Susitna-Watana Hydroelectric Project
(FERC No. 14241)

Initial Study Report Meetings
October 17, 2014
Part B – Agenda and Presentations

Millennium Hotel
4800 Spenard Road
Anchorage, Alaska 99517

Filed November 15, 2014

SUSITNA-WATANA HYDRO

Clean, reliable energy for the next 100 years.

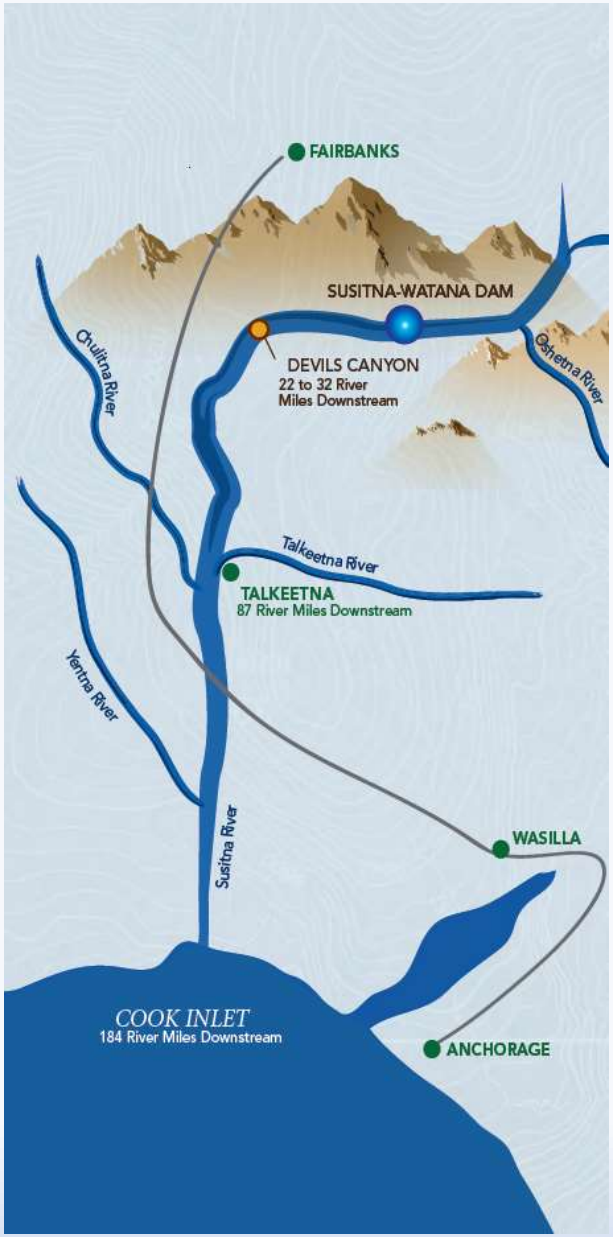
SUSITNA-WATANA HYDRO

Agenda and Schedule
Initial Study Report (ISR) Meetings

Ice (Study 7.6), Instream Flow (Study 8.5), Riparian Instream Flow (Study 8.6), Riparian Vegetation (Study 11.6)

October 17th, 2014

LOCATION:	**Millennium Hotel 4800 Spenard Road Anchorage AK, 99517**
TIME:	**8:30 am to 4:30 pm AKDT Time**
SUBJECT:	**ISR Meetings**
GoTo MEETING:	**https://www4.gotomeeting.com/register/143644303 1-888-585-9008 CODE: 810-056-852**
Goal	**Describe the status of Study Plan implementation and explain any variances and proposed modifications to ongoing studies for completion of the Study Plan.**
Agenda Items	
8:30 – 8:45	**Introductions and Review Agenda**
8:45 – 10:00	**Ice Processes in the Susitna River Study (Study 7.6) – J. Zufelt**
10:00 – 10:15	**Break**
10:15 – 12:00	**Fish and Aquatics Instream Flow Study (Study 8.5) – D. Reiser/P. Hilgert**
12:00 – 1:00	**Lunch**
1:00 – 3:00	**Riparian Instream Flow Study (Study 8.6) – K. Fetherston**
3:00 – 3:15	**Break**
3:15 – 4:15	**Riparian Vegetation Study Downstream of the Proposed Susitna – Watana Dam (Study 11.6) – Aaron Wells**
4:15 – 4:30	**Next Steps and Adjourn**



Initial Study Report Meeting

Study 7.6 Ice Processes in the Susitna River

October 17, 2014

Prepared by HDR

Study 7.6 Objectives

- Document the timing, progression, and physical processes of freeze-up and break-up during 2012–2014 between tidewater and the Oshetna River confluence (PRM 235.2 [RM 233.4]), using historical data, aerial reconnaissance, stationary time-lapse cameras, and physical evidence
- Determine the potential effect of various Project operational scenarios on ice processes downstream of Watana Dam using modeling and analytical methods
  - Develop a modeling approach for quantitatively assessing ice processes in the Susitna River
  - Calibrate the model based on existing conditions. Use the model to determine the extent of the open water reach downstream of Watana Dam during Project operations
  - Use the model to determine the changes in timing and ice-cover progression and ice thickness and extent during Project operations

Study 7.6 Objectives

- Develop detailed models and characterizations of ice processes at instream flow Focus Areas in order to provide physical data on winter habitat for the Fish and Aquatics Instream Flow Study (Study 8.5)
- Provide observational data of existing ice processes and modeling results of post-Project ice processes to the Fluvial Geomorphology Modeling below Watana Dam Study (Study 6.6), Groundwater Study (7.5), Instream Flow Studies (Studies 8.5-8.6), Fish and Aquatics Study (Studies 9.12), Riparian Vegetation Study Downstream of the Proposed Susitna-Watana Dam (Study 11.6), Recreation and Aesthetics Studies (12.5-12.7), and Socioeconomic and Transportation Study (Study 15.7)
- Research and summarize large river ice processes relevant to the Susitna River, analytical methods that have been used to assess impacts of projects on ice-covered rivers, and the known effects of existing hydropower operations in cold climates

Study 7.6 Components

- Aerial Reconnaissance (ISR Part A, Section 4.1; 4)
- Time-Lapse Camera Monitoring (ISR Part A, Section 4.2; 4)
- Ice Measurement Data (ISR Part A, Section 4.3; 7)
- Other Field Data (ISR Part A, Section 4.4; 8)
- River1D Ice Process Model Development for Existing Conditions (ISR Part A, Section 4.5; 8)
- Lower River Assessment (ISR Part A, Section 4.6; 9)
- Review and Compilation of Existing Cold Regions Hydropower Project Operations and Effects (ISR Part A, Section 4.7; 10)

Study 7.6 Variances

No significant variances have been made. Minor variances pertaining to the originally proposed time-lapse camera locations in Section 4.2 of the RSP have been made to provide for improved coverage and views of freeze-up and break-up processes.

Study 7.6 Summary of Results in ISR (ISR Study 7.6, Part A – Section 5)

- Breakup observations from the mouth to the Oshetna River (PRM 0-235.2) by aerial reconnaissance and time-lapse cameras made during 2012 and 2013 (Study 7.6, Appendix A)
- Freeze-up observations from the mouth to the Oshetna River (PRM 0-235.2) by aerial reconnaissance and time-lapse cameras made during 2012 (Study 7.6, Appendix A)
- Mapping of thermal and velocity open leads from the mouth to the Oshetna River (PRM 0-235.2) by aerial reconnaissance made during 2012 and 2013 (Study 7.6, Appendix A)
- Ice thickness, elevation, and winter discharge measurements made at nine Instream Flow water level recording stations in coordination with Study 8.5 during 2013 and 2014 (Study 7.6, Appendix B)
- River1D model developed for PRM 80-187.2 and calibrated for original 88 measured cross sections
- Proof-of-Concept Meeting held in April 2014 (Study 7.6, Appendix D); FA-128 (Slough 8A) River2D model example

Study 7.6 Summary of Results in ISR (ISR Study 7.6, Part A – Section 5)

- Assessment of Lower River water elevations under proposed conditions of increased discharge during winter completed at Sunshine and Susitna Station (Study 7.6, Appendix A)

- Review and compilation of existing cold regions hydropower project operations and effects including degree of success of using various modeling techniques (Study 7.6, Appendix C)

Study 7.6 Summary of Results since ISR (September 2014 Tech Memo)

- Breakup observations from the mouth to the Oshetna River (PRM 0-235.2) by aerial reconnaissance and time-lapse cameras made during 2014 (Study 7.6, TM-2014)
- Freeze-up observations from the mouth to the Oshetna River (PRM 0-235.2) by aerial reconnaissance and time-lapse cameras made during 2013 (Study 7.6, TM-2014)
- Mapping of thermal and velocity open leads from the mouth to the Oshetna River (PRM 0-235.2) by aerial reconnaissance made during 2014 (Study 7.6, TM-2014)
- River1D ice processes model modified with new measured cross sections and calibrated for open water conditions
- River2D models developed for FA-128 (Slough 8-A) and FA-104 (Whiskers Slough) and calibrated for open water conditions

AEA Proposed Modifications to Study 7.6 in ISR (ISR Study 7.6, Part C – Section 7.1.2)

Time Lapse Cameras

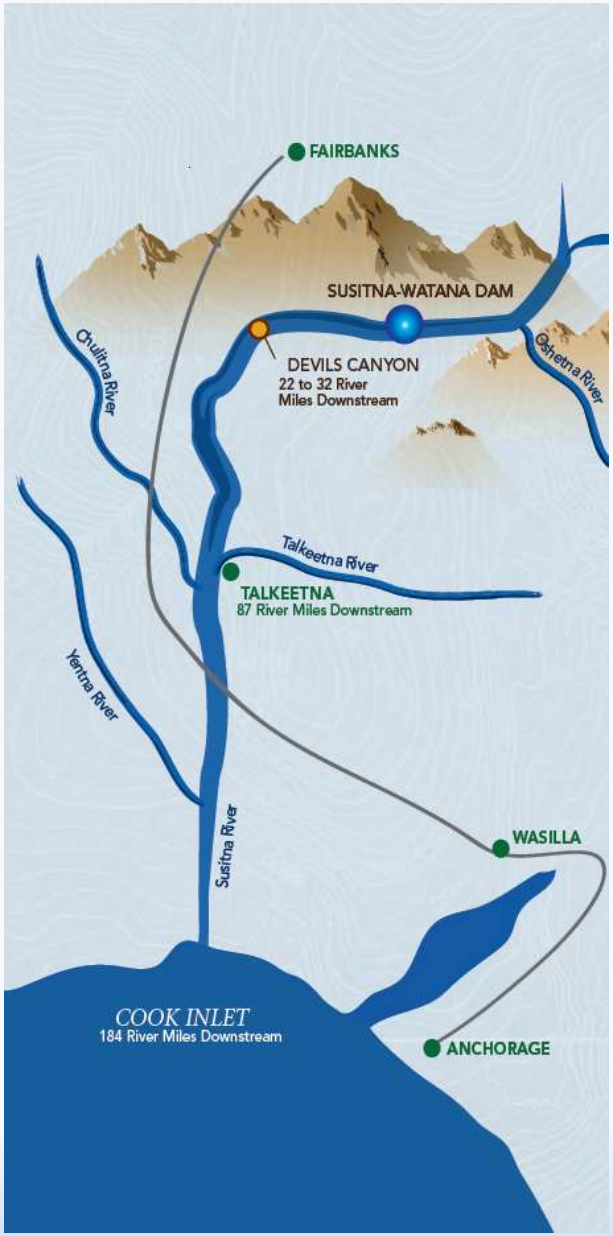
- The Study Plan indicated time lapse cameras would be located at FA-151 (Portage Creek) and FA-184 (Watana Dam). Lack of Cook Inlet Regional Working Group (CIRWG) land access in 2013 prevented the placement of these proposed cameras.
- A remote telemetered camera at ESS55 near the mouth of Portage Creek installed by the Fish and Aquatics Instream Flow Study (Study 8.5) provided suitable images, fully meeting the study objectives.
- The ice conditions at the Watana Dam site were obtained through the aerial video flights during freeze-up, the open lead surveys, and breakup, which provided adequate coverage of FA-184 (Watana Dam) to meet the study objectives.

Current Status and Steps to Complete Study 7.6

- **River1D Ice Processes Model**
  - Complete the ice-covered calibration for existing conditions, including updates to geometric data from 2014 field studies
  - Simulate existing and proposed Project operational scenarios for the 50-year hydrologic record during ice-covered periods
  - Coordinate with other studies to provide information on jam locations, water elevations, and flooded areas (Studies 6.6, 7.5, 8.5, and 8.6)
- **River2D models of the Focus Areas (FA)**
  - Develop and calibrate models for the other 8 FA's as geometric data becomes available
  - Utilize models to simulate depth and velocity during ice-covered periods using cold, warm, and average representative years of the hydrologic record
- **Model Analysis**
  - Conduct model accuracy and error analyses for the River1D and River2D modeling efforts

Licensing Participants Proposed Modifications to Study 7.6?

- Agencies
- CIRWG members and Ahtna
- Public



Initial Study Report Meeting

Study 8.5 Fish and Aquatics Instream Flow

October 17, 2014

Prepared by

R2 Resource Consultants

Miller Ecological Consultants

Golder Associates

Study 8.5 Objectives

- **Map the current aquatic habitat in main channel and off-channel habitats of the Susitna River affected by Project operations.** This objective will be completed as part of the Characterization of Aquatic Habitats Study (Study 9.9) (Figure 2-1)
- **Select study areas and sampling procedures to collect data and information that can be used to characterize, quantify, and model mainstem and lateral Susitna River habitat types at different scales.** This objective will be completed via a collaborative process with the other resource studies (Riparian Instream Flow [Study 8.6], Groundwater [Study 7.5], Geomorphology [Studies 6.5 and 6.6], Water Quality [Studies 5.5 and 5.6], and Fish and Aquatics studies), and is described in ISR Study 8.5, Section 4
- **Develop a mainstem Open-water Flow Routing Model that estimates water surface elevations and average water velocity along modeled transects on an hourly basis under alternative operational scenarios.** See ISR Study 8.5, Sections 4.4 and 5.3
- **Develop site-specific Habitat Suitability Criteria (HSC) and Habitat Suitability Indices (HSI) for various species and life stages of fish for biologically relevant time periods selected in consultation with the TWG.** Criteria will include observed physical phenomena that may be a factor in fish preference (e.g., depth, velocity, substrate, embeddedness, proximity to cover, groundwater influence, turbidity). If study efforts are unable to develop robust site-specific data, HSC/HSI will be developed using the best available information and selected in consultation with the TWG. See ISR Study 8.5, Sections 4.5 and 5.5

Study 8.5 Objectives

- **Develop integrated aquatic habitat models that produce a time series of data for a variety of biological metrics under existing conditions and alternative operational scenarios.** These metrics may include (but are not limited to) the following:
  - Water surface elevation at selected river locations
  - Water velocity within study areas subdivisions (cells or transects) over a range of flows during seasonal conditions
  - Length of edge habitats in main channel and off-channel habitats
  - Habitat area associated with off-channel habitats
  - Clear water area zones
  - Effective spawning and incubation habitats
  - Varial zone areas
  - Frequency and duration of exposure/inundation of the varial zone at selected river locations
  - Habitat suitability indices
  - See ISR Study 8.5, Sections 4.6 and 5.6
- **Evaluate existing conditions and alternative operational scenarios using a hydrologic database that includes specific years or portions of annual hydrographs for wet, average, and dry hydrologic conditions and warm and cool Pacific Decadal Oscillation (PDO) phases.** See ISR Study 8.5, Sections 4.3 and 5.4

Study 8.5 Objectives

- **Coordinate instream flow modeling and evaluation procedures with complementary study efforts,** including Riparian Instream Flow (Study 8.6), Geomorphology (Studies 6.5 and 6.6), Groundwater (Study 7.5), Baseline Water Quality (Study 5.5), Fish Passage Barriers (Study 9.12), and Ice Processes (Study 7.6) (see Figure 2-1)
- **Develop a Decision Support System-type framework to conduct a variety of post-processing comparative analyses derived from the output metrics estimated under aquatic habitat models.** These include (but are not limited to) the following:
  - Seasonal juvenile and adult fish rearing
  - Habitat connectivity
  - Spawning and egg incubation
  - Juvenile fish stranding and trapping
  - Ramping rates
  - Distribution and abundance of benthic macroinvertebrates
  - See ISR Study 8.5, Sections 4.8 and 5.8

Study 8.5 Components

- IFS Analytical Framework (ISR Part A, Section 4.1; pg 5)
- River Stratification and Study Area Selection (ISR Part A, Section 4.2; pg 7)
- Hydrologic Data Analysis (ISR Part A, Section 4.3; pg 18)
- Reservoir Operations Model and Open-water Flow Routing Model (ISR Part A, Section 4.4; pg 22)
- Habitat Suitability Criteria Development (ISR Part A, Section 4.5;pg 26)
- Habitat-Specific Model Development (ISR Part A, Section 4.6; pg 42)
- Temporal and Spatial Habitat Analysis (ISR Part A, Section 4.7; pg 50)
- Instream Flow Study Integration (ISR Part A, Section 4.8; pg 51)

Study 8.5 Variances

- The Study Plan indicated **13 mainstem water-level recording stations** would be maintained in 2013 (RSP Section 8.5.4.3.1). After calibration and validation of the Version 1 Open-water Flow Routing Model, and in response to land owner access issues, five stations were not maintained in 2013 (ISR Study 8.5, Section 4.4.2).
- The Study Plan indicated continuous stage measurements would be collected in the mainstem (RSP Section 8.5.4.3.1). Due to ice damage, flooding and land access issues, some short and long-term data gaps of water stage exist for eight hydrology locations (ISR Study 8.5, Section 4.3.2).
- The Study Plan indicated **continuous gaging would be installed at Fog Creek and Portage Creek** (RSP Section 8.5.4.4.1.1). Due to land access issues, these were not installed in 2013 (ISR Study 8.5, Section 4.3.2).
- The Study Plan indicated that **specific representative years** and the duration of the continuous flow record would be selected by AEA in consultation with the TWG in Q3 2013 (RSP Section 8.5.4.4.1.2). This selection was discussed at the November 13-15, 2013 Riverine Modelers meeting and Q4 2013 TWG meeting. (ISR Study 8.5, Section 4.3.2). The recommended representative years and the rationale for selection were presented at the April 15-17, 2014 Proof of Concept meeting and described in ISR Study 8.5, Appendix J.
- The Study Plan indicated that hydrologic parameters for **IHA analysis** would be developed in consultation with the TWG in Q3 2013 and interim results of IHA-type analysis would be presented in the ISR (RSP Section 8.5.4.4.1.3). A description of the initial proposed methodology is provided in ISR Study 8.5, Section 5.3, and Section 7.3 and will undergo continued discussion and coordination with the TWG (ISR Study 8.5, Section 4.3.2). An Instream Flow Study (IFS) Technical Team (TT) meeting occurred on March 21, 2014 which reviewed candidate metrics and proposed analysis for IHA and EFC.

Study 8.5 Variances

- The Study Plan indicated that **HSC sample sites** would be stratified and randomly selected from within the **Middle River Segment and Lower River Segment** (RSP Section 8.5.4.5.1.1.3). Due to access restrictions, the Middle River Segment was limited to habitat areas between Portage Creek and Three Rivers Confluence. Due to flow related delays in completing the habitat mapping surveys and the desire to focus sampling in 2013 on the Middle River, the Lower River segment was not sampled (ISR Study 8.5, Section 4.5.2).
- The Study Plan indicated **spawning redd dimensions** would be collected (RSP Sections 8.5.4.5.1.1.4 and 8.5.4.5.1.1.5). These were collected in 2012 but in 2013 deemed unnecessary for developing evaluation metrics (ISR Study 8.5, Section 4.5.2).
- The Study Plan indicated that **substrate size** (dominant, sub-dominant, and percent dominant) would be characterized in accordance with a Wentworth grain size scale modified to reflect English units (RSP Sections 8.5.4.5.1.1.4, 8.5.4.5.1.1.5, 8.5.4.5.1.1.6.1, and 8.5.4.6.1.2.4). Field personnel found it impracticable to attempt to accurately differentiate gravel composition into three size classes in turbid water conditions and used two instead (ISR Study 8.5, Section 4.5.2).
- The Study Plan indicated that location in water column, **focal point and mean column velocity** would be measured using a Price AA current meter (RSP Section 8.5.4.5.1.1.6.1). Most fish captures occurred using electrofishing, seining or a combination of the two methods which precluded the identification of fish focal point position within the water column (ISR Study 8.5, Section 4.5.2).
- The Study Plan indicated that **mesohabitat type** would be recorded for fish observation/capture points (RSP Section 8.5.4.5.1.1.6.1). However, this was not done during the field surveys but will be **completed after the mesohabitat mapping task is complete** by applying GIS data layers containing the location of HSC fish use observations (ISR Study 8.5, Section 4.5.2) to denote mesohabitat types

Study 8.5 Variances

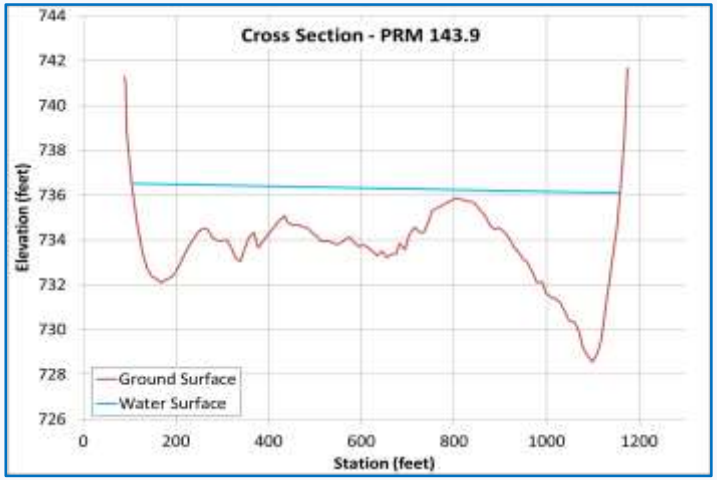
- The Study Plan indicated that field surveys would be conducted **at potential stranding and trapping areas on an opportunistic basis** following up to three flow reduction events during 2013 (RSP Section 8.5.4.5.1.2.2). The need for these studies will be discussed with the TWG.
- The Study Plan indicated that 2012-2013 winter study results would be distributed to the TWG by Q3 2013 (RSP Section 8.5.4.5.1.2.1). The results were presented and discussed during an IFS TT meeting in March 2014 (ISR Study 8.5, Section 4.5.2, Appendix L).
- The Study Plan indicated that macroinvertebrate sampling would occur at six stations, each with three sites (one mainstem site and two off-channel sites associated with the mainstem site), for **a total of 18 sites** (RSP Section 8.5.4.5.1.2.3). This sampling occurred at five stations on the Susitna River, each station with three to five sites (establishing sites at all macrohabitat types present within the station), for **a total of 20 sites** (ISR Study 8.5, Section 4.5.2).
- The Study Plan indicated the **Deshka River Chinook Salmon and Yentna River Sockeye Salmon** datasets would be examined for flow-dependent biological cues (RSP Section 8.5.4.5.1.3). Mainly due to lack of the necessary data, the Deshka River and the Yentna River were not used for this study. Through further discussions with ADF&G, the **Taku River and Stikine River Chinook Salmon** stocks were selected (ISR Study 8.5, Section 4.5.2).
- The Study Plan indicated that **additional variables would be compared to fish distribution and abundance:** surface flow and groundwater exchange fluxes, dissolved oxygen (intergravel and surface water), macronutrients, temperature (intergravel and surface water), pH, dissolved organic carbon, alkalinity, and Chlorophyll-a. Depending on these relationships**, additional HSC preference curves may be needed** (FERC 2013b [FERC April 1 SPD, page B-85]). Most of the data necessary to complete this analysis is still being processed and/or undergoing quality assurance checks and is not available at this time (ISR Study 8.5, Section 4.5.2, and Section 7.5.1.2.1).

Study 8.5 Variances

- The Study Plan indicated that **five tributary mouths**, including Sheep Creek and Caswell Creek, would be investigated as part of the Lower River studies (R2 2013b [Technical Memorandum, Selection of Focus Areas and Study Sites in the Middle and Lower Susitna River for Instream Flow and Joint Resource Studies – 2013 and 2014]). **Two of the five sites** identified for study in 2013 were not completed and were **deferred to the next study year** in order to evaluate the effectiveness of the model outputs from the other three sites and evaluate the need for additional sites (ISR Study 8.5, Section 4.6.2).
- The Study Plan indicated that an evaluation of the **representativeness of the Lower River study areas was to occur by Q4 2013** (R2 2013b [Technical Memorandum, Selection of Focus Areas and Study Sites in the Middle and Lower Susitna River for Instream Flow and Joint Resource Studies – 2013 and 2014]). This task was **completed as part of the IFS TT POC Meetings, April 15-17, 2014**; ISR Study 8.5, Section 7.6.
- The Study Plan indicated that the final approach and details concerning methods for conducting **temporal analysis and Project operational scenarios would be discussed with the TWG in Q4 2013** (RSP Section 8.5.4.7.1.1). The general approaches to be used for the spatial analysis of the fish habitat models and the temporal analysis for the different resource models were discussed as part of the November 13-15, 2013 Instream Flow Study Technical Team Riverine Modelers meeting. More **details concerning these methods are provided in this ISR** and AEA is planning on finalizing the methods in 2014, in accordance with the Study Plan schedule; AEA demonstrate the application of the temporal methods and presented **options for the spatial analysis during the IFS TT POC Meetings, April 15-17, 2014** (ISR Study 8.5, Section 4.7.2, Section 7.7).

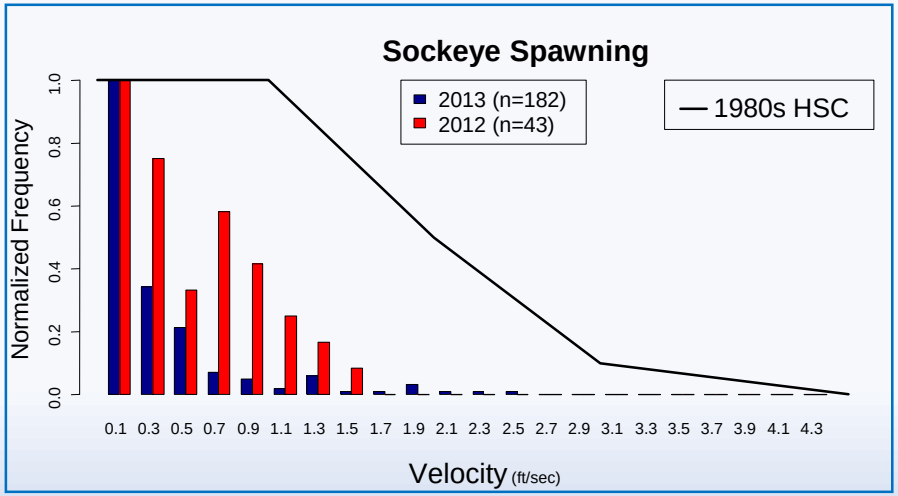
Study 8.5 Summary of Results in ISR (ISR Study 8.5, Part A – Section 5)

- Mainstem open-water transects measured between PRM 187.2 and PRM 29.9 (Study 8.5 Appendices A, C, D)
- Ten tributary gaging stations with stage recorders, two tributary spot measurement stations (Study 8.5, Appendix E, F)
- Version 2 of the Open-water Flow Routing Model (see Study 8.5, Appendix K)
  - Version 1 (88 x-sections)
  - Version 2 (167 x-sections)
- 10 Middle River Focus Areas selected; 7 measured in 2013
  - Bathymetry
  - Stage and flow
  - Surficial substrate and cover
- 5 tributary mouths and 6 mainstem sites selected in Lower River; 3 tributary mouths and 3 mainstem study sites measured in 2013.



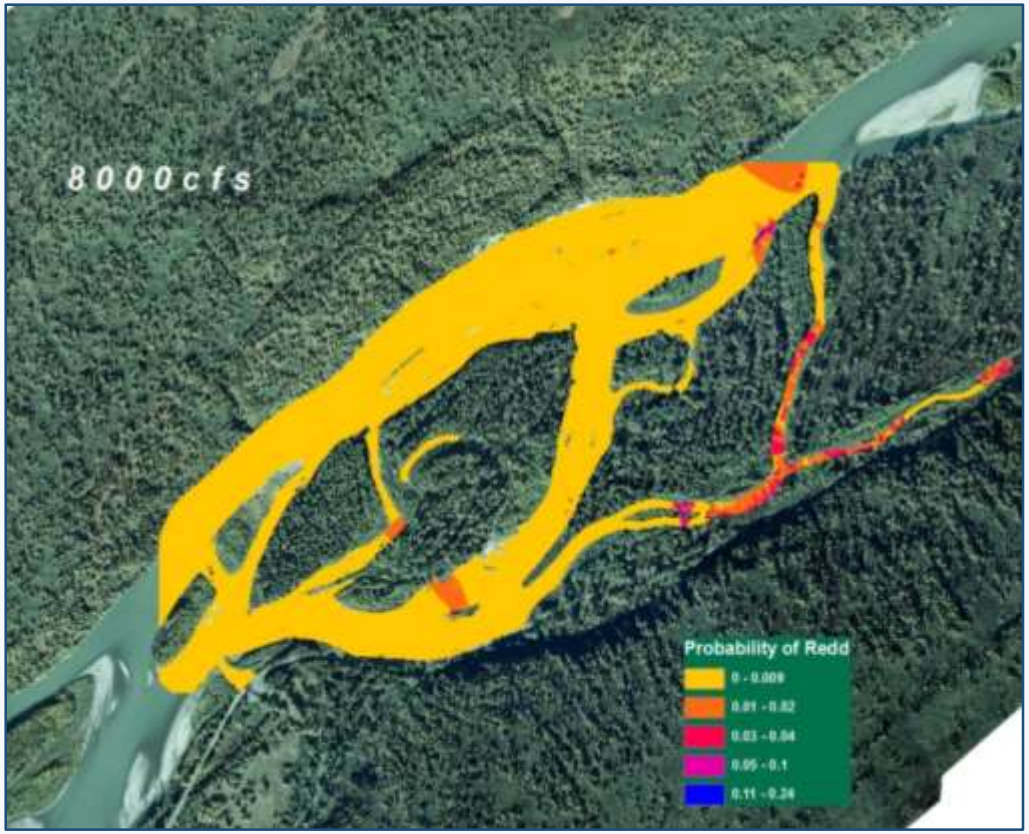
Study 8.5 Summary of Results in ISR (ISR Study 8.5, Part A – Section 5)

- HSC sampling sites relied on stratified random sampling approach and areas of known fish use; 1,433 observations of habitat use collected for four lifestages of 12 species in 2013
- In response to suggestion in April 2013 FERC Study Plan Determination, micro-piezometer measurements routinely collected during HSC habitat use and availability observations
- Draft HSC histogram plots (Study 8.5, Appendix G)
- HSC data and fish distribution and abundance data (Study 9.6) used to develop periodicity tables (Study 8.5, Appendix H)
- Pilot Winter Studies (Study 8.5, Appendix L)



Study 8.5 Summary of Results in ISR (ISR Study 8.5, Part A – Section 5)

- Riverine Modelers meeting held in November 2013
- Proof-of-Concept Meeting held in April 2014 (Study 8.5, Appendix N); FA-128 (Slough 8A) example
- Lower River Habitat Modeling (Study 8.5 Appendices I and O) ; Birch Creek tributary mouth example



Example GIS layer of salmonid spawning habitat FA-128 (Slough 8A)

Study 8.5 Summary of Results since ISR

IFS Analytical Framework (ISR Study 8.5, Part C, Appendix N (Proof of Concept))

- System Input
  - Mainstem and tributary gaging
- Reach Scale Modeling
  - Mainstem transects
- Focus Area Scale Modeling
  - 2-D computational mesh for 7 Focus Areas
  - Additional bathymetry, stage, and flow at Focus Area features
  - FA-151 (Portage Creek) bathymetry, stage, flow, substrate
- Fish Habitat Modeling
  - HSC in Lower River, FA-173 (Stephan Lake Complex), FA-184 (Watana Dam) and other Middle River sites
  - Measurement of groundwater/surface water features
  - Fish habitat model refined to integrate both SRH-2D (open-water) and River2D (ice) hydraulic data
  - Fish habitat model modified to integrate additional HSC parameters
- Decision Support System

Study 8.5 Summary of Results since ISR

September 2014 Technical Memorandum

2013-2014 Instream Flow Winter Studies

Field Study Results

- 2014 Sampling sessions:
  - February, March ,and April
  - 4 Middle River Focus Areas below Devils Canyon
  - 28 Daytime electrofishing surveys (n=248 fish)
  - 16 Night electrofishing surveys (n=659 fish)
- HSC
  - 262 HSC observations
  - 8 species, fry and juveniles
  - Coho (120), Sockeye (68), chum (42)
- Water Quality
  - Intergravel water temps in main channel near 0°C
  - Intergravel water temps in sloughs 2-4 °C warmer
  - Dissolved oxygen levels drop to 4 mg/L depending on groundwater source and proportion of flow

Study 8.5 Summary of Results since ISR

HSC Curve Development

- Additional HSC data collection
  - Lower, Middle (above and below Devils Canyon)
  - Sampling sessions:
    - May 20-June 7
    - July 15-22
    - Sep 17-24
  - May-September 2014 Sampling
    - 1,465 habitat use measurements
    - 1,584 habitat availability measurements
    - Completed data entry – QC3
- **Technical Memorandum - Relationship Between Fish Abundance and Specific Microhabitat Variables**
  - Determine if "strong" relationships are present between fish abundance and 8 additional variables
    - HSC
    - HSI
    - Threshold
    - Not considered

Study 8.5 Summary of Results since ISR

HSC Curve Development

Species	Lifestage	Total Through July 2014	1980's Total
Chinook	Juvenile	218	
Chum	Fry	272	
	Spawning	348	333
Coho	Fry	280	
	Juvenile	84	
Pink	Fry	39	
	Spawning	59	NR
Sockeye	Fry	378	
	Spawning	181	81
Arctic Grayling	Fry	120	
	Juvenile	52	
	Adult	8	140

Study 8.5 Summary of Results since ISR

HSC Curve Development

Species	Lifestage	Total Through July 2014	1980's Total
Burbot	Juvenile	6	
	Adult	20	18
Dolly Varden	Fry	20	
	Adult	2	2
Longnose Sucker	Fry	87	
	Juvenile	79	
	Adult	73	157
Rainbow Trout	Juvenile	7	
	Adult	7	143
Whitefish	Fry	112	
	Juvenile	54	
	Adult	33	384

Study 8.5 Summary of Results since ISR

HSC Curve Development

Life Stage	Multivariate Preference Curve (2012-2015 data)	Univariate Utilization 2012-2015/1980's Data	Literature Based/ Prof. Opinion
Spawning	Chum		
	Pink		
	Sockeye		
Fry	Coho	Arctic Grayling	
	Chinook	Whitefish	
	Sockeye	Longnose Sucker	
Juvenile	Coho	Arctic Grayling	
	Chinook		
	Longnose Sucker		
Adult	Whitefish	Arctic Grayling	Bering Cisco
	Longnose Sucker	Rainbow	Eulachon
			Burbot

AEA Proposed Modifications to Study 8.5 in ISR (ISR Study 8.5, Part C – Section 7)

7.1.1.2. **IFS Analytical Framework**

- No modifications to the Study Plan are needed to complete this study component and meet Study Plan objectives

7.2.1.2. **River Stratification and Study Area Selection**

- At this time, no modifications to the Study Plan are needed to complete this study component and meet Study Plan objectives

7.3.1.2. **Hydrologic Data Analysis**

- Several hydrology stations established in 2012 will be discontinued in 2014
  - ESS60 (PRM 168.1) and ESS35 (PRM 102.1) not ideal for rating curve development
- At least 6 original hydrology stations will be maintained in 2014 for water level and temperature
  - ESS80 (PRM 225.0), ESS70 (PRM 187.2), ESS65 (PRM 176.5), ESS55 (PRM 152.1), ESS40 (PRM 107.1), ESS30 (PRM 98.4)
  - Remaining stations will be maintained for air temperature and camera images
  - Additional water-level recording stations will be installed and maintained as needed
    - Some of those include mainstem Susitna River near Sheep Creek (PRM 69.5) and Caswell Creeks (PRM 67)
- Hydrology gages will be installed at Fog Creek and Portage Creek (delayed from lack of land access)
- Three instead of five representative years were selected to represent wet/warm (1981), average (1985), and dry/cool (1976) conditions. The two additional years that were to represent warm and cold Pacific Decadal Oscillations were not included since analysis did not support this distinction. See Appendix J.
- Final metrics will be developed with input from the TWG and other resource disciplines after Version 3 of the Open-water Flow Routing Model is available in 2015

7.4.1.2. **Reservoir Operations and Open-water Flow Routing Modeling**

- No modifications to the Study Plan are needed to complete the modeling for this study component and meet Study Plan objectives

AEA Proposed Modifications to Study 8.5 in ISR (ISR Study 8.5, Part C – Section 7)

7.5.1.2. **Habitat Suitability Criteria Development**

- Initial analysis of microhabitat variables and fish abundance need to be finished in 2014 by AE. Depending on the results of the analysis, additional HSC/HSI variables may need to be included in the analysis.

7.6.1.2. **Habitat-Specific Model Development**

- As described in ISR Section 4.6.2, AEA is deferring LR-2 field studies from 2013 to 2015. This schedule modification for completing the Study Plan for the Lower River Segment will not impact AEA's ability to meet the objectives of the Study Plan. All other methods for Lower River fish habitat modeling will remain unchanged from the methods described in RSP Sections 8.5.4.2 through 8.5.4.7).

7.7.1.3. **Temporal and Spatial Habitat Analyses**

- Temporal analyses include extrapolating the results of 2-D modeling of Focus Area fish habitats from existing conditions (i.e., License Year 0) to future conditions (i.e. Years 25 and 50). Spatial analyses include applying 1-D and 2-D fish habitat model results from modeled to non-modeled areas. General approaches for temporal and spatial analysis were discussed during the November 13-15, 2013 IFS TT Riverine Modelers Meeting (AEA 2013), and were more specifically described during the IFS TT POC meeting on April 15-17, 2014 (AEA 2014b). The final approaches for both the temporal and spatial analysis were to be provided in the ISR (RSP Section 8.5.4.7.1.3); and while discussion occurred during implementation of the Study Plan in 2013 and early 2014, decisions on the final approaches were deferred to 2015.

7.8.1.3. **Instream Flow Study Integration**

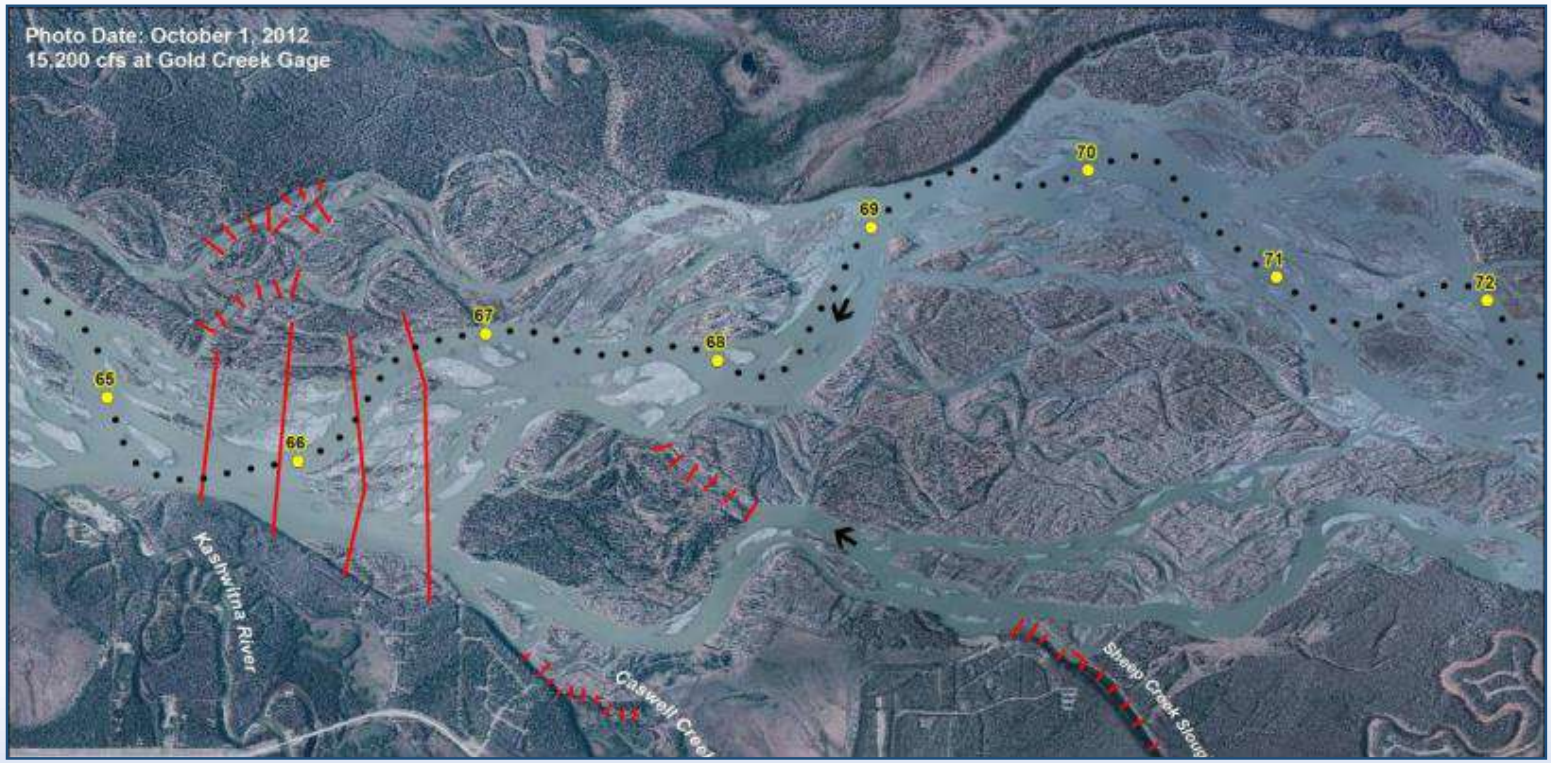
- No modifications to the Study Plan are needed to complete the study components and meet Study Plan objectives

Current Status and Steps to Complete Study 8.5

- **System Input**
  - Mainstem and tributary gaging (open-water and ice)
- **Reach Scale Modeling**
  - Mainstem transects (bathymetry, stage , and flow)
  - Version 3 Open-water Flow Routing Model
- **Middle River Focus Area Scale Modeling**
  - Measure FA-173 (Stephan Lake Complex), FA-184 (Watana Dam) bathymetry, stage, flow, substrate, and cover measurements
  - Maintain monitoring sensors (stage, water temp and DO) in FA-104 (Whiskers Creek), FA-128 (Slough 8A) and FA-138 (Gold Creek) during open-water and ice periods
  - Finalize SRH-2D (open-water) and River2D (ice) 2-D hydraulic modeling

Current Status and Steps to Complete Study 8.5

- **Lower River Transect Modeling**
  - Measure Lower River sites near PRM 67 (mainstem, side channel, Sheep and Caswell creeks) transect x-sections, stage, flow, substrate, and cover
  - Finalize transect hydraulic modeling at six tributary mouths and six mainstem study sites



Current Status and Steps to Complete Study 8.5

Middle River Focus Area Habitat Modeling

- HSC measurements in Middle River with reduced emphasis on species/lifestages with large data sets
- Measurement of groundwater/surface water features at Focus Areas
- Finalize periodicity
- Finalize HSC
- Finalize Visual Basic and associated GIS tools to compute HSC/HSI metrics
- Ensure fish habitat models integrate additional HSC parameters as needed
- Conduct fish habitat modeling that integrates both SRH-2D (open-water) and River2D (ice) hydraulic data
- Develop varial zone models for Middle River Focus Areas
- Calculate breaching flow/habitat connectivity metrics
- Conduct effective spawning:incubation modeling at Focus Areas
- Conduct salmonid rearing habitat analyses
- Calculate Index of Hydrologic Alteration (IHA) and Environmental Flow Components (EFH) using Version 3 of Open-Water Flow Routing Model

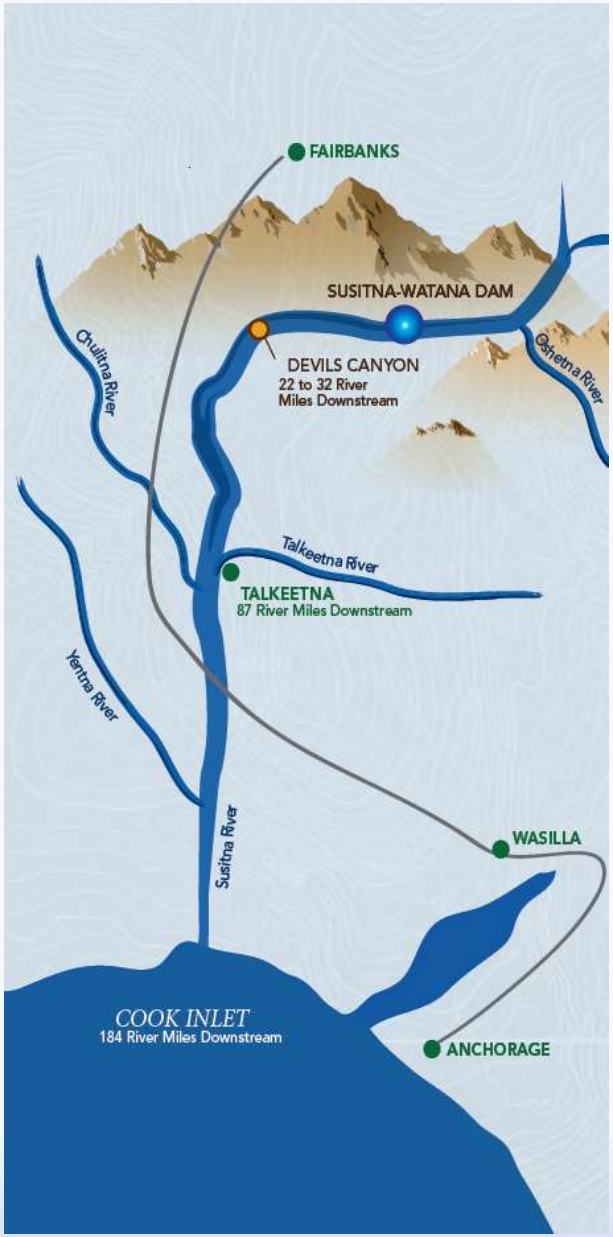
Current Status and Steps to Complete Study 8.5

- **Lower River Transect Habitat Modeling**
  - HSC measurements in Lower River
  - Adjust periodicity and HSC for Lower River as needed
  - Calculate fish passage and habitat connectivity metrics
  - Calculate Weighted Usable Area for target species for open-water period
  - Calculate Weighted Usable Area time series for open-water period
- **Decision Support System**
  - Finalize temporal and spatial habitat extrapolation process
  - Finalize process for evaluating uncertainty in evaluation metrics
  - Finalize integration process for fish habitat metrics

    Matrix Method
    - Multiple Criteria Decision Analysis
    - Focus on KEY metrics
    - Large matrix
  - Finalize integration process for other riverine and reservoir related interests

Licensing Participants Proposed Modifications to Study 8.5?

- Agencies
- CIRWG members and Ahtna
- Public



Initial Study Report Meeting

Study 8.6 Riparian Instream Flow

October 17, 2014

Prepared by

R2 Resource Consultants

Study 8.6 Objectives

- Synthesize historic physical and biological data for Susitna River floodplain vegetation, including 1980s studies, studies of hydro project impacts on downstream floodplain plant communities, and studies of un-impacted floodplain plant community successional processes
- Delineate sections of the Susitna River with similar environments, vegetation, and riparian processes, termed *riparian process domains* (RPDs), and select representative areas within each riparian process domain, termed *Focus Areas*, for use in detailed 2013–2014 field studies
- Characterize seed dispersal and seedling establishment groundwater and surface water hydroregime requirements. Develop a predictive model of potential Project operational impacts to seed dispersal and seedling establishment
- Characterize the role of river ice in the establishment and recruitment of dominant floodplain vegetation. Develop a predictive model of potential Project operational impacts to ice process regimes and dominant floodplain vegetation establishment and recruitment
- Characterize the role of erosion and sediment deposition in the formation of floodplain surfaces, soils, and vegetation. Develop a predictive model of Project operations changes to erosion and sediment deposition patterns and associated floodplain vegetation
- Characterize natural floodplain vegetation groundwater and surface water maintenance hydroregime. Develop a predictive model to assess potential changes to natural hydroregime and potential floodplain vegetation
- Develop floodplain vegetation study synthesis, scaling of Focus Areas to riparian process domains, and Project operations effects modeling

Study 8.6 Components

- Synthesize Historic Physical and Biological Data for Susitna River Floodplain Vegetation, including 1980s Studies, Studies of Hydro Project Impacts on Downstream Floodplain Plant Communities, and Studies of Un-impacted Floodplain Plant Community Successional Processes (hereafter, Literature Review of Dam Effects on Downstream Vegetation) (ISR Part A, Section 4.1; pg 4)
- Focus Area Selection-Riparian Process Domain Delineation (ISR Part A, Section 4.2; pg 5)
- Characterize Seed Dispersal and Seedling Establishment Groundwater and Surface Water Hydroregime Requirements. Develop Predictive Model of Potential Project Operational Impacts to Seedling Establishment (hereafter, Seed Dispersal and Seedling Establishment (ISR Part A, Section 4.3; pg 8)
- Characterize the role of river ice in the establishment and recruitment of dominant floodplain vegetation. Develop predictive model of potential Project operational impacts to ice processes and dominant floodplain vegetation establishment and recruitment (hereafter, River Ice Effects on Floodplain Vegetation) (ISR Part A, Section 4.4; pg 15)
- Characterize the role of erosion and sediment deposition in the formation of floodplain surfaces, soils, and vegetation. Develop a predictive model of Project operations changes to erosion and sediment deposition patterns and associated floodplain vegetation (hereafter, Floodplain Stratigraphy and Floodplain Development (ISR Part A, Section 4.5; pg 18)
- Characterize natural floodplain vegetation groundwater and surface water maintenance hydroregime. Develop a predictive model to asses potential Project operational changes to natural hydroregime and floodplain vegetation (hereafter, Riparian GW/SW Hydroregime) (ISR Part A, Section 4.6; pg 21)
- Floodplain Vegetation Study Synthesis, Focus Area to Riparian Process Domain Model Scaling and Project Operations Effects Modeling (hereafter, Riparian Vegetation Modeling Synthesis and Project Area Scaling) (ISR Part A, Section 4.7; pg 27)

Study 8.6 Variances

- Completion of the literature review was scheduled for Q4 2013 and is now scheduled for 2014 (see ISR Part A, Section 4.1).
- The first year (0+) balsam poplar and willow establishment study was restricted to documenting the current cohort of seedlings less than 1 year old rather than all woody plants less than 1 meter in height. In response to this variance, AEA anticipates conducting a clonal reproduction study to characterize asexual recruitment patterns in 2015 field season (see ISR Part A, Section 4.3.2).

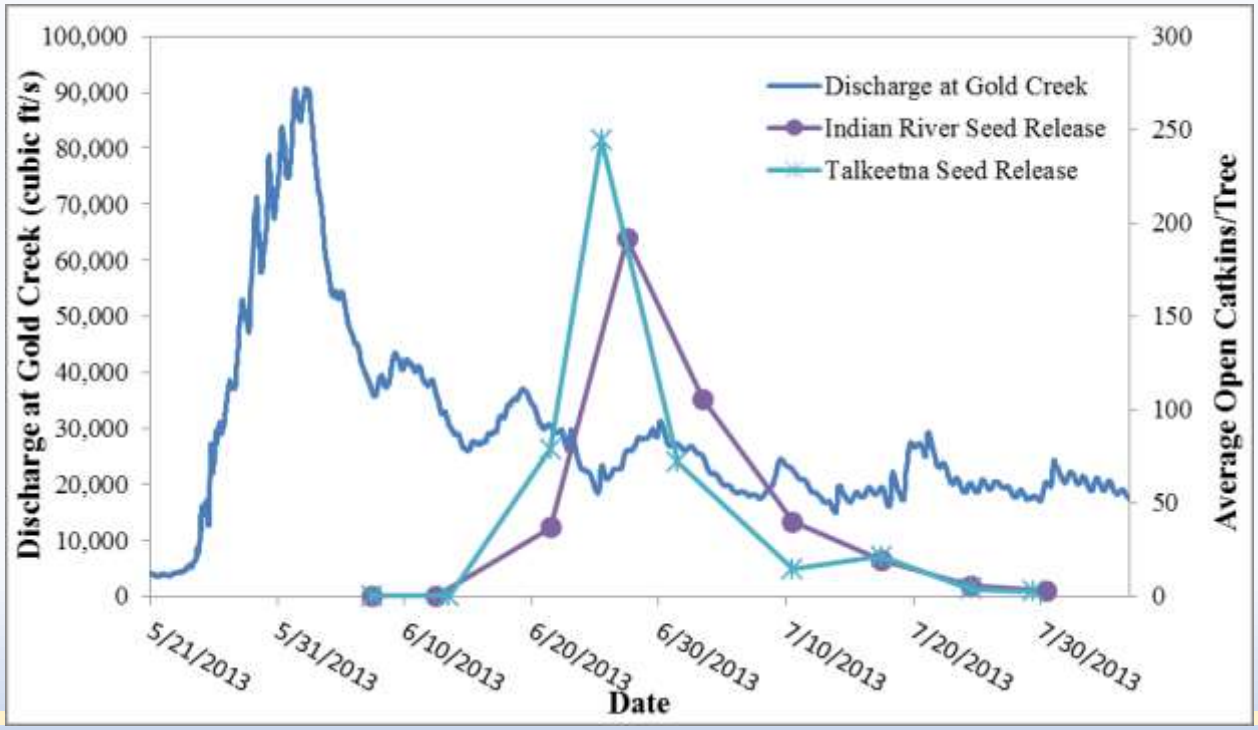
Study 8.6 Summary of Results in ISR (ISR Study 8.6, Part A – Section 5)

- Seed dispersal was surveyed at four seed dispersal study sites and preliminary models were developed.(ISR Part A, Section 5.3.1)
- First year (0+) balsam poplar and willow seedling establishment were documented with thirty-five transects and 824 plots across five Focus Areas. Counts of established seedlings were completed in late-July through early August and again in September 2013. To characterize white spruce establishment patterns, twelve eight-meter-wide (26.25 feet wide) belt transects were surveyed covering approximately 3.5 hectares (8.7 acres) on seven mid-channel islands in the Middle River Segment.
- A systematic riverbank survey of tree ice scars was conducted from PRM 102.2 through PRM 145.8 between September 15 and 29, 2013. A total of 222 ice scarred trees, 190 locations with no visible ice-scars, and 29 locations with signs of ice damage that were not measurable were surveyed. In addition, 48 ice scarred trees were sampled for dendrochronologic analysis of ice floodplain vegetation interaction frequency and magnitude.
- Tree and shrub composition and abundance were measured at 80 ITU and mid-channel island plots in the Middle and Lower River Segments. Tree core samples for dendrochronologic analysis were collected at all ITU plots.
- Riparian Groundwater/Surface Water studies included collection of 659 plant samples, 545 soil samples, and 100 water samples for isotopic analysis of water source. Transpiration of woody species was measured with TDP sensors installed at 21 trees at FA-104 (Whiskers Slough) and 27 trees at FA-128 (Slough 8A). Transpiration by herbaceous and small shrub species was measured through collection of 3,602 individual stomatal conductance measurements, including measurements from 1,747 herbaceous plants (11 species), 1,771 shrubs (11 species), and 79 trees (3 species).

Study 8.6 Summary of Results in ISR (ISR Study 8.6, Part A – Section 5)

5.3.1. Seed Dispersal

- Catkins releasing seed from six female balsam poplar (*Populus balsamifera*) trees and six to twelve female willow (*Salix* spp.) shrubs were counted weekly at each of four seed release study sites distributed across the Middle and Lower River Segments
- Depending on site, the peak period of seed release for poplar began 17 to 20 days following peak discharge (ISR Part A, Section 5.3.1)



Study 8.6 Summary of Results in ISR (ISR Study 8.6, Part A – Section 5)

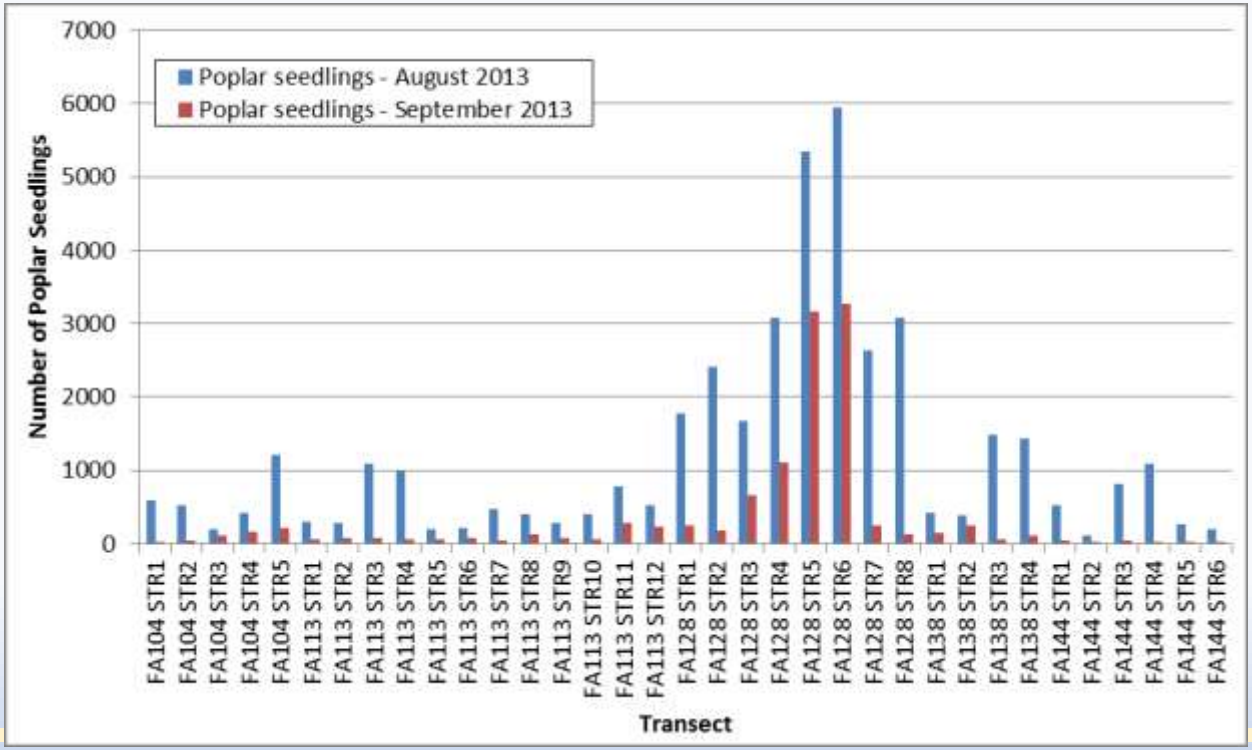
5.3.2. Seedling Establishment and Recruitment

- Significant mortality was observed as a result of the mid August peak flow. Seedling survival occurred in sheltered terrain positions whereas high seedling mortality was observed resulting from both channel bed scour and sediment burial in exposed lateral channel margins.
- Seedling establishment study identified previously unreported White spruce establishment in Tall Alder seral stage. White spruce was shown to establish throughout early floodplain forest successional stages.
- Only Balsam poplar and willow year 0+ seedlings were observed in woody seedling reconnaissance surveys.
- Clonal reproduction of Balsam poplar appears to be a significant recruitment process in high ice flow disturbance zones. What appeared to be poplar sexual reproduction in these terrain areas is not. This finding has potential significance relative to assessment of Project operations effects on ice regime interactions with riparian vegetation, an assessment objective of the vegetation ice processes study.

Study 8.6 Summary of Results in ISR (ISR Study 8.6, Part A – Section 5)

5.3.2. Seedling Establishment and Recruitment

• Significant mortality was observed as a result of the mid August peak flow in Year 1. Seedling survival occurred in sheltered terrain positions whereas high seedling mortality was observed resulting from both channel bed scour and sediment burial in exposed lateral channel margins.



Study 8.6 Summary of Results in ISR (ISR Study 8.6, Part A – Section 5)

5.4. River Ice Effects on Floodplain Vegetation

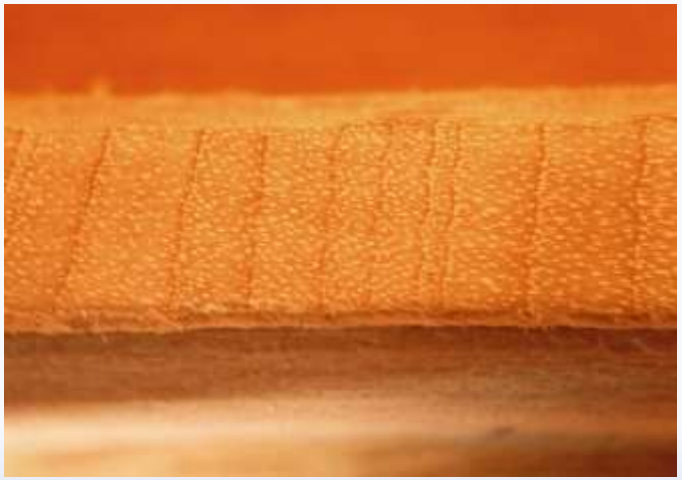
• A systematic riverbank survey of tree ice scars was conducted from PRM 102.2 through PRM 145.8 between September 15 and 29, 2013. A total of 222 ice scarred trees, 190 locations with no visible ice-scars, and 29 locations with signs of ice damage that were not measurable were surveyed. In addition, 48 ice scarred trees were sampled for dendrochronologic analysis of ice floodplain vegetation interaction frequency and magnitude. An additional 25 ice scarred trees were sampled in August 2014.

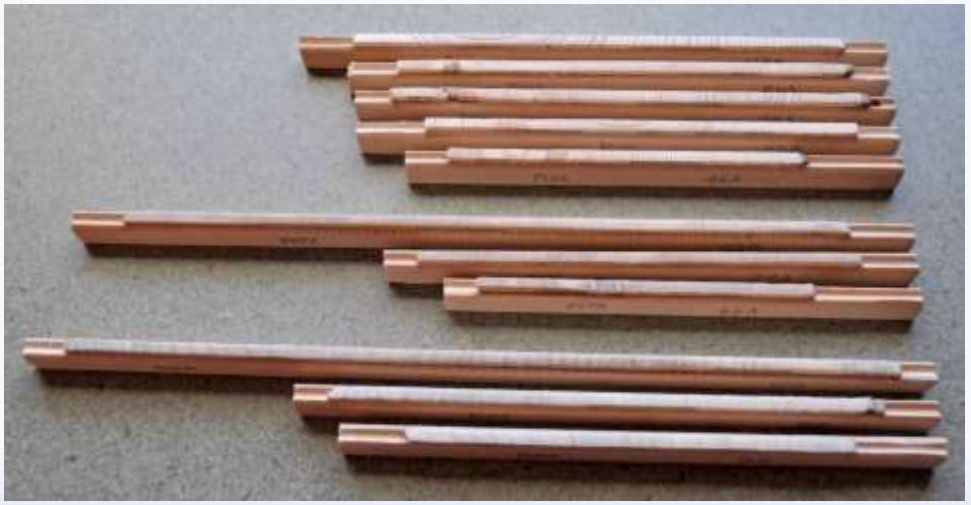
• Ice dam backwater flooding was observed to deposit up to 20-30 cm of fine sand burying existing floodplain vegetation. Sediment deposition during ice dam backwater was observed to be a local phenomena associated with ice dam backwater floods. Ice process generated floodplain sediment deposition is potentially a significant driver of local floodplain vegetation pattern.

Study 8.6 Summary of Results in ISR (ISR Study 8.6, Part A – Section 5)

5.5. Floodplain Stratigraphy and Floodplain Development

- Tree and shrub composition and abundance were measured at 80 ITU and mid-channel island plots in the Middle and Lower River Segments. Tree core samples for dendrochronologic analysis were collected at all ITU plots.



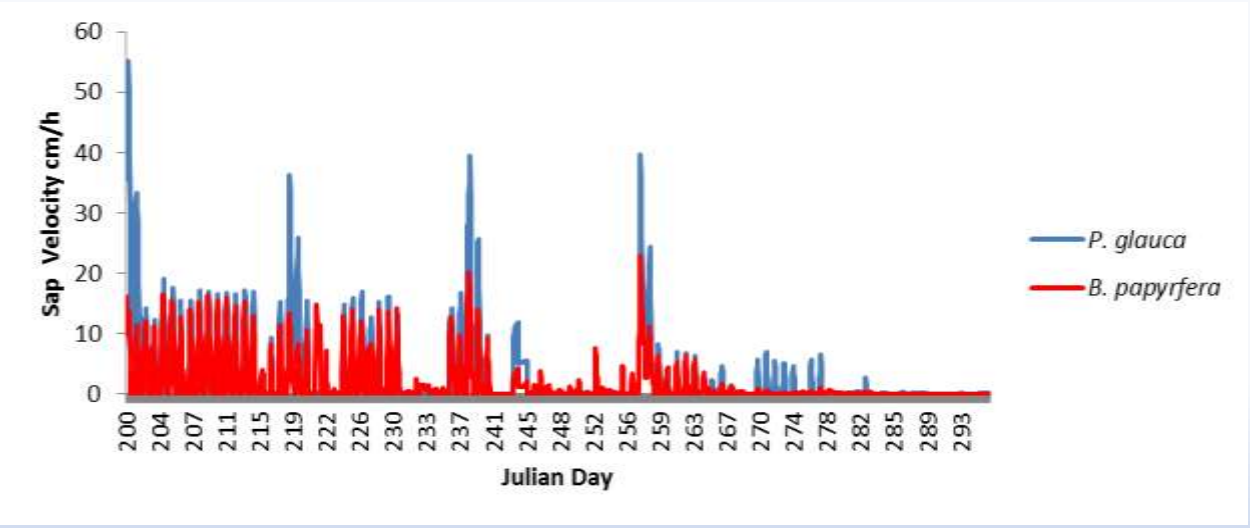


Study 8.6 Summary of Results in ISR (ISR Study 8.6, Part A – Section 5)

5.6. Riparian GW/SW Hydroregime

- Riparian Groundwater/Surface Water studies included collection of 659 plant samples, 545 soil samples, and 100 water samples for isotopic analysis of water source. Transpiration of woody species was measured with TDP sensors installed at 21 trees at FA-104 (Whiskers Slough) and 27 trees at FA-128 (Slough 8A). Transpiration by herbaceous and small shrub species was measured through collection of 3,602 individual stomatal conductance measurements, including measurements from 1,747 herbaceous plants (11 species), 1,771 shrubs (11 species), and 79 trees (3 species).

- FA-138 (Gold Creek) river right floodplain wetlands were shown to not be strongly influenced by surface water fluctuations associated with the Mid August peak flow. This observation was made by measuring floodplain off-channel water body surface water elevations as compared to river stage fluctuations.



Study 8.6 Summary of Results since ISR

- 2014 First year (0+) and Second year (1+) balsam poplar and willow seedling establishment were documented with thirty-five transects and 824 plots across five Focus Areas. Counts of established seedlings were completed in late-July through early August and again in early September 2014.
- Ice scar sampling completed at FA-115 (Slough 6A); 20 ice scar wedges were collected.
- On-going data collection at FA-115 (Slough 6A) and FA-104 (Whiskers Slough)

AEA Proposed Modifications to Study 8.6 in ISR (ISR Study 8.6, Part C – Section 7.1.2)

- Completion of the literature review was scheduled for Q4 2013 and is now scheduled for 2014. (See discussion in RSP Section 8.6.3.1)
- Seedling Establishment and Recruitment Study (RSP Section 8.6.3.3.2)
  - Quantitatively capture where (floodplain terrain locations), and how Balsam poplar clonal establishment and recruitment is occurring
  - Transect sampling at select Focus Area mid-channel islands and lateral floodplain margins to be determined in the field in 2015

Current Status and Steps to Complete Study 8.6

- AEA expects to complete the FERC-approved Study Plan through the filing of the Updated Study Report by February 1, 2016, in accordance with the ILP schedule issued by FERC on January 28, 2014. With regard to this specific study, AEA expects to complete data collection in both the 2014 and 2015 study seasons, which will be reported in the USR.

- Based on data collection completed in 2013, preliminary analyses, and plans for continued data collection in the next study year, the study is on track to meeting all Project objectives.

Steps to Complete Study 8.6 (ISR Study 8.6, Part C – Section 7.1) Tasks Completed in 2014

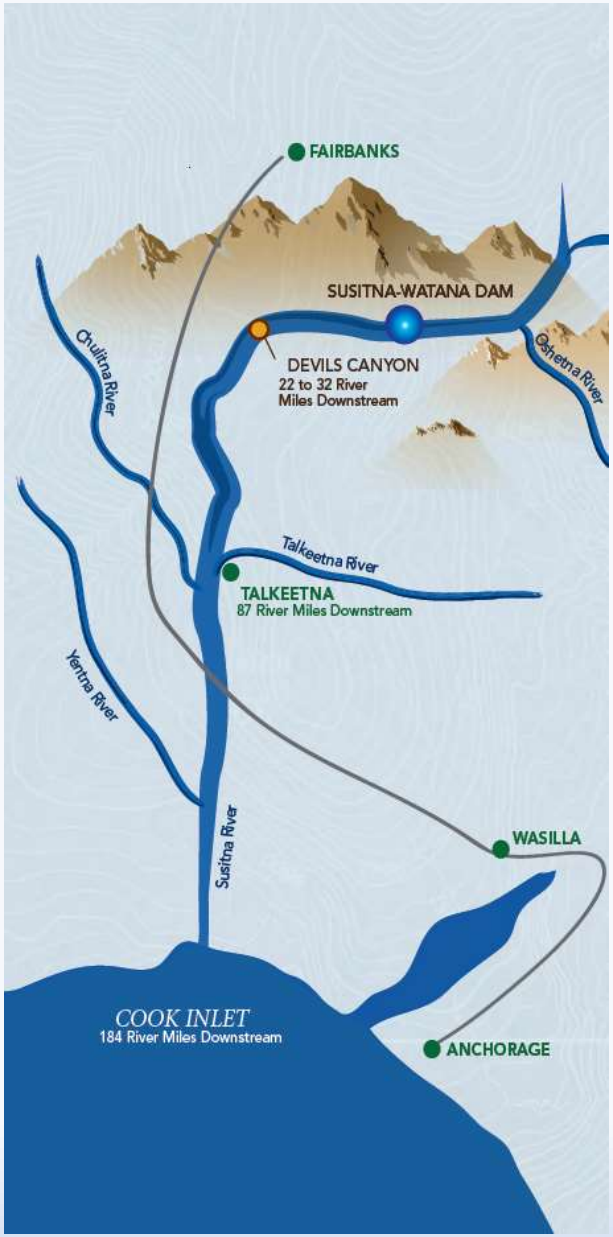
- Aerial survey completed in Spring 2014 to view thermal ice breakup interaction with riparian vegetation.
- Evapotranspiration (ET) study sap flow sensors were re-installed in May 2014 with on-going data collection to continue through October 2014.
- Seedling transects established in 2013 were re-sampled in August and September 2014.
- Tree ice scar wedges were collected to date ice scar events at select Focus Areas.

Steps to Complete Study 8.6 (ISR Study 8.6, Part C – Section 7.1) Tasks Planned for 2015

- Complete final riparian process domain analysis
- Second season of field work for seed release study and model development to link peak seed release to local climate and discharge records.
- To characterize seedling establishment hydrologic conditions, seedling transects will be revisited and seedlings counted twice during the growing season to capture seedling mortality relative to bimodal peak flow patterns. Clonal poplar and willow surveys will be completed on the lateral channel margins
- Additional White spruce and paper birch seedling establishment transects will be conducted on lateral floodplains, terraces and mid-channel islands.
- ITU plots surveyed by the Riparian Vegetation (Study 11.6) will be sampled to age trees and date the floodplain surface.
- Refinement of mapping and further interpretation of ice scar zones will be done to determine intensive ice floodplain vegetation interaction survey locations.
- Riparian GW/SW model construction will be developed.
- Model development and continued coordination with TWG

Licensing Participants Proposed Modifications to Study 8.6?

- Agencies
- CIRWG members and Ahtna
- Public



Initial Study Report Meeting

Study 11.6

Riparian Vegetation Study Downstream of the Proposed Susitna-Watana Dam

October 17, 2014

Prepared by

ABR, Inc.—Environmental Research & Services

Study 11.6 Objectives

- Classify, delineate, and map riparian ecotypes, wetlands, and wildlife habitats downstream from the Watana Dam site;
- Characterize the role of erosion and sediment deposition in the formation of floodplain surfaces, soils, and vegetation;
- Quantify and describe Susitna River riparian vegetation communities; and
- Coordinate closely in the implementation of the Riparian IFS (Study 8.6), Groundwater Study (Study 7.5), Ice Processes in the Susitna River Study (Study 7.6), and Fluvial Geomorphology Modeling below Watana Dam Study (Study 6.6)

Study 11.6 Components

- Develop mapping materials from historical and current data (ISR Part A, Section 4.1; 4); data sources include:
  - Vegetation mapping and succession studies conducted in the 1980s
  - National Wetland Inventory (NWI) mapping
  - Hydrographic and digital elevation data
  - Recent high- and moderate-resolution aerial imagery
- Field Surveys (ISR Part A, Section 4.2; 5)
- Integrated Terrain Unit (ITU) classification and mapping of downstream riparian areas (ISR Part A, Section 4.3; 12)—ITU components include geomorphology, surface form, vegetation class, poplar size class, and disturbance class

Study 11.6 Variances

- In the RSP (Section 11.6), the proposed plot-allocation procedure to determine the number of ELS plots in Focus Areas (FAs) was based on FA size alone.
  - In response to agency comments, this was revised to account for both FA size and the number of riparian ecotypes in each FA, such that a smaller-sized FA with a higher number of ecotypes would be assigned a larger number plots than it would based on size alone.
  - Overall a higher number of ELS plots were allocated within each FA than under the original procedure.
  - A technical memorandum describing this revised plot-allocation procedure was filed with FERC on July 1, 2013.

Study 11.6 Variances

- On ELS plots, the spacing interval for the point-intercept vegetation sampling locations along transect lines was increased from 0.5 m to 1 m.
  - This change facilitated the collection of more representative and accurate plant cover data (i.e., less overlap in recording the same plants in the dense, multi-canopied vegetation in the Susitna River floodplain).
  - The larger sampling interval required a larger sampling radius (23 m) for the ELS plots.

Study 11.6 Variances

- For ELS plots along groundwater transects, the groundwater installation equipment was placed just outside the 23-m radius of each ELS plot (as opposed to the plot center noted in the FERC-approved study plan).
  - This was done to reduce the risk of vegetation disturbance within the plot because the groundwater installation equipment was large relative to the 3-m-radius ELS plot center.
  - Avoiding vegetation disturbance in intensive plots is important because these are designed as long-term monitoring plots.

Study 11.6 Variances

No additional variances or modifications to the study have been made in 2014.

Study 11.6 Summary of Results in ISR (ISR Study 11.6, Part A – Section 5)

- 2012 field surveys completed during one sampling period (June 24-July 3):
  - June 24–July 3: 87 ITU plots along 28 transects were sampled
    - the ITU transects span a number of floodplain features and the sample plots were placed in distinct vegetation types
    - vegetation and soils data were collected at the ITU plots
    - ITU plots designed primarily to support the mapping of riparian vegetation

Study 11.6 Summary of Results in ISR (ISR Study 11.6, Part A – Section 5)

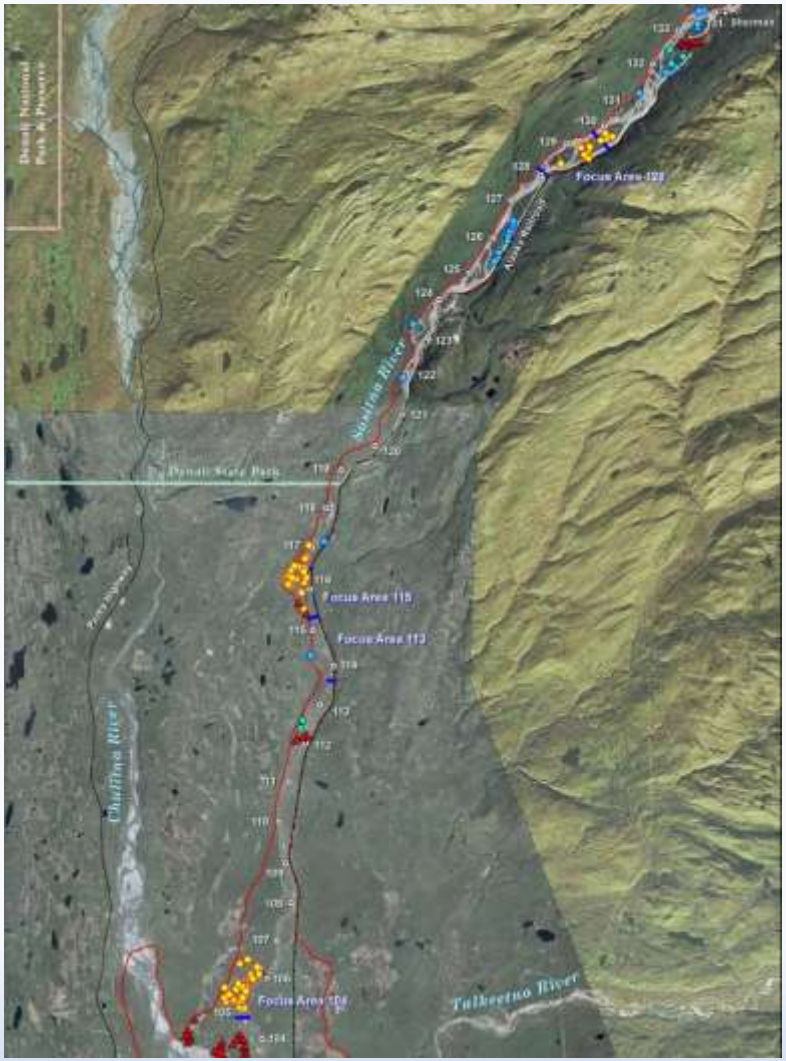
2013 field surveys completed as planned in four survey periods (April 30–May 3, May 19–22, June 17–July 10, July 24 –August 12):

- April–May: AVC Level III and surficial geomorphology verification
- May: soil trenching and soil core sampling trials
- June–August: sampling of 214 ITU plots along 35 transects
  - the ITU transects span a number of floodplain features and the sample plots were placed in distinct vegetation types
  - vegetation and soils data were collected at the ITU plots, primarily to support the mapping of riparian vegetation

Study 11.6 Summary of Results in ISR (ISR Study 11.6, Part A – Section 5)

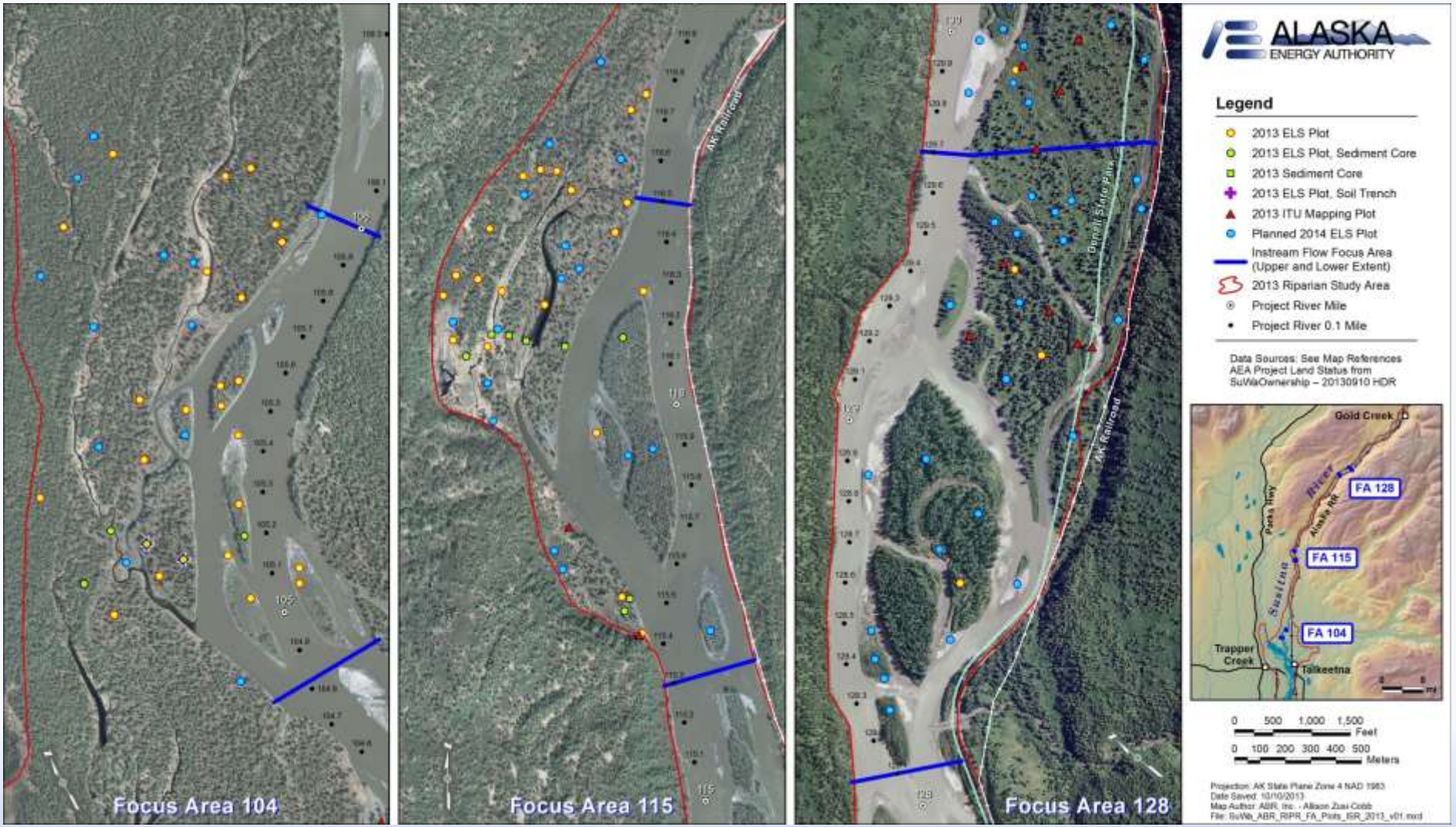
- June–August 2013: 62 intensive, permanent ELS plots were established and sampled
  - vegetation composition and soils data
  - dendrochronology and forest structure data were collected
  - ELS plots are designed to serve as long-term monitoring plots

Study 11.6 Summary of Results in ISR (ISR Study 11.6, Part A – Section 5)

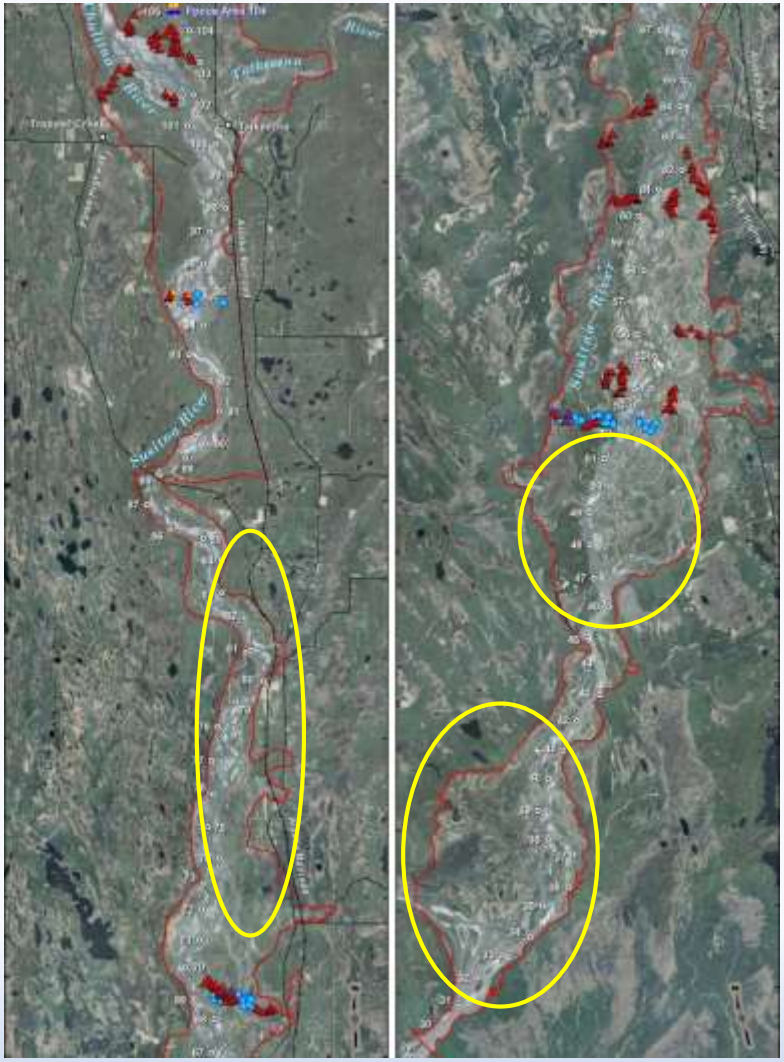


- ELS and ITU Plots (2013) and Planned ELS Plots (2015), Middle River

Study 11.6 Summary of Results in ISR (ISR Study 11.6, Part A – Section 5)



Study 11.6 Summary of Results in ISR (ISR Study 11.6, Part A – Section 5)

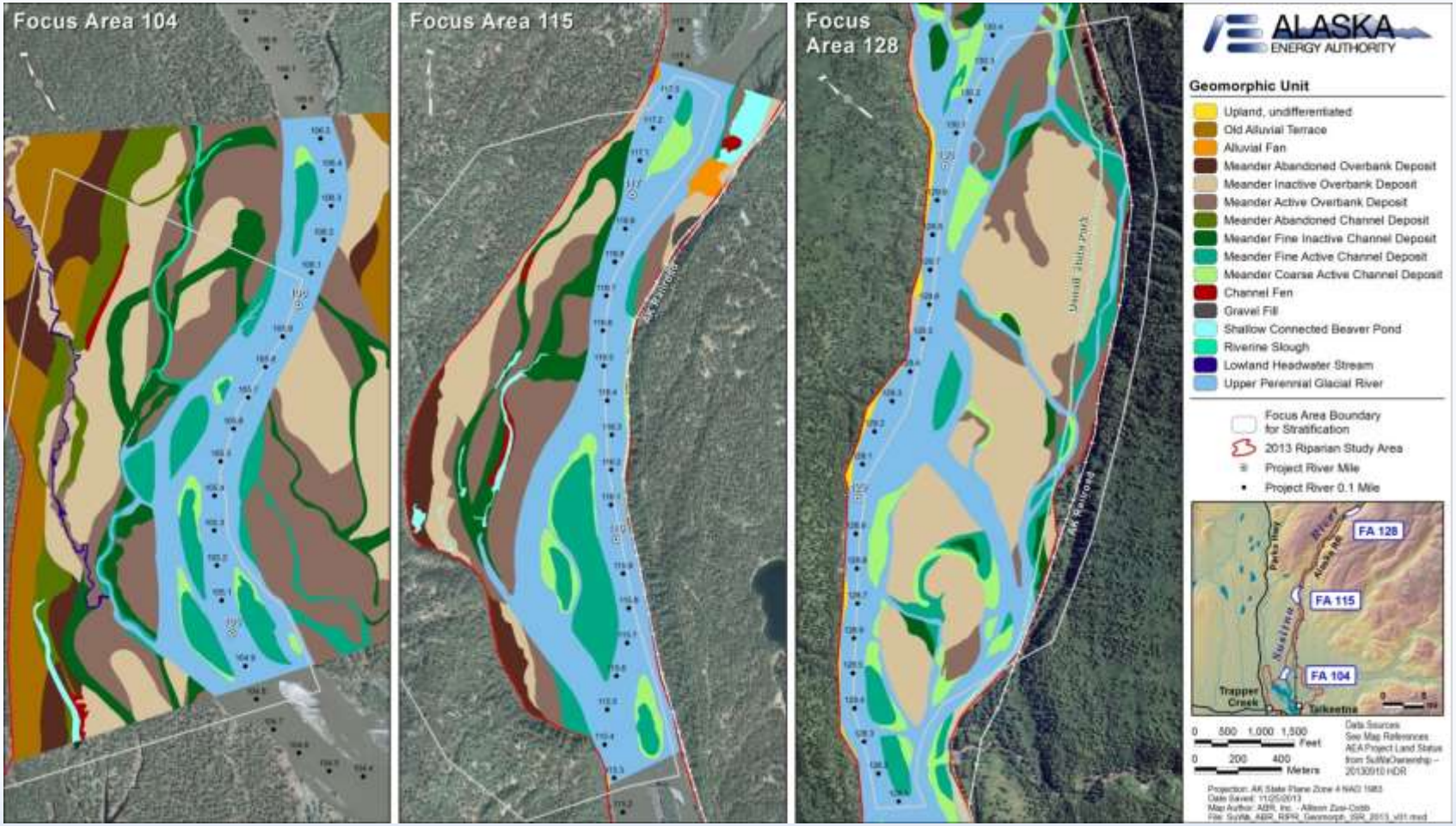


- ELS and ITU Plots (2013) and Planned ELS Plots (2015), Lower River

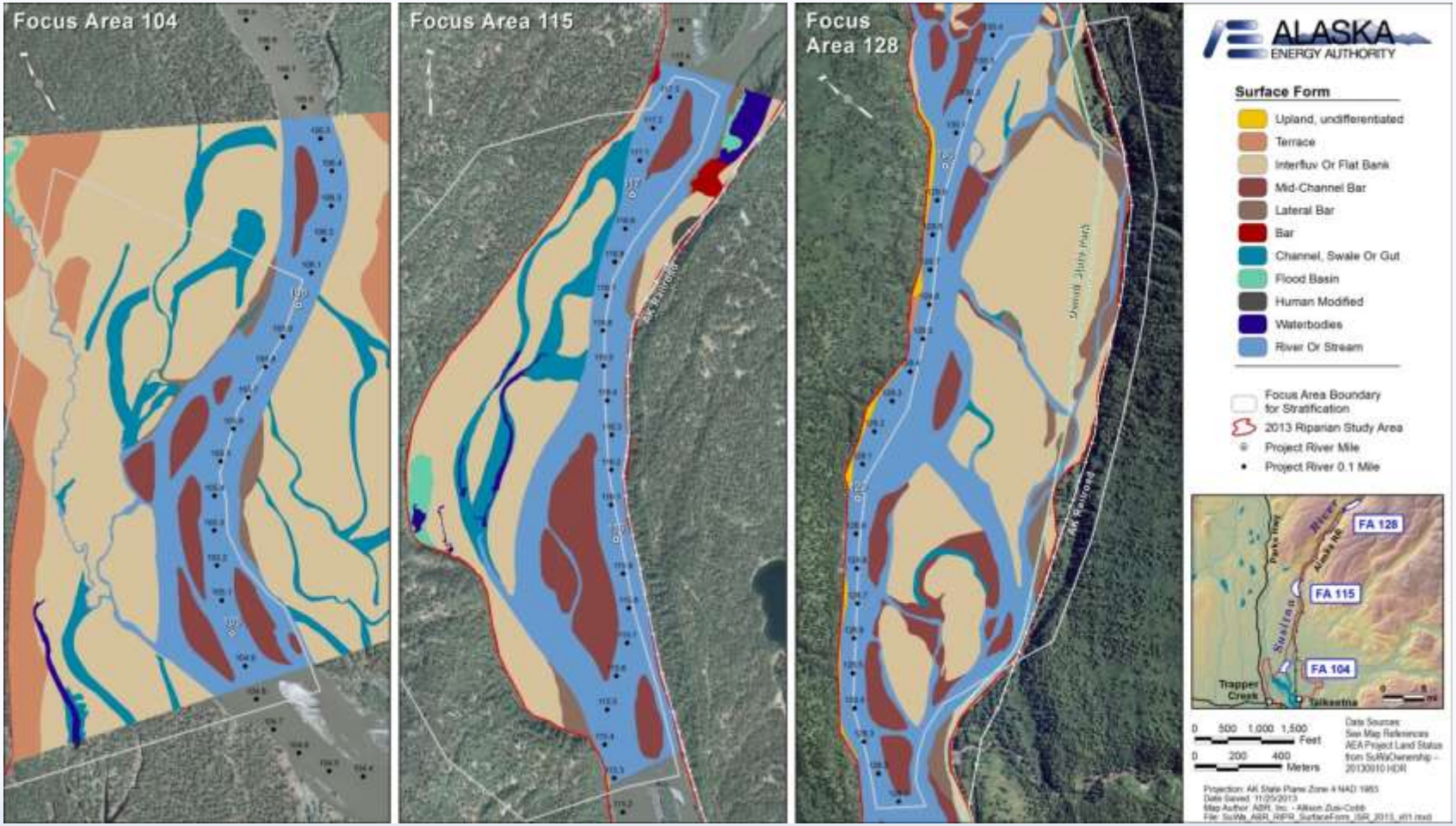
Study 11.6 Summary of Results since ISR (ISR Study 11.6, Part A – Section 5)

- 62,661 acres in the study area have been mapped to date, which accounts for 50% of the total study area
- Total mapping area up from approximately 9,000 acres at time the ISR was submitted
- Preliminary analysis of 2013 field data
- Focused mapping efforts occurring now through spring
- ITU attributes recorded for each map polygon include:
  - AVC Level IV vegetation class
  - Seral vegetation class (e.g., poplar size class)
  - Riverine geomorphology class, indirectly gets at flood frequency

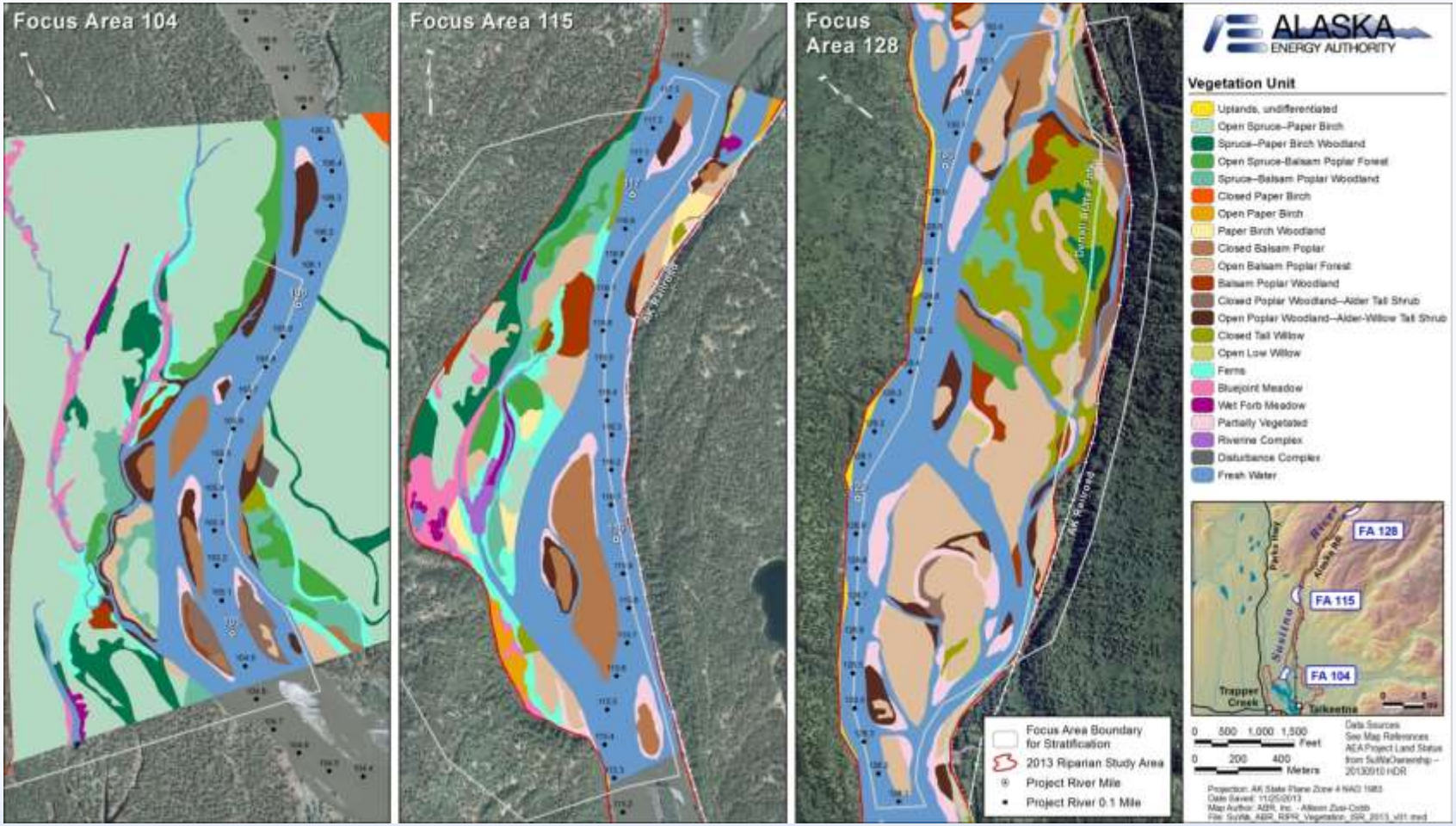
Study 11.6 Summary of Results since ISR (ISR Study 11.6, Part A – Section 5): Geomorphology in Focus Areas



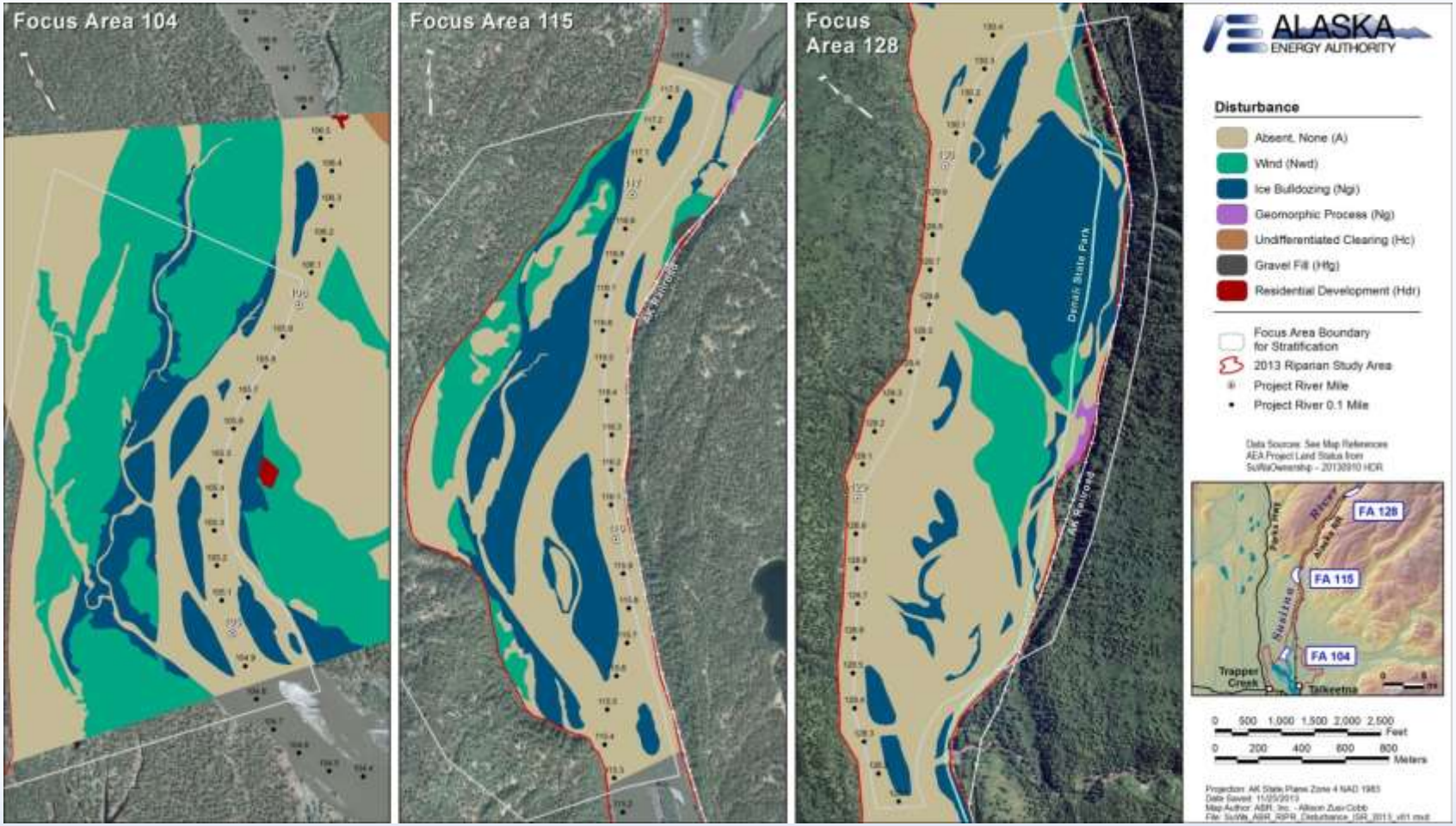
Study 11.6 Summary of Results since ISR (ISR Study 11.6, Part A – Section 5): Surface Form in Focus Areas



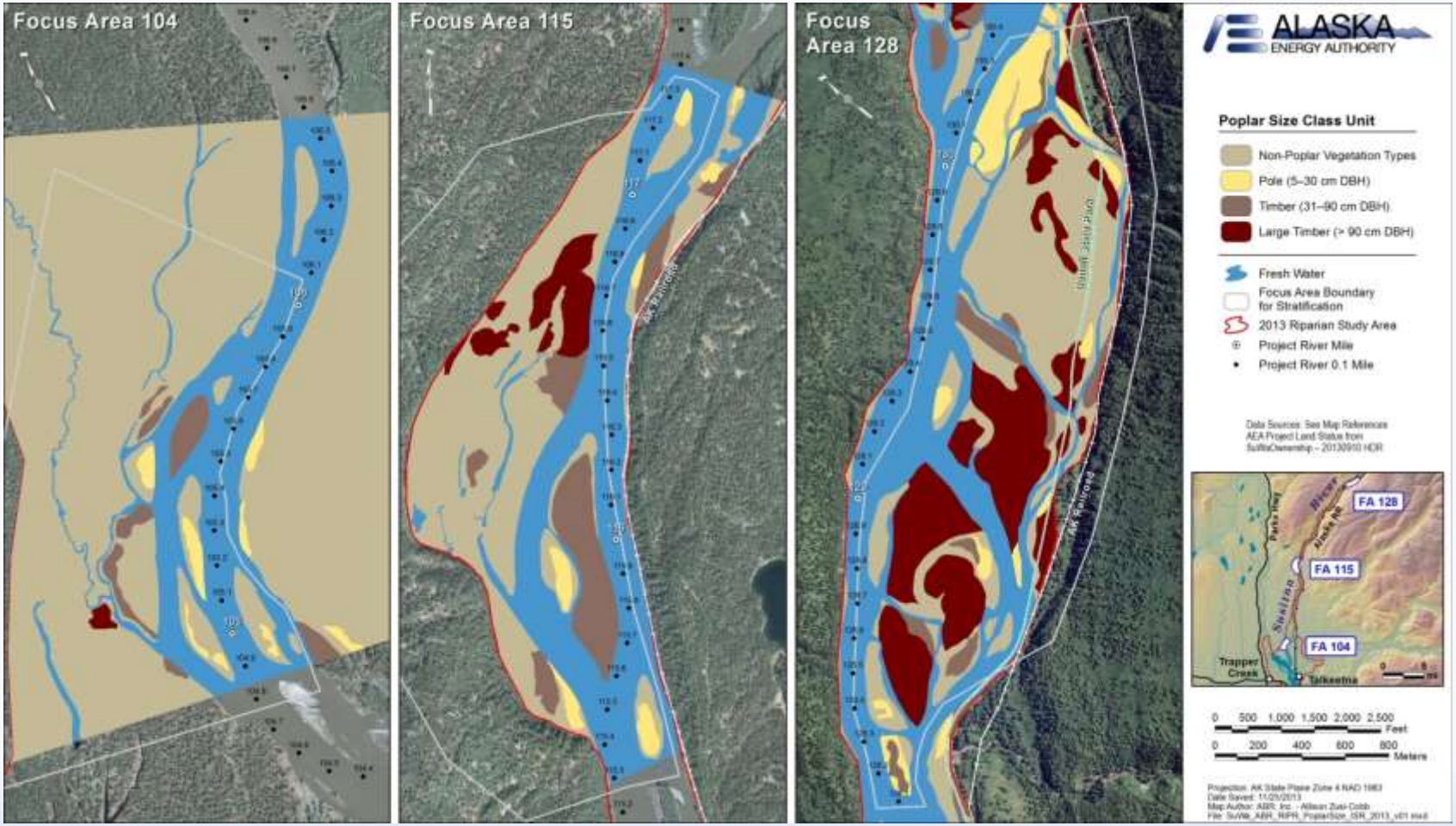
Study 11.6 Summary of Results since ISR (ISR Study 11.6, Part A – Section 5): Vegetation in Focus Areas



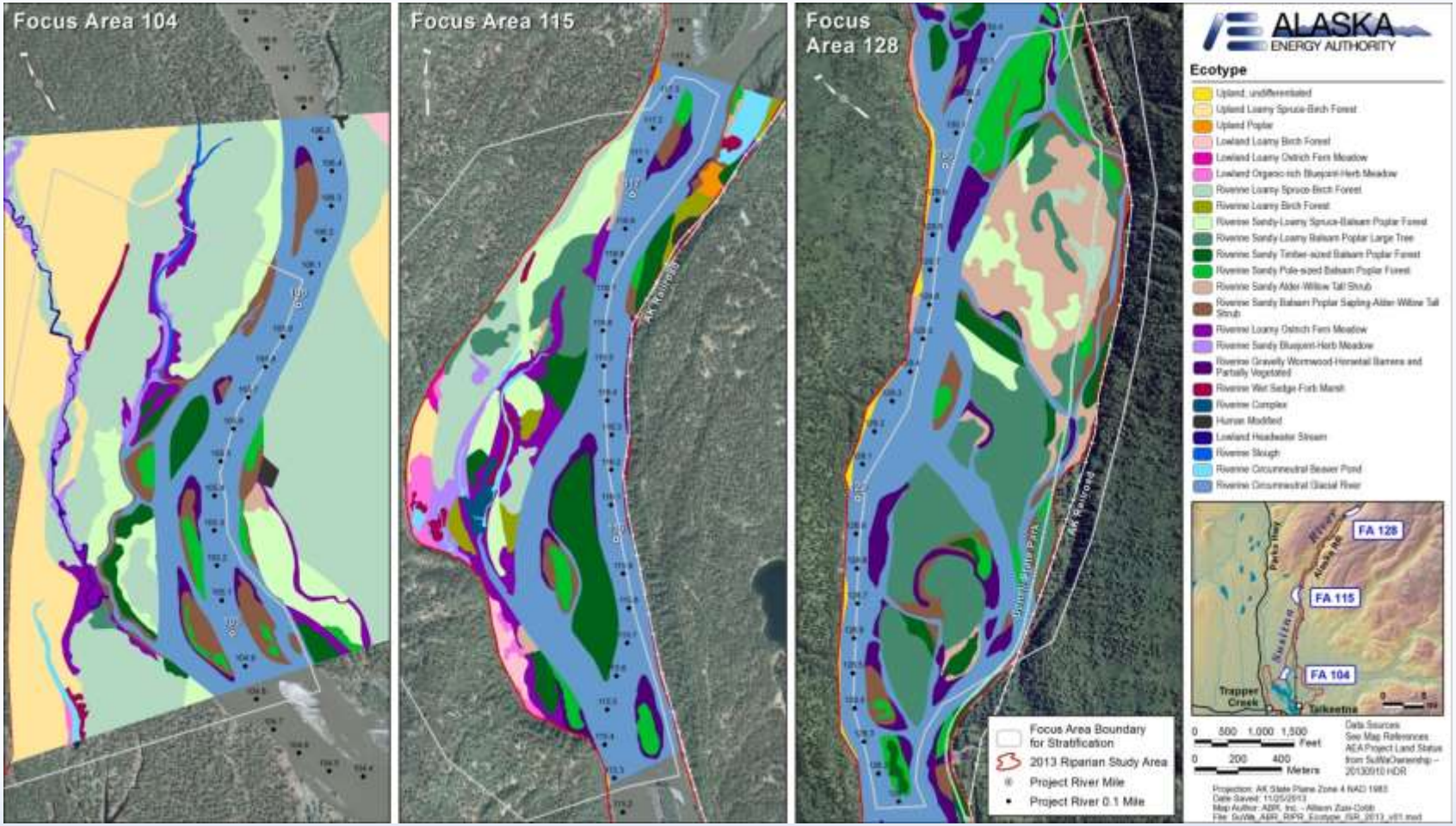
Study 11.6 Summary of Results since ISR (ISR Study 11.6, Part A – Section 5): Disturbance in Focus Areas



Study 11.6 Summary of Results since ISR (ISR Study 11.6, Part A – Section 5): Poplar Size Class in Focus Areas



Study 11.6 Summary of Results since ISR (ISR Study 11.6, Part A – Section 5): Ecotype Mapping in Focus Areas



AEA Proposed Modifications to Study 11.6 in ISR (ISR Study 11.6, Part C – Section 7.1.2)

No significant modifications to Study 11.6

Current Status and Steps to Complete Study 11.6 (ISR Study 11.6, Part C – Section 7.1)

- Sediment sampling and aging analyses in September 2014;
- Field sampling of ELS and ITU mapping plots in summer 2015, focusing farther upstream in the Middle River and farther downstream in the Lower River;
- Finalize ITU mapping based on 2015 field data;
- Derive final riparian ecotypes from the field and ITU mapping data;
- Develop riparian wildlife habitat and wetland types in coordination with Project wildlife researchers and the vegetation and wildlife habitat mapping study team; and
- Develop natural riparian vegetation-succession pathway models based on the 2012, 2013, and 2015 field data.

Steps to Complete Study 11.6 (ISR Study 11.6, Part C – Section 7.1)

- As described in the ISR, no additional study modifications are anticipated to be needed to meet the study objectives.
- Currently, with the implementation of the variances described in the ISR, the study objectives are being met.
- The study objectives will be fully met when the final field surveys, ITU mapping, and modeling of riparian successional pathways are completed in 2015.

Licensing Participants Proposed Modifications to Study 11.6?

- Agencies
- CIRWG members and Ahtna
- Public