

| Study Title                  | Study Objectives  | Potential Study Methods   | Relevant 2012 Components   | 2012 Study Titles                                 | Purpose   |
|------------------------------|---|---|--|---|---|
| Instream Flow Study          | 1) Develop a modeling approach to quantify the seasonal habitat versus flow and other parameter relationships for aquatic species, lifestages and/or guilds.  | 1a) Build upon and use, where appropriate, the extensive instream flow model development work conducted in the 1980s.<br>1b) Select target species, lifestages and/or guilds.<br>1c) Determine the periodicity (seasonal timing) and longitudinal distribution along the river of the target species/lifestages/guilds.<br>1d) Determine the macro (e.g., turbidity) and mesohabitat types (main channel, side channel, sloughs, tributary mouths) utilized by target species/lifestages/guilds.<br>1e) Develop macro and micro habitat suitability criteria for target species/lifestages/guilds.<br>1f) Identify the important physical habitat processes (upwelling/downwelling, turbidity, substrate quality, ice/water temperature, breaching of sloughs by mainstem flows, channel change) and determine modeling methods for each, as appropriate.<br>1g) Develop a stratification approach for the river and select study sites that represent the riverine habitat types (main and side channel, sloughs, tributary mouths).<br>1h) Coordinate with other studies (flow routing, fluvial geomorphology, water quality, ice processes, riparian, productivity, fish passage) to provide physical/biological process input data for the habitat modeling.<br>1i) Model hydraulics and habitat over a range of flows using empirical mapping, 1D modeling, and/or 2D modeling.  | <ul style="list-style-type: none"> <li>• Synthesis of the 1980s instream flow studies and an evaluation of the applicability of the studies to the current Project;</li> <li>• Identification of appropriate species/lifestages, study reaches, study sites, and instream flow modeling methods for the 2013-2014 Instream Flow Study; and</li> <li>• Coordination of instream flow study data needs across resource disciplines and studies.</li> </ul> | F-S5: 2012 Instream Flow Planning Study           | <ul style="list-style-type: none"> <li>• Characterize aquatic habitat as a function of existing and potential with-Project stream flow/conditions;</li> <li>• Use/integrate results from the various physical habitat and biological process studies to assess aquatic habitat (e.g., Flow Routing, Ice Processes, Fluvial Geomorphology Modeling, Water Quality Modeling, Instream Flow Riparian, Productivity, and Fish Passage studies); and</li> <li>• Provide a basis for impact assessment; developing A/P measures; developing PME measures; and developing resource management / monitoring plans.</li> </ul> |
|                              | 2) Use the habitat versus flow/other parameter relationships to develop a time series and effective habitat analysis appropriate for quantifying existing conditions and a range of with-Project conditions.  | 2a) Use the period-of-record existing hydrology and alternative with-Project flow scenarios to develop habitat time series exceedance plots of habitat.<br>2b) Use the existing and alternative with-Project hydrology time series (including routing model results of flow attenuation) to analyze effective habitat for non-mobile species/lifestages (e.g., spawning/incubation).  |  |   |   |
|                              | 3) Identify the time periods, flow/other parameter conditions, and life stages when habitat may be a limiting factor for aquatic species.   | 3) Summarize and compare the modeling results from different modeling scenarios to identify the time periods and flow scenarios where habitat is a potential limiting factor for target species/lifestages/guilds.  |  |   |   |
| Instream Flow Riparian Study | 1) Quantify the riparian vegetation versus flow relationships (recruitment, encroachment, species composition, and seral stage), including the amount of active channel/floodplain that could experience riparian vegetation change under various flow scenarios. | 1a) Develop a conceptual riparian process and succession model for the Susitna River.<br>1b) Develop a life history strategy matrix for common riparian species (e.g., balsam poplar, willows, alders), including seed release timing, seed viability, root growth rate, scour tolerance, and vegetative regrowth.<br>1c) Coordinate with the Instream Flow Study to select study sites to quantify riparian processes.<br>1d) Develop detailed maps of the riparian zone within the instream flow study sites, including species composition and age class information.<br>1e) Model inundation of vegetation adjacent to the channel and sloughs/side channels over a range of flows, including ice/ice elevation and the effects of flow on ice elevation.<br>1f) Characterize historic riparian recruitment processes along the Susitna River, including identifying successful riparian recruitment events (use tree cores for aging as appropriate), describing the associated hydrology and ice processes, and quantifying the flow and ice levels/ranges that correlate to the current riparian vegetation. Coordinate with the Ice Processes Study.<br>1g) Assess the potential riparian vegetation change for a range of potential Project operations on the hydrograph components and ice processes important for riparian species recruitment and establishment, including frequency, magnitude, timing, duration, and recession rates of scouring and recruitment flows and ice processes. | <ul style="list-style-type: none"> <li>• Instream Flow Riparian Study Project Manager</li> </ul>   | RFP Task 4: Instream Flow Riparian Study Planning | <ul style="list-style-type: none"> <li>• Characterize the riparian vegetation as a function of existing and potential with-Project stream flow conditions;</li> <li>• Provide riparian vegetation inputs to the Fluvial Geomorphology Modeling, Instream Flow, and Wildlife studies; and</li> <li>• Provide a basis for impact assessment; developing A/P measures; developing PME measures; and developing resource management / monitoring plans.</li> </ul>  |
|                              | 2) Estimate the effects of potential riparian vegetation changes on channel topography.   | 2) Evaluate the interaction of potential with-Project changes to riparian vegetation on channel morphology (sediment deposition/transport and encroachment/channel narrowing/bar stability) in coordination with the Fluvial Geomorphology Study.   |  |   |   |
|                              | 3) Provide riparian vegetation change information to other studies.   | 3) Coordinate with the Instream Flow and Wildlife Habitat studies to provide riparian data in a manner that it can be used by these studies to form a basis for analyzing potential changes to instream flow aquatic habitat and riparian/wildlife habitat.   |  |   |   |