

Table 7.4-1. Summary of consultation on Hydrology Related Resources study plans.

Comment Format	Date	Stakeholder	Affiliation	Subject	Response
Email	08/23/2012	Joseph Klein	ADF&G	What are the monitoring well placement sampling approach (e.g. equal spacing along linear transects, etc.) and location (e.g. for instream flow, in all habitat types?) for the various resource studies (i.e. instream flow, riparian instream flow, water quality). Also, a description of sampling intensity would be helpful (i.e. for instream flow purposes, will the objective be to characterize entire gw/sw interaction throughout entire intensive study site or only at select microhabitats).	AEA has included more detail in the Groundwater RSP Sections 7.5.4.5 and section 7.5.4.6 pertaining to well place sampling approach and location. In general, the placement of wells in transects will be determined by local hydrologic boundary conditions. Wells are generally placed close to a boundary (stream, slough, main channel) and then at increasing distance away from the boundary to help measure the pressure response from rising and falling stage levels in surface-water features (internal/external modeling boundaries). Additionally, some wells will be placed in key areas related to riparian habitat, key instream flow study needs, or to help identify hydrologic conditions near groundwater model or study area boundaries. Within each Candidate Focus Area (CFA), there will be area(s) where groundwater analysis will be focused. In some of the CFAs, this may cover a majority of the CFA area, in others it may only be a portion. The groundwater analysis areas will encompass the internal focus areas for riparian and instream to help provide the groundwater portion of the hydrologic framework being used for analysis by the various studies.
Email	08/23/2012	Joseph Klein	ADF&G	What is the duration for monitoring (I believe at the meeting it would be from installation until winter 2013-14?)	The duration of monitoring will vary for different hydrology data collection programs. The current network of gaging stations started in summer of 2012 will continue operations through the winter of 2012/13 into 2013 and 2014. Technical evaluations will be made in the summer of 2014 as to which gaging stations need to be operated during the

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					winter of 2014/15. Groundwater monitoring programs will begin at a small scale in winter 2012/13 and the increase during summer of 2013. The monitoring of groundwater wells will continue into 2014,. At that time, a subset of the groundwater wells may be monitored for the winter of 2014/15.
Email	08/23/2012	Joseph Klein	ADF&G	How often will monitoring wells be calibrated for various parameters to be sampled pre-post- and during field monitoring?	Monitoring wells will be surveyed with a combination of RTK survey methods and optical level loop methods. This will be done at least two times a year, or more frequent if well movements are recorded. Pressure transducer measurement will be verified with manual measurement at least month during summer months, and 3-4 times during winter periods. Both calibration (for determining offsets) and verification water levels will be collected. Conductivity and temperature sensors will have calibration checks performed before field installations and field calibration checks monthly during summer months. Calibration checks during winter months will be performed at least once during the mid winter period when safe access and weather conditions allow, and before spring breakup and fall freeze-up. This process will be further described in the Groundwater Study Plan in section 7.5.4.5 and section 7.5.4.6.
Email	09/01/2012	Betsy McCracken	USFWS	Groundwater- The integration of the groundwater study efforts with the biological studies is not clear. Specifically, how will the groundwater study be made relevant to the scale of fish habitat and fish habitat site selection in the Susitna River? The objectives of the groundwater study should include relevance to the hierarchially nested habitats,	In the RSP, AEA has clarified how fisheries studies have been incorporated into the instream flow and groundwater aquatic studies. The groundwater aquatics study is coordinating with both Instream Flow and Fisheries studies on the selection of Focus Areas (FAs). The groundwater study will be measuring the both horizontal and vertical

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				including macro-, meso-, and micro-habitats that are influential to fish habitat selection. The groundwater study sampling design should be relevant to fish habitat and site selection. A specific objective needs to be measuring the hydraulic gradient/head (upwelling or downwelling) under the existing hydrograph and under the proposed project hydrograph release flow schedule.	head gradients through combinations of nested wells installed at different depths and shallow wells installed in surface-water habitat areas to measure the gradients between surface-water sources and underlying groundwater conditions. Details on the measurement of fluxes can be found in the RSP in section 7.4.5.6. These gradients will be compared with simulated gradients from groundwater/surface-water models under the field conditions measured in 2013 and 2014 and compared with project operation scenarios.
Email	09/11/2012	Bob Henszey	USFWS	Section 6.6.4.5 (Groundwater): The suggested four to six intensive study reaches instrumented with groundwater and surface-water recording instruments may be insufficient to address this objective if plant response will be described by process-domains (see pseudoreplication discussion above). However, hydrology is likely the most dominant physical factor required for maintaining floodplain plant communities across the various process-domains, and barring some other dominant physical factor (e.g., soil parent material, weather, etc.) it may be possible to use data from the individual intensive study-site transects to build response curves (see Henszey et al. 2004 ne.water.usgs.gov/platte/reports/wetlands_24-3.pdf), Figure 7 for an indication of the number of data points required to build a response curve).	The purpose of the Focus Areas (FAs) is to develop intensive enough data collection and analysis programs to define the groundwater/surface-water interactions and hydrologic cycle processes in a variety of environments so the process understanding can be used at the larger scale to evaluate potential Project affects and methods for alternating Project operations to reach desired management goals. The CFAs will be used in conjunction with hydrologic analysis to help inform the Project and agencies on the hydrologic interactions and range of natural variability in the system. Response curves for the CFA's will be evaluated as part of the Riparian Groundwater Study (see RSP 8.6.4.5).
Email	09/11/2012	Bob Henszey	USFWS	One-and-a-half growing seasons (July 2013 to September 2014) will likely provide insufficient groundwater hydrology data to fit individual species response curves (especially for annual	The study schedule for riparian growing seasons is sufficient. The model simulation tools will be used to re-analyze past hydrologic conditions (such as recent years or

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				species), and may not be enough data to reasonably predict groundwater relationships with river stage and to verify the model predictions with independent data. Precipitation may also dramatically affect transient but critical groundwater levels (a few days to a week or more of elevated water levels), which would be difficult to evaluate with limited data. How will these potential problems be addressed?	<p>80s information) to gain additional data for the development of responsive curves. Data from Long-Term Ecological Research (LTER) sites such as the Bonanza Creek Experimental Forest (BCEF) will be compared with the evaluations in the Susitna riparian study areas to help expand the process understanding of riparian responses to groundwater/surface-water interactions.</p> <p>Precipitation data will be measured at each of the riparian focus areas. Shielded summer precipitation gages will be installed in early spring 2013 in time for the 2013 summer season. The information will be compared with the recent update to the statewide precipitation evaluation and new index maps. Additionally, precipitation information collected by the Glacier Runoff Study will be incorporated into the precipitation analysis for the riparian focus areas.</p>
Email	09/11/2012	Bob Henszey	USFWS	In addition to the Work Products described in Section 6.6.4.5.2, the products should provide water-level summary statistics for each location (e.g., point, plot, or transect) that will be used to test and fit plant response curves, such as growing season cumulative frequency, 7-day moving average, 10-day moving average, 14-day moving average, and arithmetic mean (see Henszey et al. 2004 { ne.water.usgs.gov/platte/reports/wetlands_24-3.pdf }, Table 1).	The Groundwater Study will provide the time series for measured and simulated groundwater levels to help provide the summary statistics needed for developing plant-response curves. This is further described in the Instream Flow Riparian Groundwater Study Plan in Section 8.6.4.5 (previously in Section 6.6.4.5.2).
Email	09/11/2012	Bob Henszey	USFWS	Section 6.6.4.7 (Succession Models and Flow Response Guilds) appears to potentially address the USFWS's Objective 6 request; however, two critical referenced papers (Merritt et al. 2010 and Pearlstine et al. 1985)	Additional detail has been added to the Riparian Instream Flow RSP Section 8.6.4.7 to demonstrate that USFWS Objective 6 will be met by the proposed methods. A description of the hydrologic gradient

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				<p>were not included in the Literature Cited. These references were not provided until 8/28/2012, and the USFWS has had insufficient time to review these papers in detail. The concept of the PSP response guilds is similar to the USFWS's request to develop plant community response curves, but the PSP methods are insufficient to evaluate if our requested Objective 6 will be met. The USFWS requested evaluating specific water-level summary statistics (see above discussion for groundwater) with a rigorous curve-fitting technique similar to Henszey et al. (2004). The methods should provide sufficient detail to show how quantifiable (not qualitative) hydrologic (surface-water and groundwater) gradients will be constructed to show the optimum and range of favorable water levels required for maintaining floodplain species/communities.</p>	<p>analyses is provided in Section 7.5: Groundwater. AEA has revised the Groundwater RSP at Section 7.5.4.5] to provide more detail to show how quantifiable hydrologic gradient will be constructed. The groundwater and surface water field measurements for continuous monitored stations will be 15 minutes or less. Model simulations will also 15 minutes or less, based on analysis of modeling results. This information will produce time series data sets, from which water level summary statistics can be calculated for a range of analysis objectives, such as running averages in hourly and daily increments.</p>

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