampled should include an estimation of embeddedness (e.g. 0-25%, 26-50%, etc.).
- Recommend recording the discharge at Gold Creek during time of each site visit to allow for comparison of flow conditions at across study sites and other time periods.

Good luck in your field work this summer.

Joe Klein, P.E.

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**From:** Eric Rothwell - NOAA Federal [<mailto:eric.rothwell@noaa.gov>]

**Sent:** Tuesday, June 04, 2013 1:28 PM

**To:** Betsy McGregor; cc: Aquatic Restoration and Research Institute; Susan Walker - NOAA Federal; Berg, Catherine; [Michael.Buntjer@fws.gov](mailto:Michael.Buntjer@fws.gov); Dudley Reiser; Klein, Joseph P (DFG)

**Subject:** NMFS comments on 2013 Criteria data collection at focus areas

**Attachment:** Focus Area Criteria Collection NMFS Technical Comments 060413.docx

Hi Betsy,

Please find our technical comments and recommendations on the May 17th instream flow meeting and subsequent update of the "2013 HSC Data Collection Revisions" presentation sent out May 22nd. I compiled these comments with our technical experts and in discussion with the USFWS. Previously (May 22) we submitted specific habitat classification comments and some general site specific habitat criteria comments, the attached comments provide more detail on our recommendations and concerns about your current approach.

We look forward to further discussion on site specific criteria development and on our previous comments/recommendations on habitat classification.

Best Regards.

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**Eric Rothwell**

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**NOAA FISHERIES**

**Attachment:** Focus Area Criteria Collection NMFS Technical Comments 060413.docx

**Review of Fish and Aquatics Technical Team presentation: 2013 Criteria Data Collection Revisions (May 22, 2013)**

Summary of meeting and presentations

During the May 17 instream flow meeting we discussed habitat classification and habitat criteria collection at focus areas. AEA and consultants presented draft plans for collecting site specific data to develop habitat utilization criteria (R2 2013a) We provided comments on the habitat classification on May 22 (NMFS 2013)

and hope that our comments will be incorporated and reflected in the revised criteria collection at focus areas plan or technical memo.

The meeting was a useful discussion on habitat classification and criteria collection, although we could not comprehensively comment on the criteria collection as the presentation/materials were not available prior to the meeting. During the meeting we made some suggestions, such as breaking the sampling sites at the Focus Areas (FA) off-channel macrohabitats into smaller sites and increasing sample sizes to capture macrohabitat longitudinal variability. We also requested that the FA criteria sampling maps be updated to show what other data would be collected (groundwater, water quality, etc.) that could be utilized to develop site specific criteria.

AEA sent out an updated presentation (2013 HSC Data Collection Revisions: 22 May 2013) that included updated focus area maps (R2 2013b). We appreciate the incorporation of our recommendation to break the off-channel habitat sampling sites into more/smaller sample sites in an attempt to capture the variability in each macrohabitat. Some of the focus areas changed, Oxbow I was no longer included (replaced by Gold Creek FA-138) and one additional sample site was included at Indian River (FA-141). On the updated maps it was unclear what the unlabeled purple cross-section lines represent, but we assume that they are water quality transects (If they are water quality transects, what information will be and how often will that information be collected?). Similarly it is unclear what the white circles are in some of the Focus Areas (for example Gold Creek and Slough 21), we assume they are identifying high use habitats but it is unclear.

### Questions/Comments

The objective of HSC/HSI or criteria (for the purposes of our comments criteria encompasses HSC and HSI to mean all physical criteria that may influence habitat use by a fish) development is to determine fish habitat preference by measuring the frequency of observations over a range of physical, chemical, and biological characteristics within macrohabitats. Fish species are either sampled or observed and each observation is associated with a suite of habitat variables measured at the same location and time. The goal of the criteria development from the variable collected is to account for the number of fish observations, but may not be able to capture the full range of utilization. Physically based habitat models are inherently limited so it is important to capture a wide range of habitat criteria (depth, velocity, substrate, distance to cover, upwelling/groundwelling, water quality, etc) that are site specific. For example proximity to spawning locations and partial migration barriers (beaver dams) should put the criteria into context as they will influence habitat utilization. In addition, observations should occur during a time when fish are likely to be present so that their absence is not attributed to habitat characteristics. Sample timing must consider the movement patterns of target fish species. Spring sampling in the Middle River macrohabitats is necessary to document habitat preferences of age-0 salmon as they move from spawning areas to rearing areas. Whereas, age-1 salmon observed in off-channel habitats in the spring may have different habitat preferences than age-0 fish not only because of ontogenetic shifts, but also because age-0 fish may not be fully dispersed from spawning areas until August or September.

As stated in our RSP comments, sampling should attempt to cover the range of variables (criteria not just depth, velocity, substrate). While the spatial distribution of habitat variables within macrohabitats is

unknown, some assumptions can be made. For example, substrate size distribution and water depths are likely different between the lower end of sloughs and side channel confluences with the main channel, and the upper ends of side channels and off-channel habitats. Water chemistry also is likely to vary longitudinally with proximity to water sources including the main channel, tributaries, or groundwater discharge. To successfully cover the range in the variables (criteria) sampling will include data from multiple Focus Areas, in addition to multiple (longitudinally distributed) sub-sampling sites within one Focus Area macrohabitat. The criteria sampling sites are disproportionately located within the subset of Focus Areas (Table 1). For example there are only two sampling sites for tributary mouths (assuming our recommendations for correcting the habitat classification of lower Whisker Creek is incorporated, NMFS 2013). Whisker Creek, in FA-104 makes up 67% of the sampling area for tributaries, the other 33% is in FA-144. FA-104 (Whisker Slough) also contains 50% of the side-slough sampling sites (38% in FA-128 Skull Creek/8a); and 31% of the upland slough sampling sites (46% of upland slough sampling will take place in FA-138 Gold Creek). The limited distribution of macrohabitat sampling sites does not capture the variability between Focus Areas.

The RSP, discussions on Focus Area selection and habitat classification and FERC study determination implied that HSC development would take advantage of the large range of macrohabitats within Focus Areas to ensure results were representative of the Middle River. However, the information presented at the recent TWG meetings does not support this approach. Site selection is limited to a sub-set of the Focus Areas, excluding those that were selected as being critical for species and life stages. For example, observations for HSC development do not include Slough 6A which was previously believed to be a critical area for juvenile salmon rearing. Site selection does not appear to account for variation in depths and velocities associated with backwaters or beaver dams, which were the two mesohabitat characteristics to be measured in off-channel habitats.

Finally, Focus Areas were presented as areas where all studies would concentrate efforts, yet it is now clear that most studies, ISF included, will be conducted only in a subset of the Focus Areas and AEA has yet to present a clear and accurate description of the Focus Areas with accurate classification showing what will be measured and where samples will be collected for each of the major study components.

Additional comments and questions:

- The proposed study approach remains to be clearly articulated.
- Unclear if utilization data will only be collected within the sampling boxes or if fish are observed anywhere in the FA if utilization data will be collected and if so how will effort be applied equally?
- Will availability data be collected at sampling sites only or at other locations? What habitat variables will be collected at sampling sites when fish are not found?
- Unclear from the two presentations how invertebrate drift density, benthic organic matter, and algal biomass criteria will be developed or if sufficient data will be collected as described in FERC's determination (2013); particularly as sampling for HSC/HSI development is not proposed among Indian River macrohabitats which would overlap with productivity sites.

- HSC/HSI development, as proposed, will not take advantage of the full range of habitat variables present among all of the macrohabitats within the Focus Areas

### Recommendations

- Writing up a summary of the Focus Area data collection for fish habitat utilization criteria development; incorporating our recommendations on criteria collection efforts and habitat classification corrections. Also needed is a discussion on methods for developing criteria once adequate data is collected.
- In addition to fish utilization, writing up a summary of the Focus Area data collection for fish habitat availability and how that data will be used in conjunction with the 2D hydrodynamic and habitat modeling conducted within each FA.
- We are concerned with the relative amount of effort allocated for the 2013 field season to microhabitat criteria/fish sampling collection. Our comments starting on the PAD, SD1, study request, PSP comments, RSP comments has reiterated the need to have site specific criteria that includes a wide range of variables. This criteria is crucial to assessing project effects on fish habitat - you can have a great understanding of some of the physical riverine processes but without a clear understanding of utilization we will not end up with a clear understanding of project effects. Sampling effort should reflect the objective to collect 100 fish utilization/criteria observations by lifestage/species per macrohabitat in the middle river. We suggest replicating the effort described for the 4 focus areas (plus one sampling location at FA-141 Indian River) in all of the focus areas downstream of Devil's Canyon (if Portage is indeed prohibitive due to access then at least add Oxbow I FA- 113 and Lane Creek FA-115 totaling 7 FA sampled for criteria).
- We recommend a more balance distribution of sampling effort between the Focus Areas by macrohabitat type. No Focus Area should represent more than 1/3<sup>rd</sup> of the sampling site effort for any one macrohabitat.
- We suggest that the site specific microhabitat data collection (information to develop HSI/HSC) should take precedence in allocating effort over the effort to collect observations of stranding/trapping, as it is unclear how that data will improve the assessment of the winter time load following operations probable stranding/trapping of juvenile salmon.
- The current effort should be developed to accurately satisfy FERC's determination to examine microhabitat criteria requested by NMFS and USFWS at Focus Areas. "For development of site-specific HSC curves, habitat use information (i.e., water depth, velocity, substrate type, upwelling, turbidity, and cover) would be collect at the location of each identified target fish and life stage" (FERC 2013).
- NMFS and USFWS requested a number of microhabitat variables that were not included in AEA's study plans. FERC recommended a preliminary approach to a number of these that would identify if further data collection would be necessary in the 2014 field season for: surface flow and groundwater exchange fluxes; dissolved oxygen (intragravel and surface water); macronutrients (i.e., nitrogen and phosphorus); temperature (intragravel and surface water); pH; dissolved organic carbon; alkalinity;

and Chlorophyll-a. FERC (2013) stated, “We recommend that AEA file with the Initial Study Report, a detailed evaluation of the comparison of fish abundance measures (e.g., number of individual s by species and age class) with specific microhabitat variables measurements where sampling overlaps, to determine whether a relationship between a specific microhabitat variable and fish abundance is evident.” We read this statement to mean that a sufficient number of measurements are necessary to determine if there is a relationship between utilization of habitat by priority species/lifestages and these microhabitat variables.

- Co-locate the sampling boxes with water quality data collection cross-sections when practical, or describe how water quality data will be collected at the sampling boxes.
- Increase the data collection of surface/groundwater exchange and the sampling sites by installing vertical thermistor arrays to calculate vertical fluxes and associated temperature. Currently only nine sampling sites have groundwater measures (only one tributary if our classification recommendations are incorporated). All off-channel habitats should have this measure to allow for enough samples to assess potential relationships between utilization and surface/groundwater exchange.

Table 1. Focus Area Sampling Site Summary by Macrohabitats

The following table assumes that the habitat classification will incorporate NMFS suggestions and classification corrections (NMFS 2013).

Focus Area (FA)		Main	Tributary	Tributary mouth	Side channel	Side slough	Upland slough
FA-104 Whiskers Slough	Total length of sample sites in FA (m)	200	100	0	100	200	200
	% of total sampling effort in FA	25%	67%	0%	20%	50%	31%
	# sampling sites colocated with GW in FA	0	1	0	0	1	0
FA-113 Oxbow I	Total length of sample sites in FA (m)	0	0	0	0	0	0
	% of total sampling effort in FA	0%	0%	0%	0%	0%	0%
	# sampling sites colocated with GW in FA	0	0	0	0	0	0
FA-115 Lane Creek (6a)	Total length of sample sites in FA (m)	0	0	0	0	0	0
	% of total sampling effort in FA	0%	0%	0%	0%	0%	0%
	# sampling sites colocated with GW in FA	0	0	0	0	0	0
FA-128 Skull Creek (8a)	Total length of sample sites in FA (m)	200	0	50	50	150	100
	% of total sampling effort in FA	25%	0%	50%	10%	38%	15%
	# sampling sites colocated with GW in FA	0	0	0	0	1	1
FA-138 Gold Creek	Total length of sample sites in FA (m)	200	0	0	150	0	300
	% of total sampling effort in FA	25%	0%	0%	30%	0%	46%
	# sampling sites colocated with GW in FA	0	0	0	1	0	1
FA-141 Indian River	Total length of sample sites in FA (m)	0	0	50	0	0	0
	% of total sampling effort in FA	0%	0%	50%	0%	0%	0%
	# sampling sites colocated with GW in FA	0	0	0	0	0	0
FA-144 Side Channel 21	Total length of sample sites in FA (m)	200	50	0	200	50	50
	% of total sampling effort in FA	25%	33%	0%	40%	13%	8%
	# sampling sites colocated with GW in FA	0	0	0	2	0	1
FA-151 Portage Creek	Total length of sample sites in FA (m)	0	0	0	0	0	0
	% of total sampling effort in FA	0%	0%	0%	0%	0%	0%
	# sampling sites colocated with GW in FA	0	0	0	0	0	0
FA-173 Stephen Lake, complex channel	Total length of sample sites in FA (m)	0	0	0	0	0	0
	% of total sampling effort in FA	0%	0%	0%	0%	0%	0%
	# sampling sites colocated with GW in FA	0	0	0	0	0	0
FA-184 Watana Dam	Total length of sample sites in FA (m)	0	0	0	0	0	0
	% of total sampling effort in FA	0%	0%	0%	0%	0%	0%
	# sampling sites colocated with GW in FA	0	0	0	0	0	0
<b>Total</b>	total length of sample sites	800	150	100	500	400	650
	# sampling sites colocated with GW	0	1	0	3	2	3

References

Federal Energy Regulatory Commission (FERC). 2013. *Study Plan Determination on 14 remaining studies for the Susitna-Watana Hydroelectric Project*. FERC Project No. 14241. April 1, 2013.

National Marine Fisheries Service (NMFS). 2013. *Comments on Focus Area Habitat Classification in response to May 17 TWG*. NOAA-NMFS AKR Technical Comments on Susitna-Watana Hydropower Project FERC No. 14241. Filed May 22, 2013.

R2 Resources Consultants (R2). 2013a. *2013 HSC Data Collection: 17 May 2013*. Technical Team Meeting, Fish and Aquatic Instream Flow. Prepared for AEA.

R2 Resources Consultants (R2). 2013b. *2013 HSC Data Collection Revisions: 22 May 2013*. Technical Team Meeting, Fish and Aquatic Instream Flow. Prepared for AEA.