PART A - FIGURES

Susitna-Watana Hydroelectric Project
(FERC No. 14241)

Fish and Aquatics Instream Flow Study (8.5)

Part A - Figures

Initial Study Report

Prepared for

Alaska Energy Authority

SUSITNA-WATANA HYDRO

Clean, reliable energy for the next 100 years.

Prepared by

R2 Resource Consultants, Inc.

June 2014

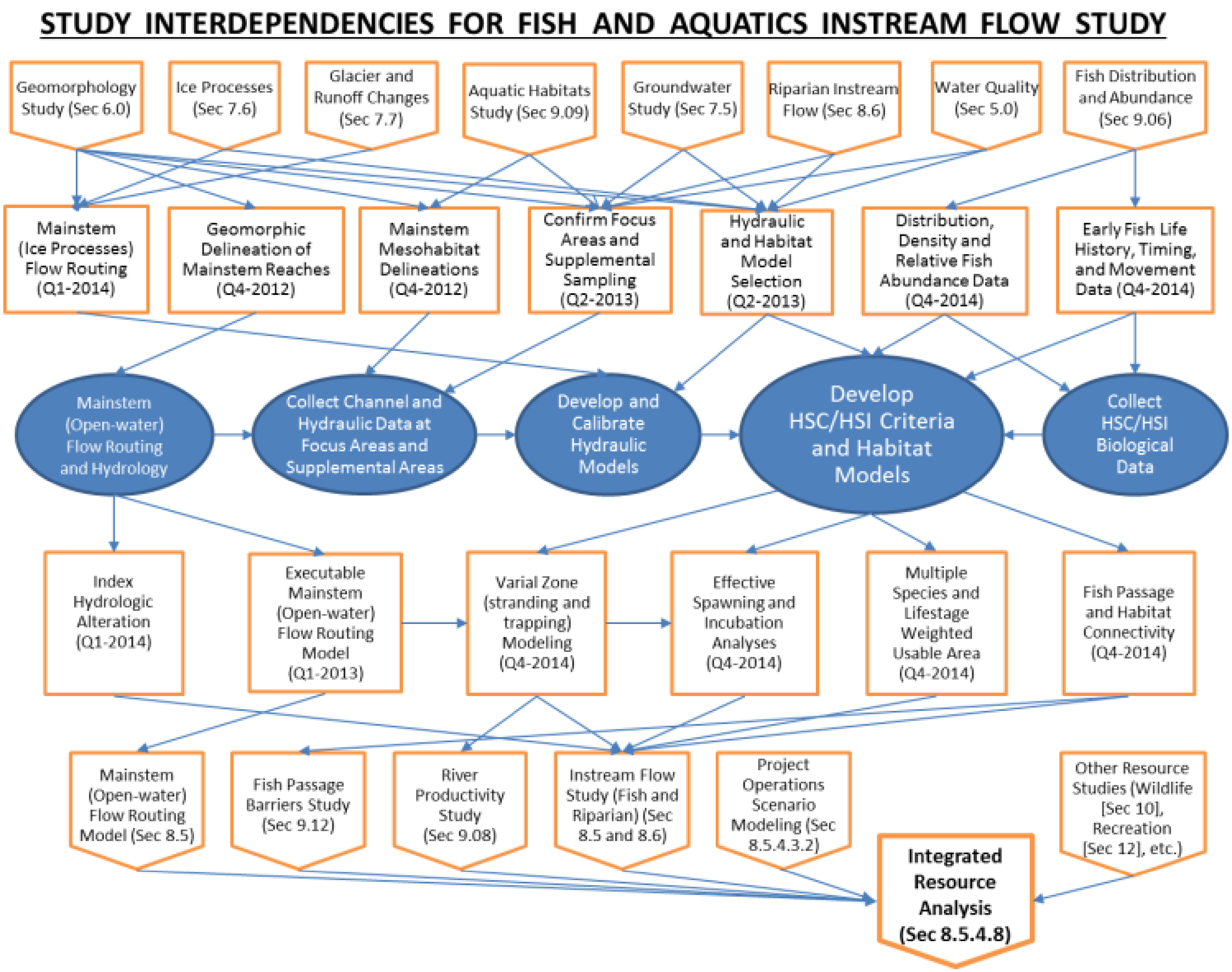


Figure 2-1. Study interdependencies for Fish and Aquatics Instream Flow Study.

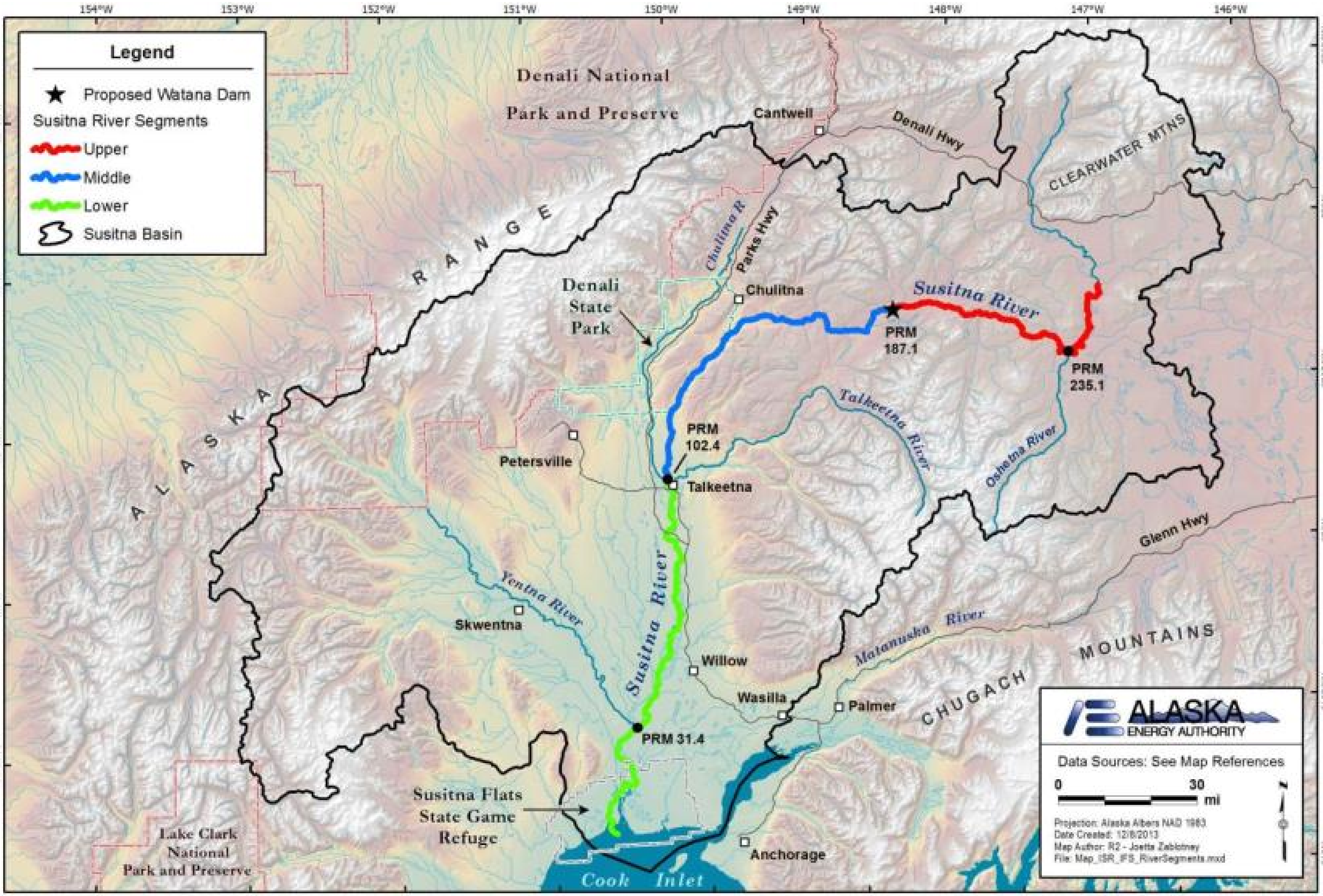


Figure 3-1. Map depicting the Upper, Middle and Lower Segments of the Susitna River potentially influenced by the Susitna-Watana Hydroelectric Project.

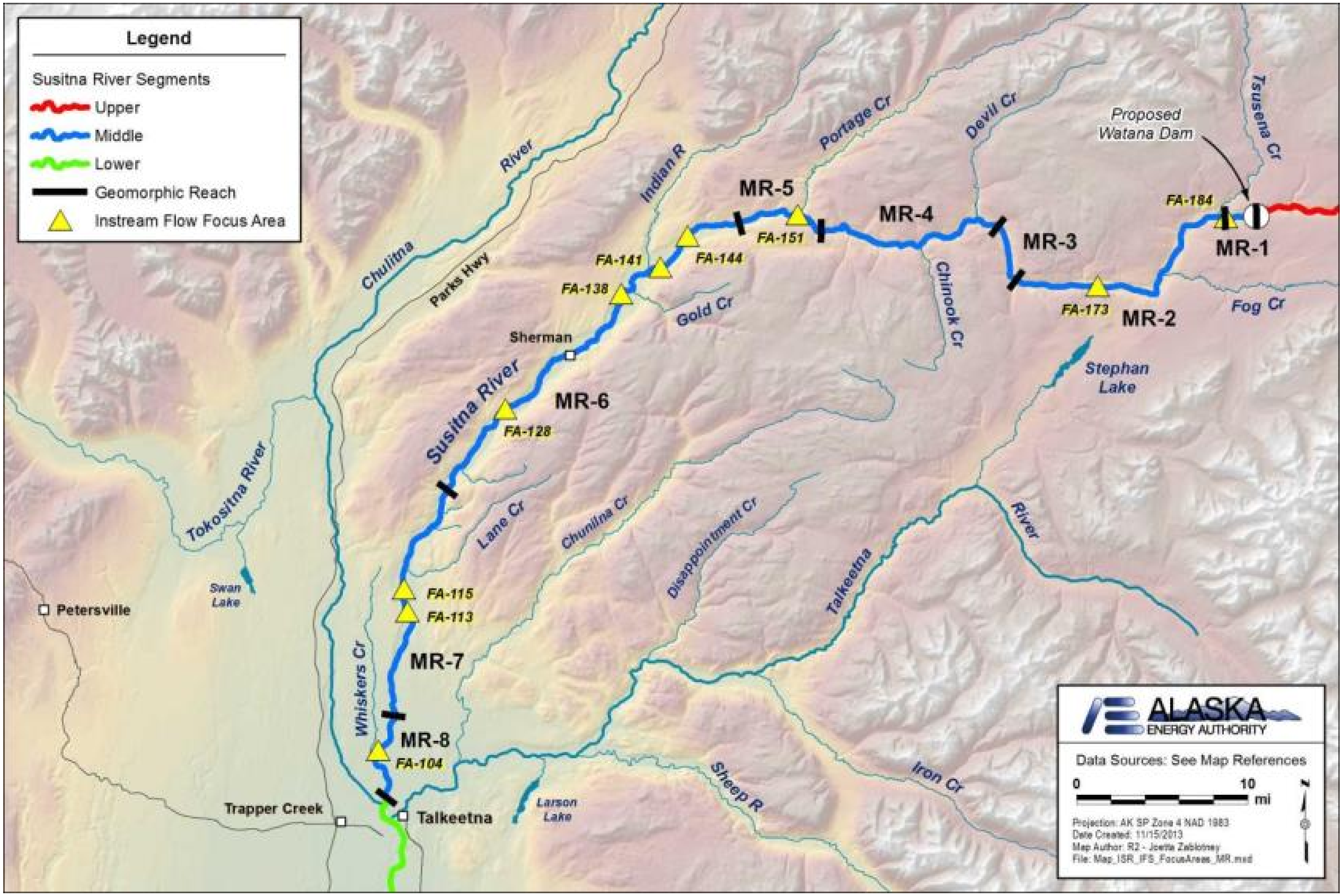


Figure 3-2. Map of the Middle Segment of the Susitna River depicting the eight Geomorphic Reaches and locations of ten Focus Areas. No Focus Areas were located in MR-3 and MR-4 due to safety issues related to sampling within or proximal to Devils Canyon.

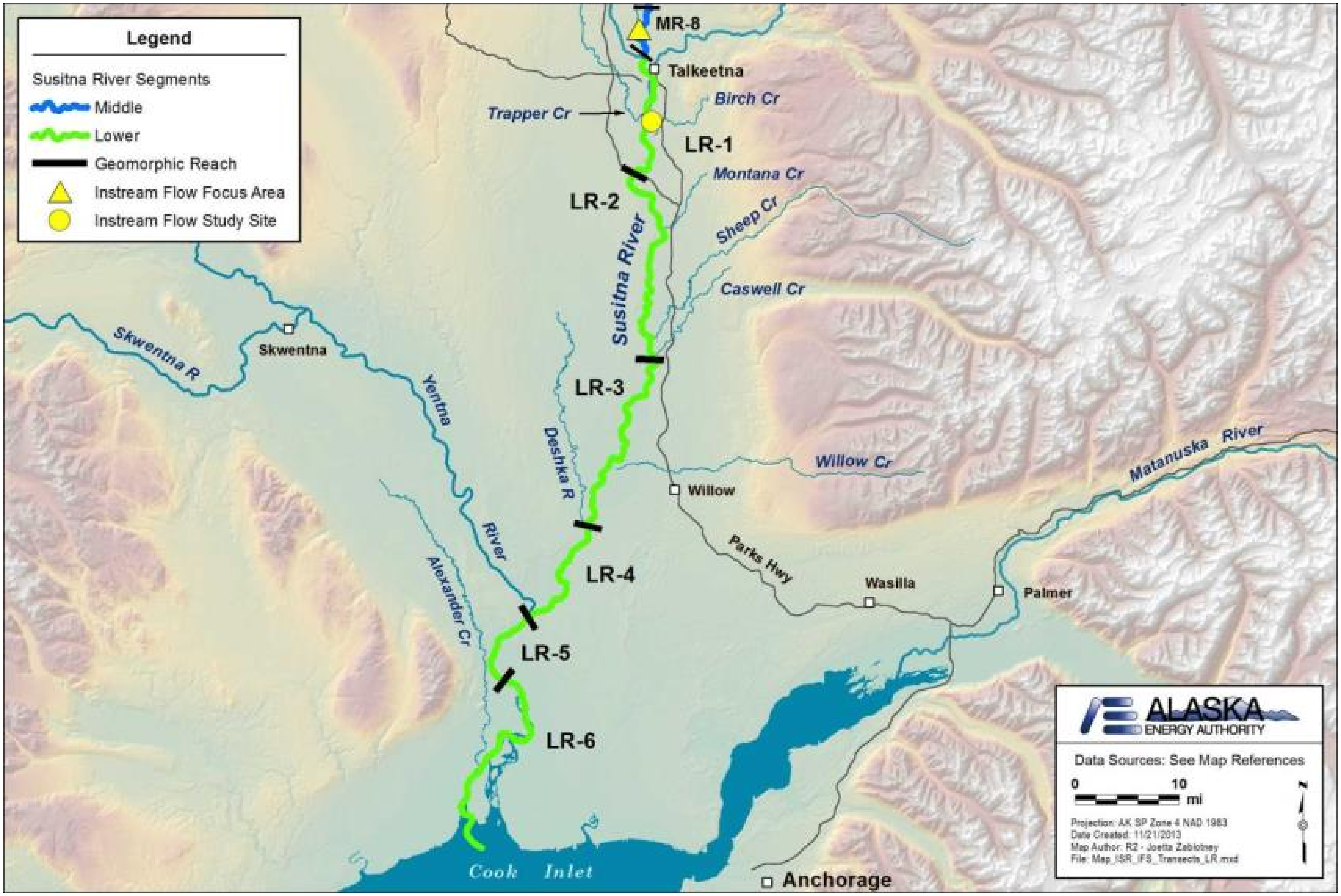
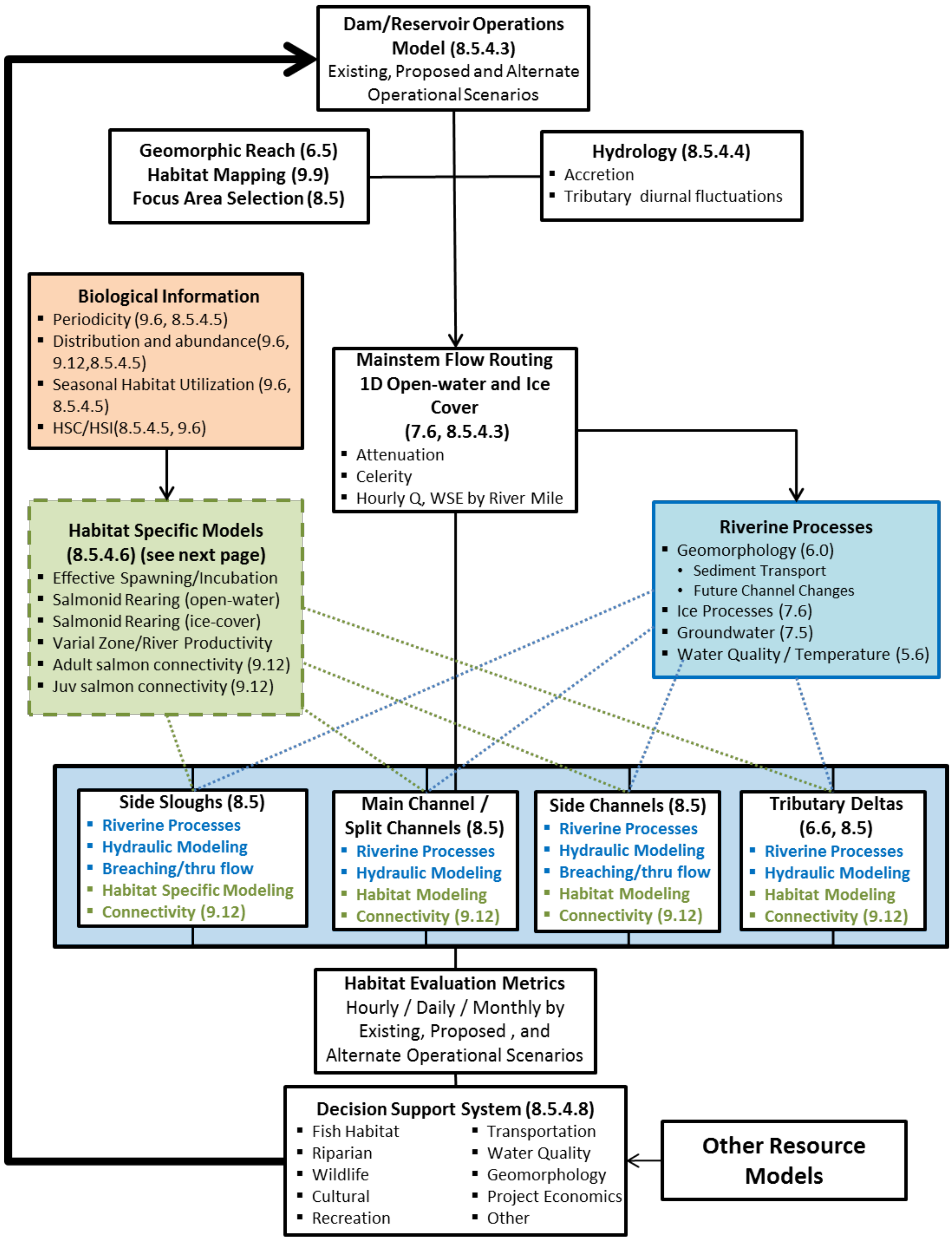


Figure 3-3. Map of the Lower Segment of the Susitna River depicting the six Geomorphic Reaches. Focus Areas have not been identified in this segment but will be considered pending results of open-water flow routing modeling.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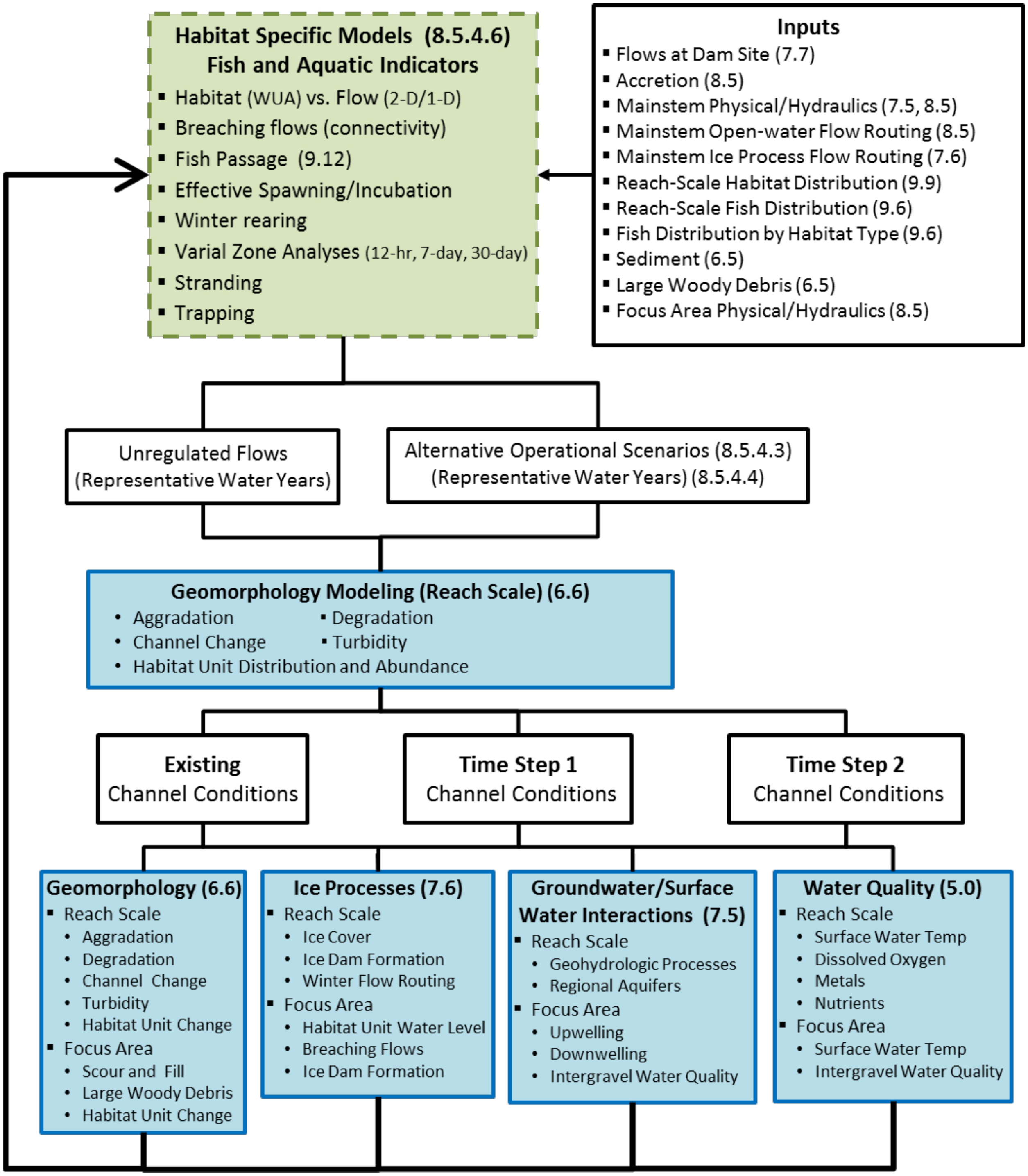


Figure 4.1-1. Conceptual framework for the Susitna-Watana Instream Flow Study depicting integration of habitat specific models and riverine processes to support integrated resource analyses; and integration of riverine processes to develop fish and aquatic habitat specific models.

Figure 4.2-1. Map showing FA-184 (Watana Dam) that begins at Project River Mile 184.7 and extends upstream to PRM 185.7. This Focus Area is located about 1.4 miles downstream of the proposed Watana Dam site near Tsusena Creek.

Figure 4.2-2. Map showing FA-173 (Stephan Lake)beginning at Project River Mile 173.6 and extends upstream to PRM 175.4. This Focus Area is near Stephan Lake and consists of main channel and a side channel complex.

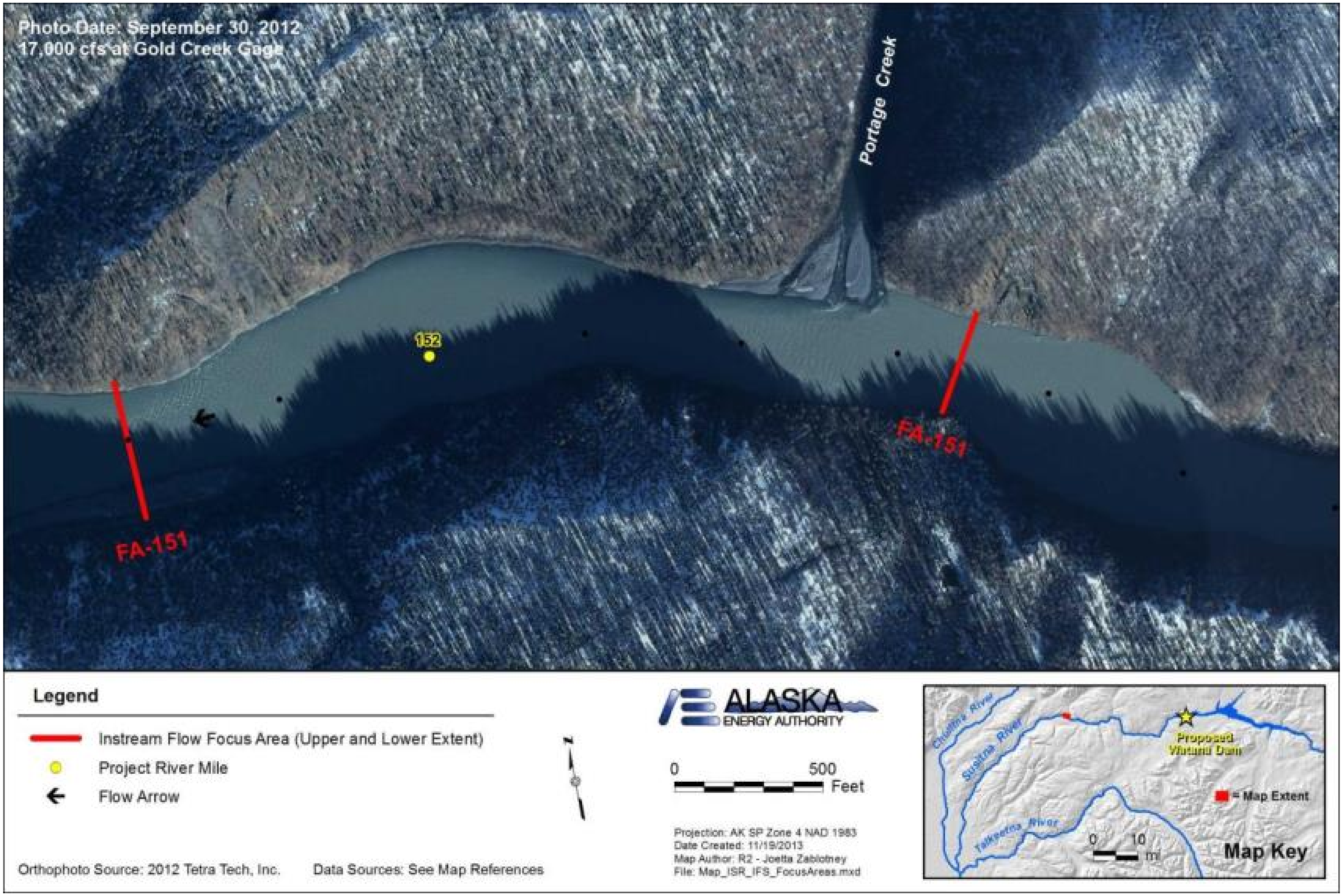


Figure 4.2-3. Map showing FA-151 (Portage Creek)beginning at Project River Mile 151.8 and extends upstream to PRM 152.3. This single main channel Focus Area is at the Portage Creek confluence.

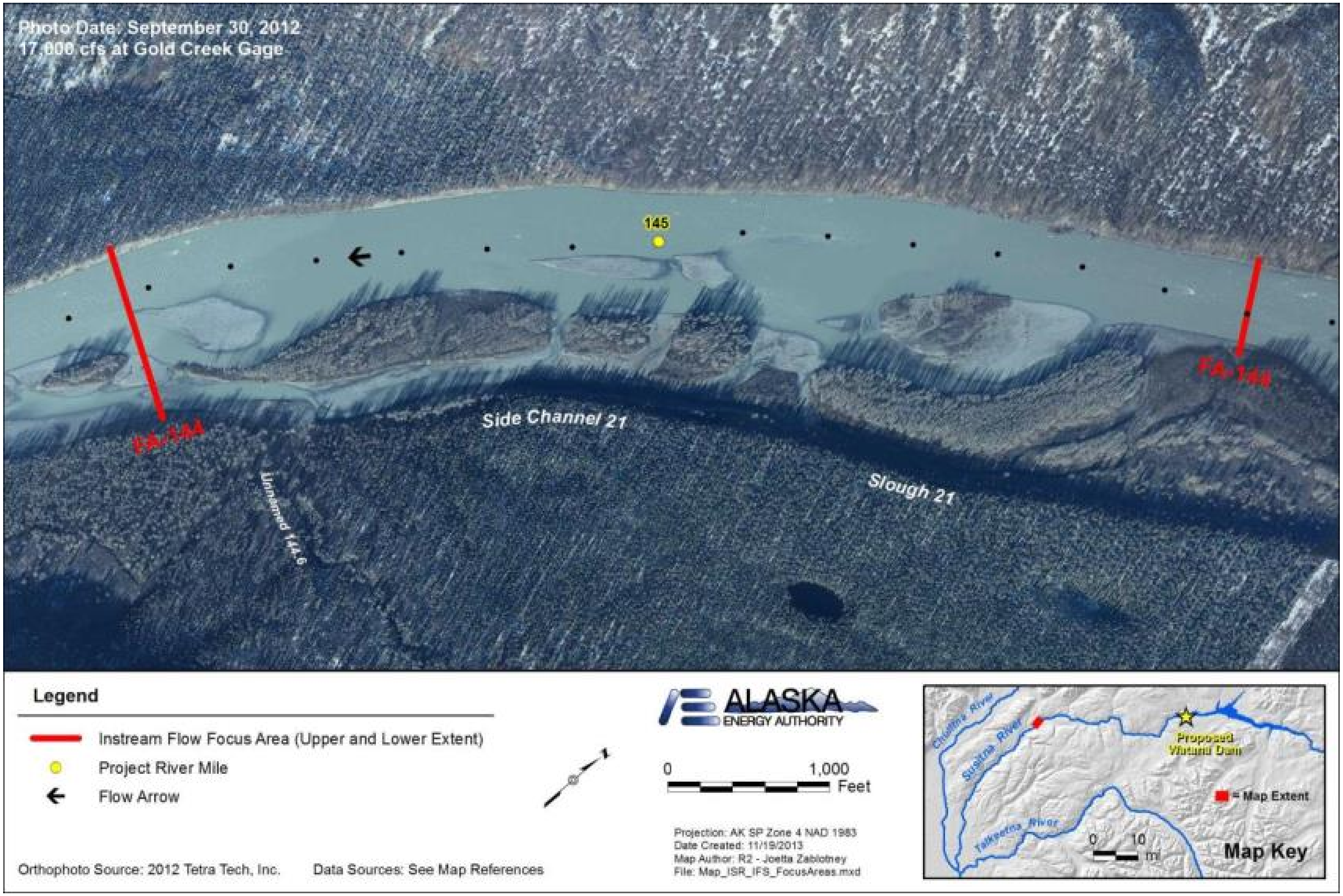


Figure 4.2-4. Map showing FA-144 (Slough 21) beginning at Project River Mile 144.4 and extends upstream to PRM 145.7. This Focus Area is located about 2.3 miles upstream of Indian River and includes Side Channel 21 and Slough 21.

Figure 4.2-5. Map showing FA-141 (Indian River) beginning at Project River Mile 141.8 and extends upstream to PRM 143.4. This Focus Area includes the Indian River confluence and a range of main channel and off-channel habitats including Slough 17.

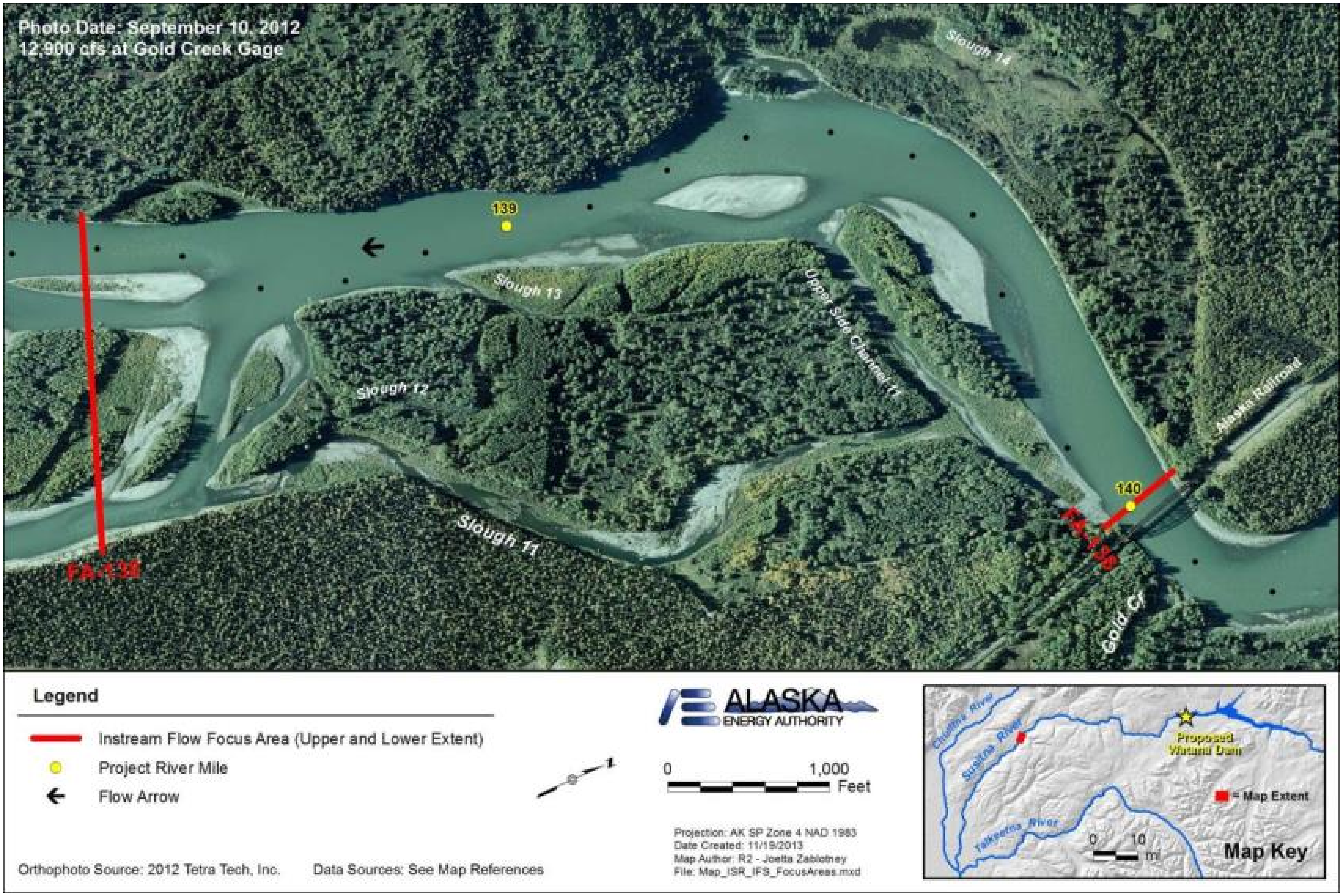


Figure 4.2-6. Map showing FA-138 (Gold Creek) beginning at Project River Mile 138.5 and extends upstream to PRM 140. This Focus Area is near Gold Creek and consists of a complex of side channel, side slough and upland slough habitats including Upper Side Channel 11 and Slough 11.

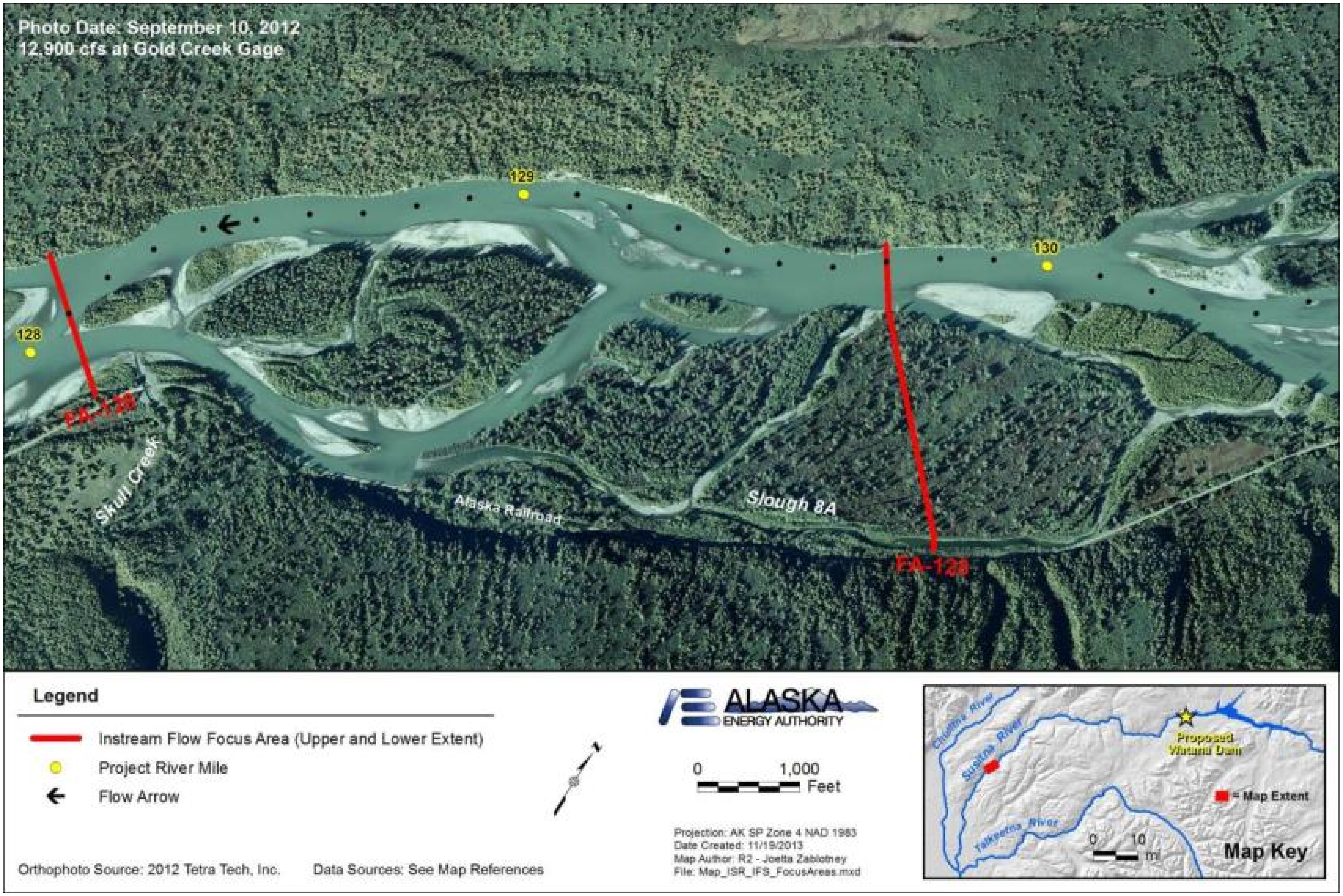


Figure 4.2-7. Map showing FA-128 (Slough 8A) beginning at Project River Mile 128.1 and extends upstream to PRM 129.7. This Focus Area consists of side channel, side slough and tributary confluence habitat features including Skull Creek.

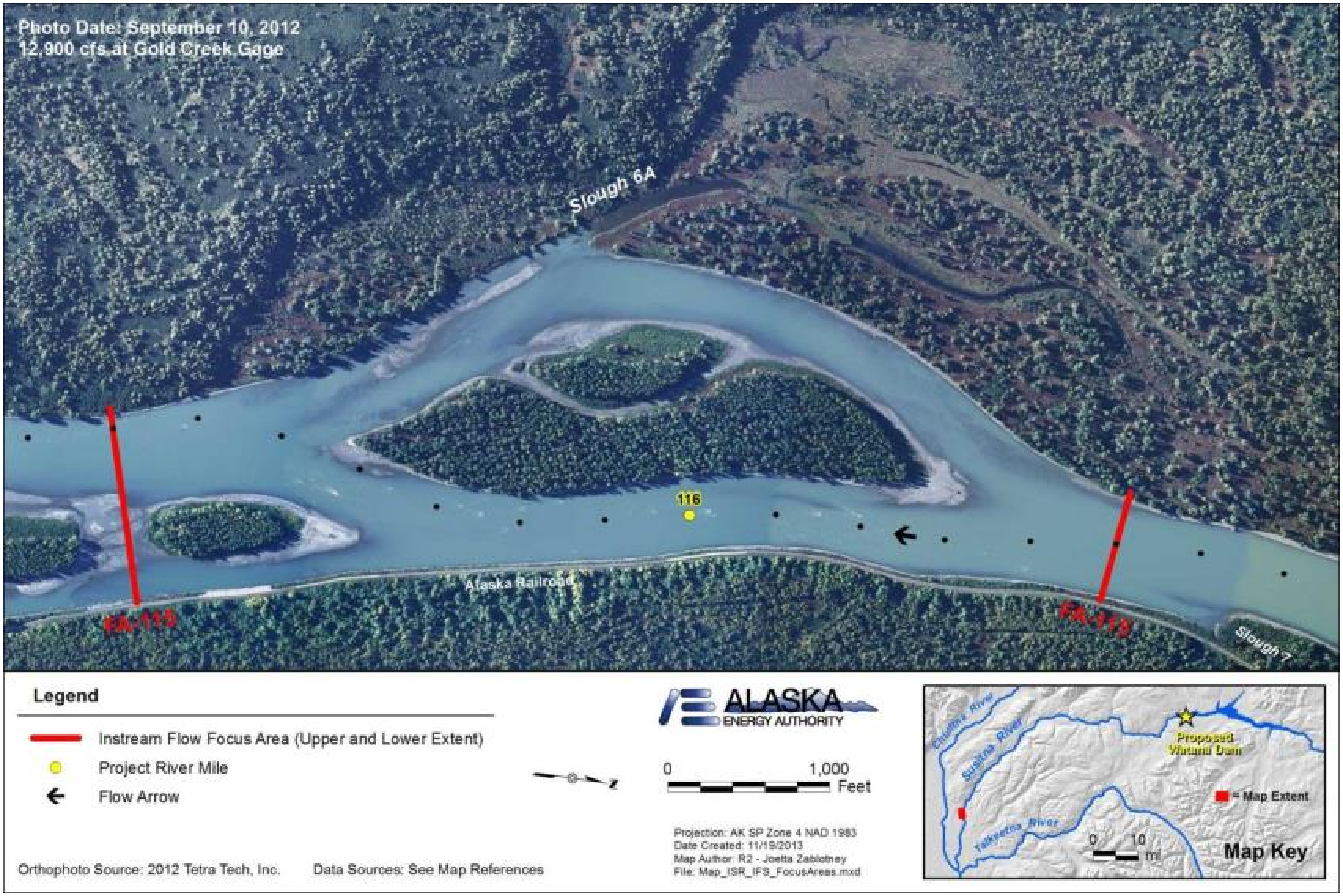


Figure 4.2-8. Map showing FA-115 (Slough 6A) beginning at Project River Mile 115.3 and extends upstream to PRM 116.5. This Focus Area is located about 0.6 miles downstream of Lane Creek and consists of side channel and upland slough habitats including Slough 6A.

Figure 4.2-9. Map showing FA-113 (Oxbow 1) beginning at Project River Mile 113.6 and extends upstream to PRM 115.3. This Focus Area consists of side channel and slough habitats including Oxbow 1.

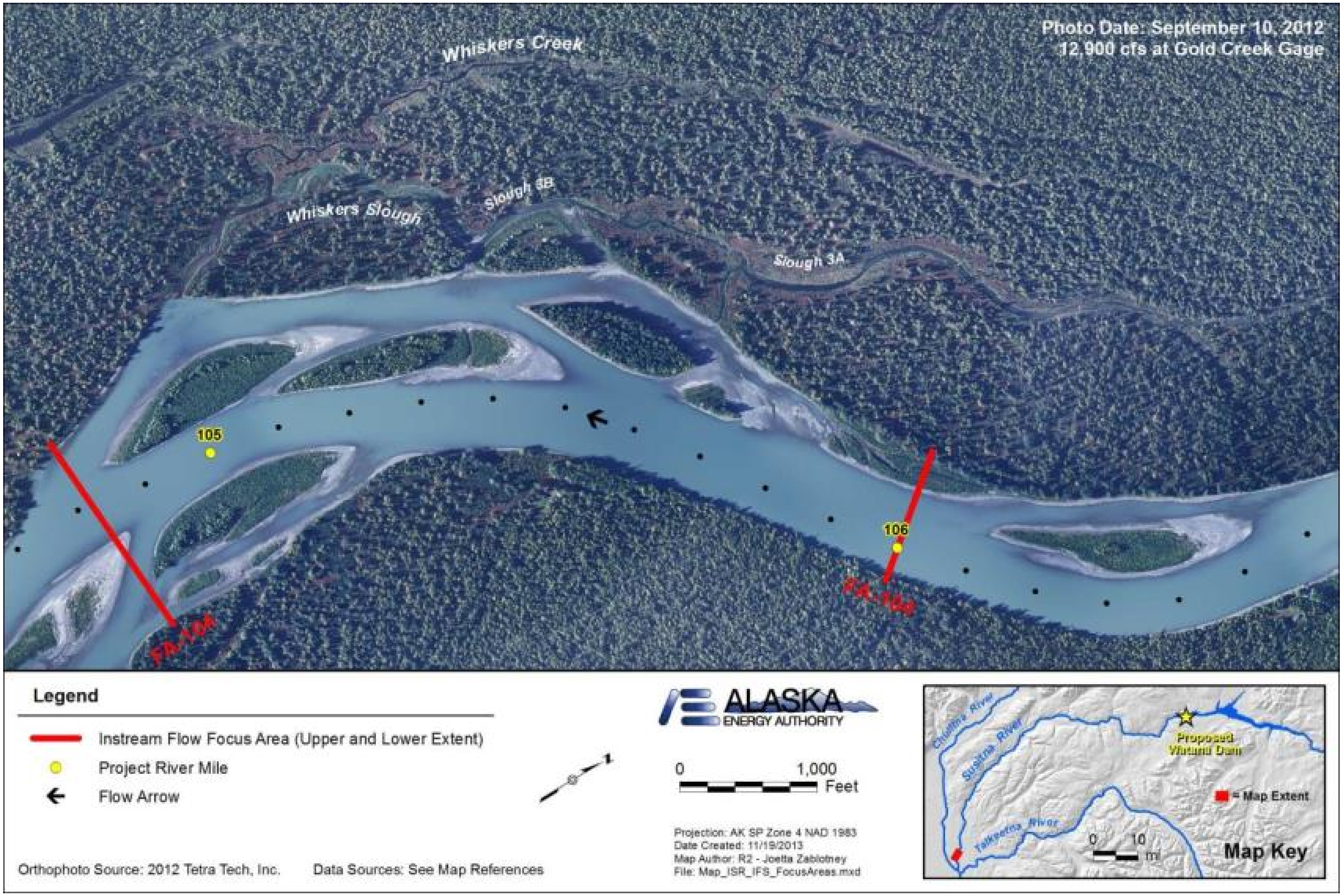


Figure 4.2-10. Map showing FA-104 (Whiskers Slough) beginning at Project River Mile 104.8 and extends upstream to PRM 106. This Focus Area covers the diverse range of habitats in the Whiskers Slough complex.

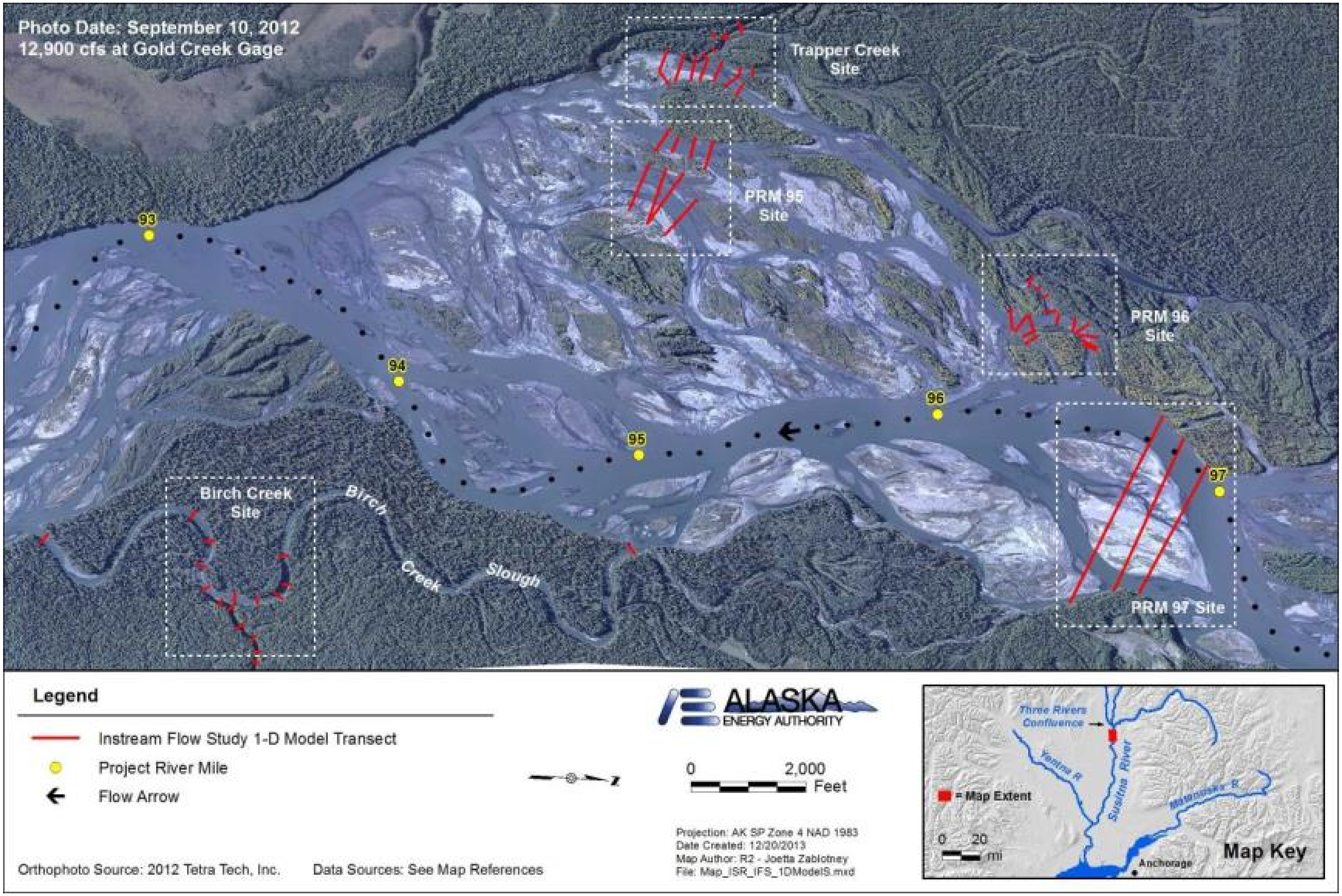


Figure 4.2-11. Map showing location of lower Susitna River instream flow-fish habitat transects in Geomorphic Reach LR-1 in the vicinity of Trapper Creek.

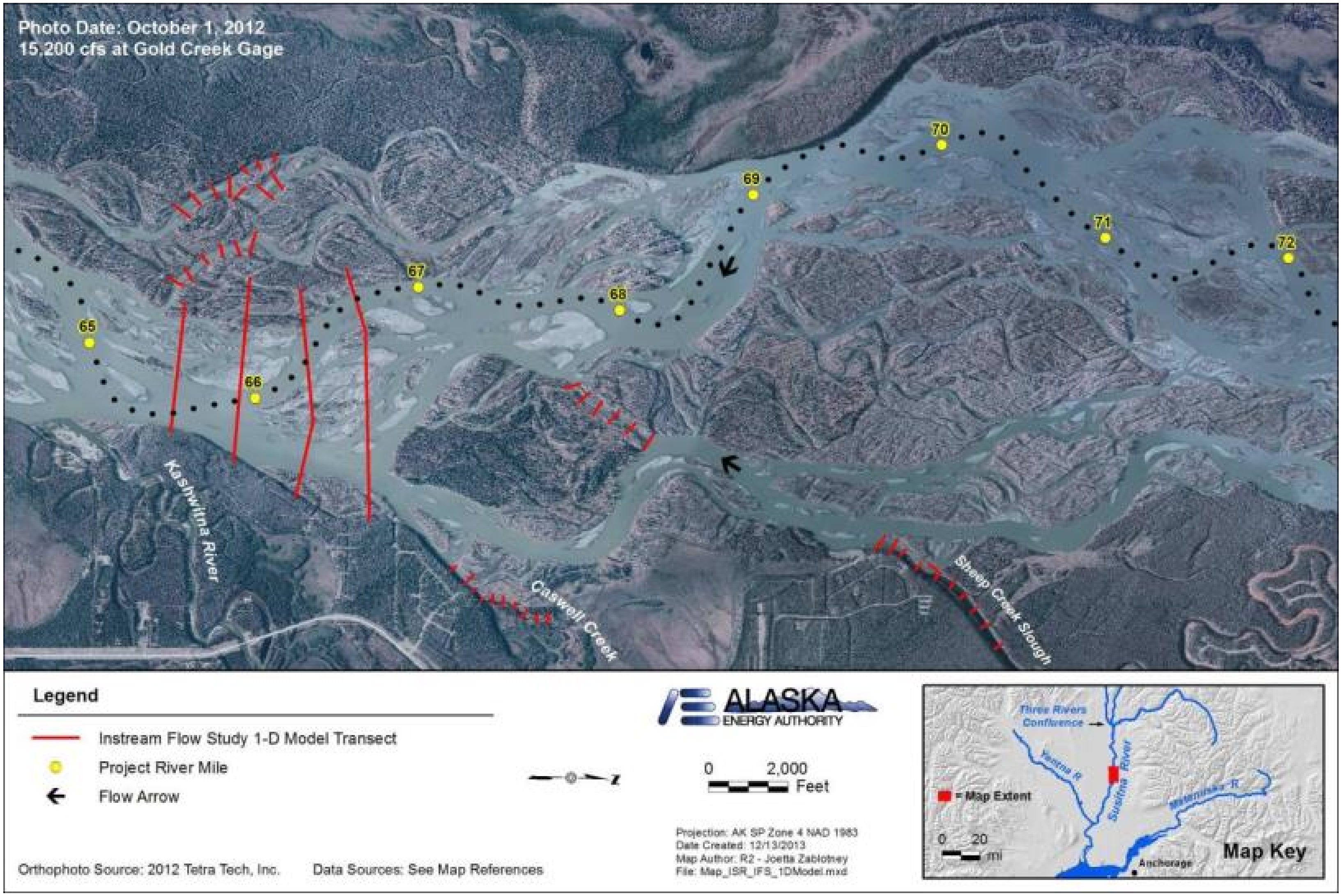


Figure 4.2-12. Map showing location of lower Susitna River instream flow-fish habitat transects in Geomorphic Reach LR-2 in the vicinity of Caswell Creek. These transects will be measured in 2014. The proposed location, number, angle, and transect endpoints are tentative pending on-site confirmation during open-water conditions. Where feasible, instream flow fish habitat transects will be co-located with geomorphology, open-water flow routing and instream flow-riparian transects.

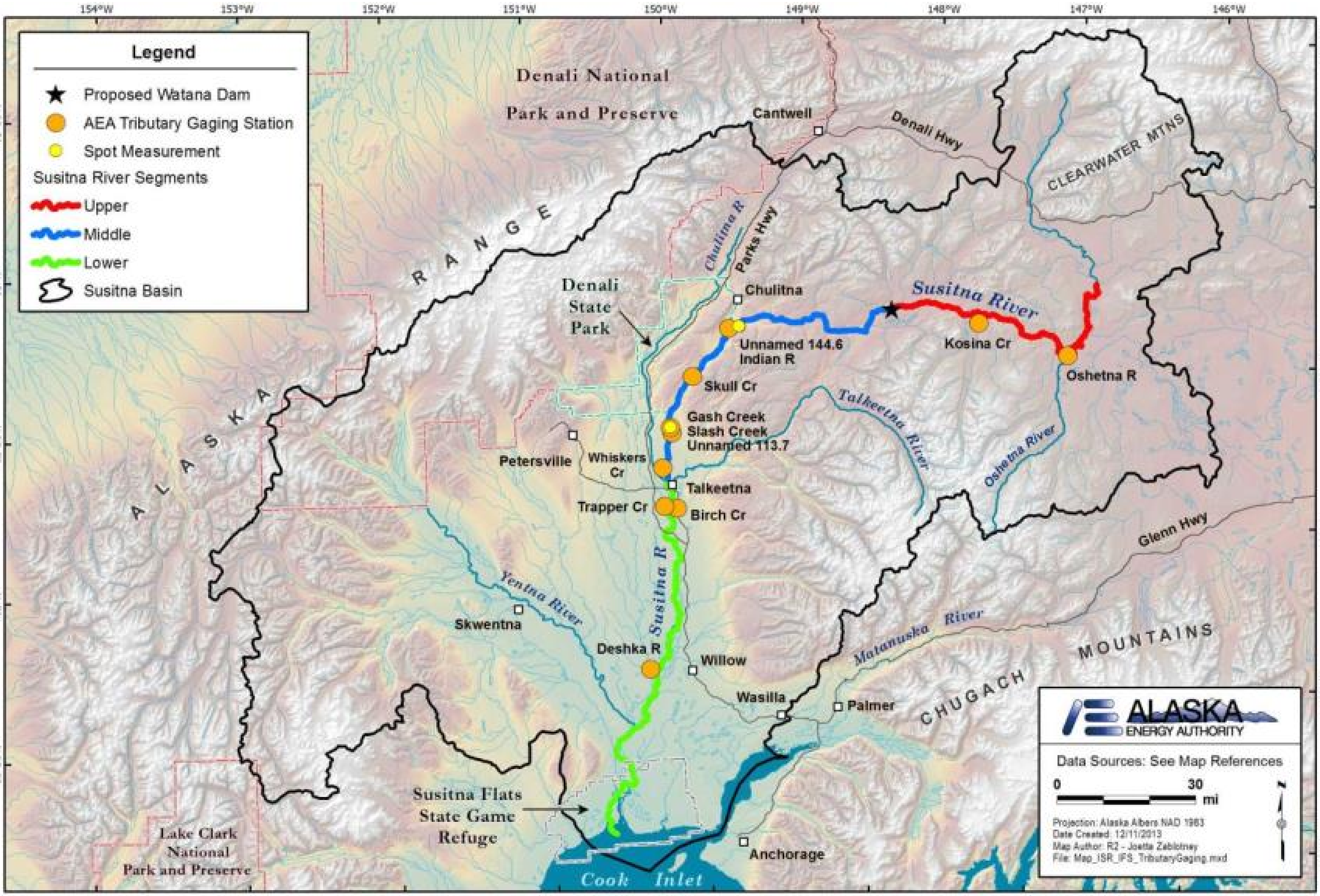


Figure 4.3-1. 2013 Tributary Gaging Locations.

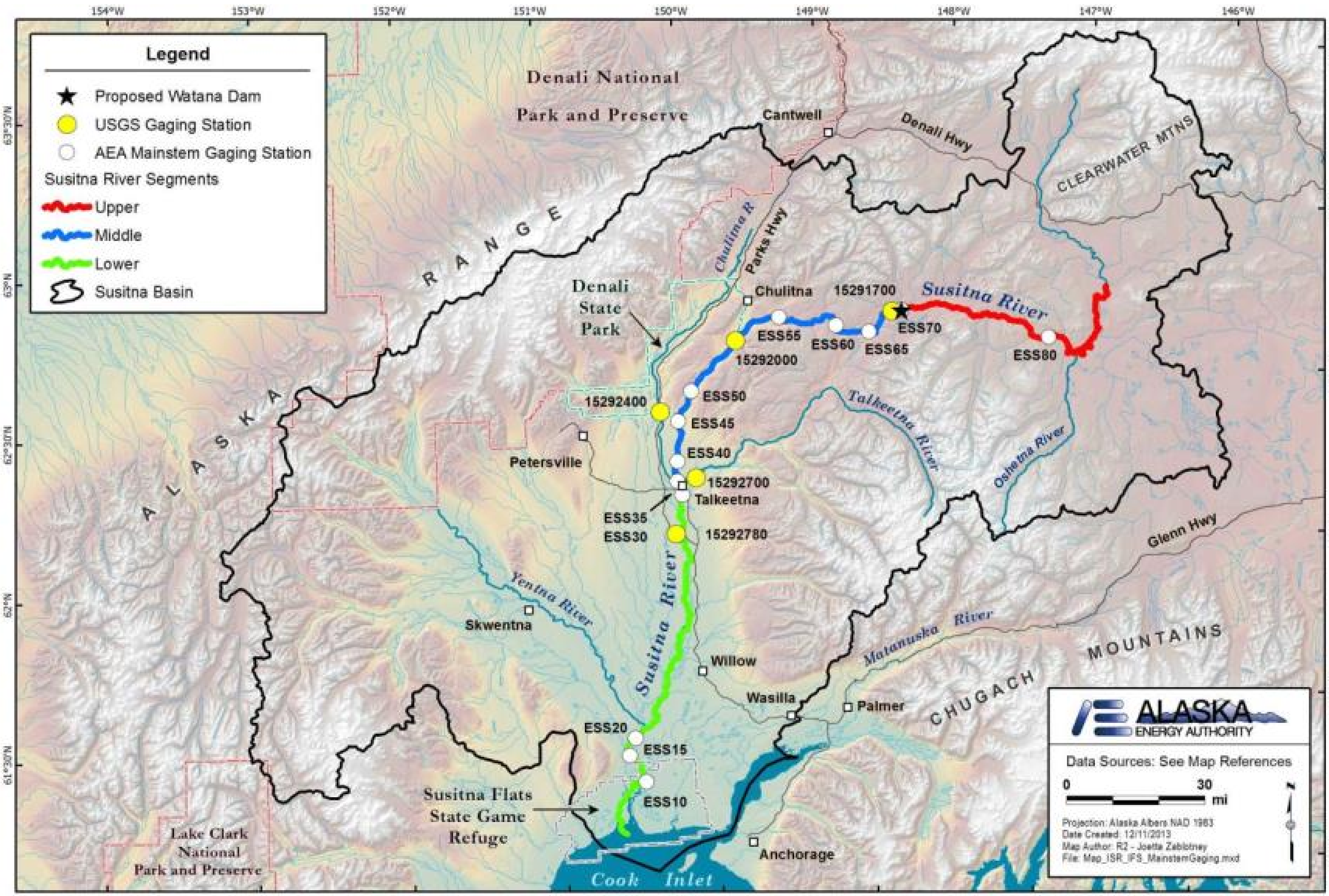


Figure 4.4-1. Mainstem gaging locations.

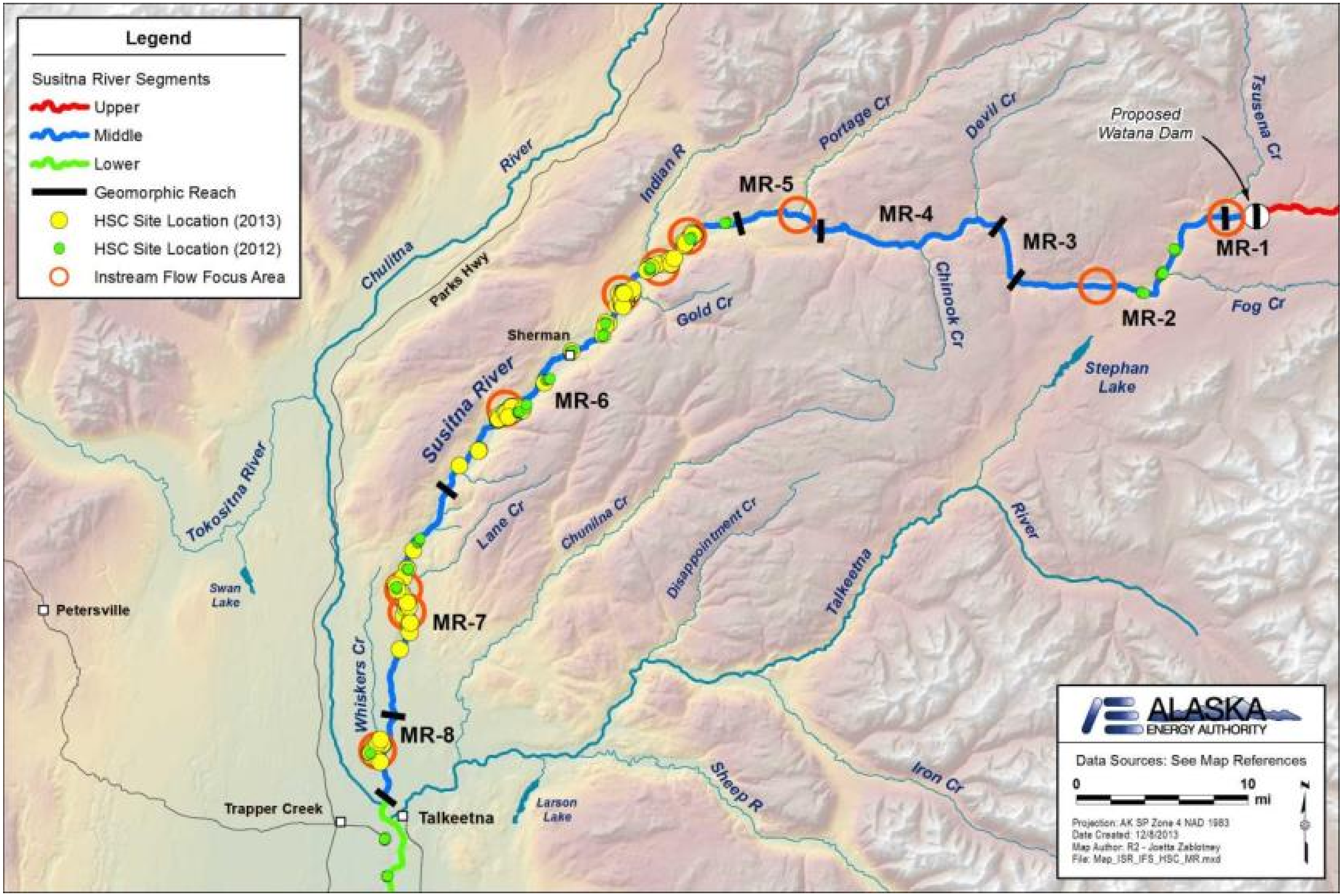


Figure 4.5-1. Map showing 2013 HSC sampling locations (yellow circles) in relationship to geomorphic reaches and Focus Areas (red circles) in the Middle River Segment of the Susitna River, Alaska.

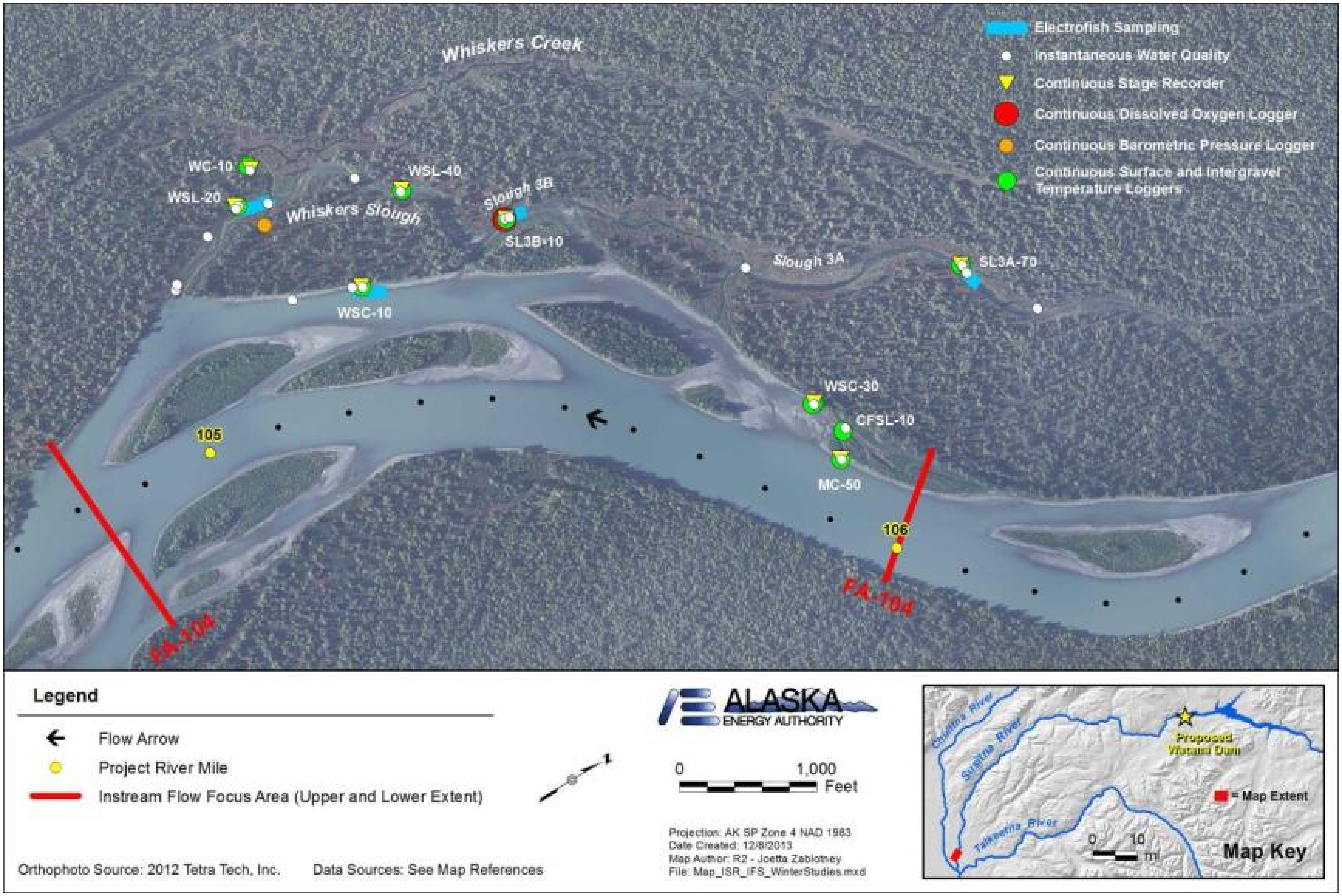


Figure 4.5-2. Locations of 2012-2013 winter sites for continuous and instantaneous water quality monitoring, water level monitoring, and fish sampling in FA-104 (Whiskers Slough).

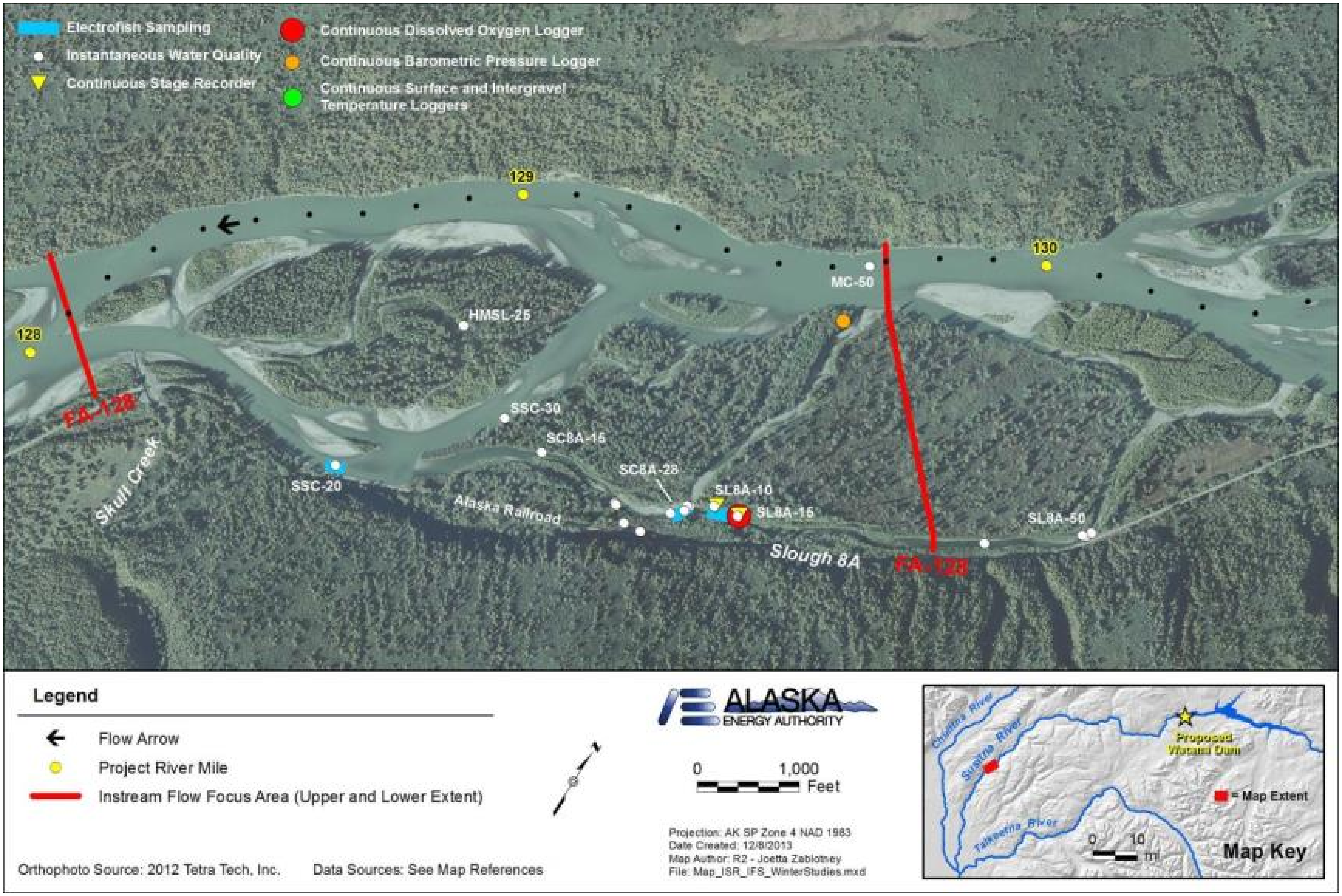


Figure 4.5-3. Locations of 2012-2013 winter sites for continuous and instantaneous water quality monitoring, water level monitoring, and fish sampling in FA-128 (Slough 8A).

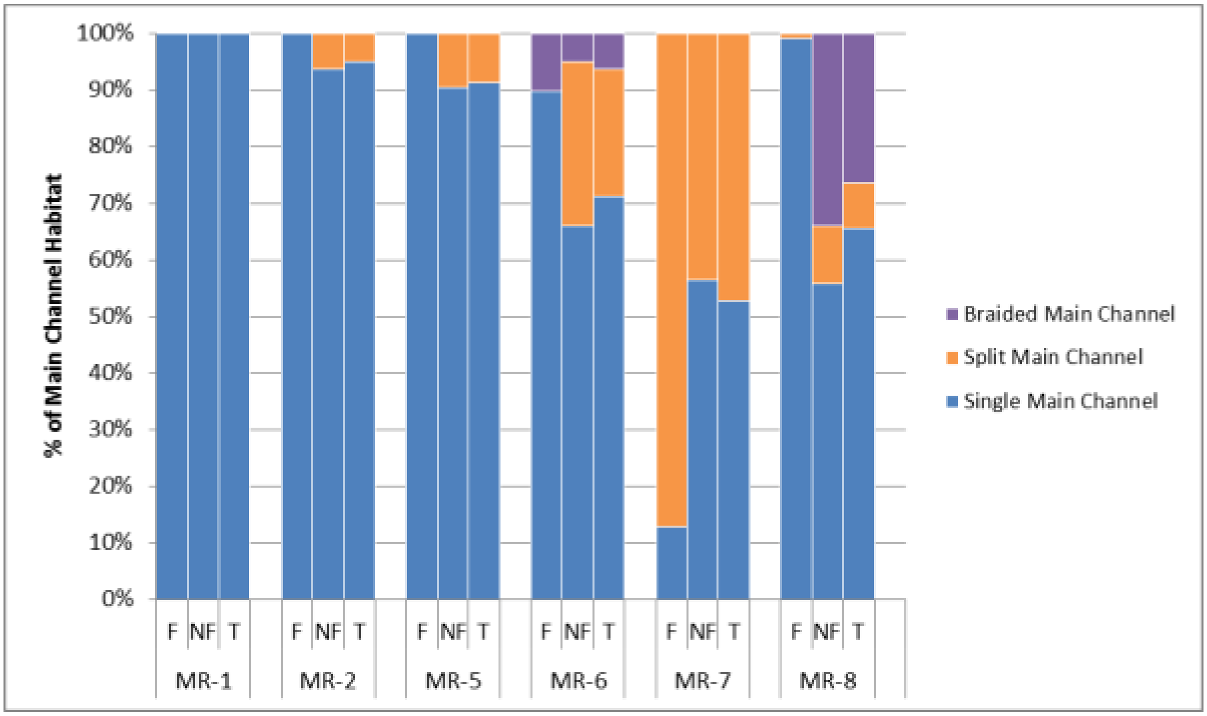


Figure 5.2-1. Percent of main channel in single main, split main, and braided main channel habitat by geomorphic reach and Focus Area (F), non-Focus Area (NF), and total (T).

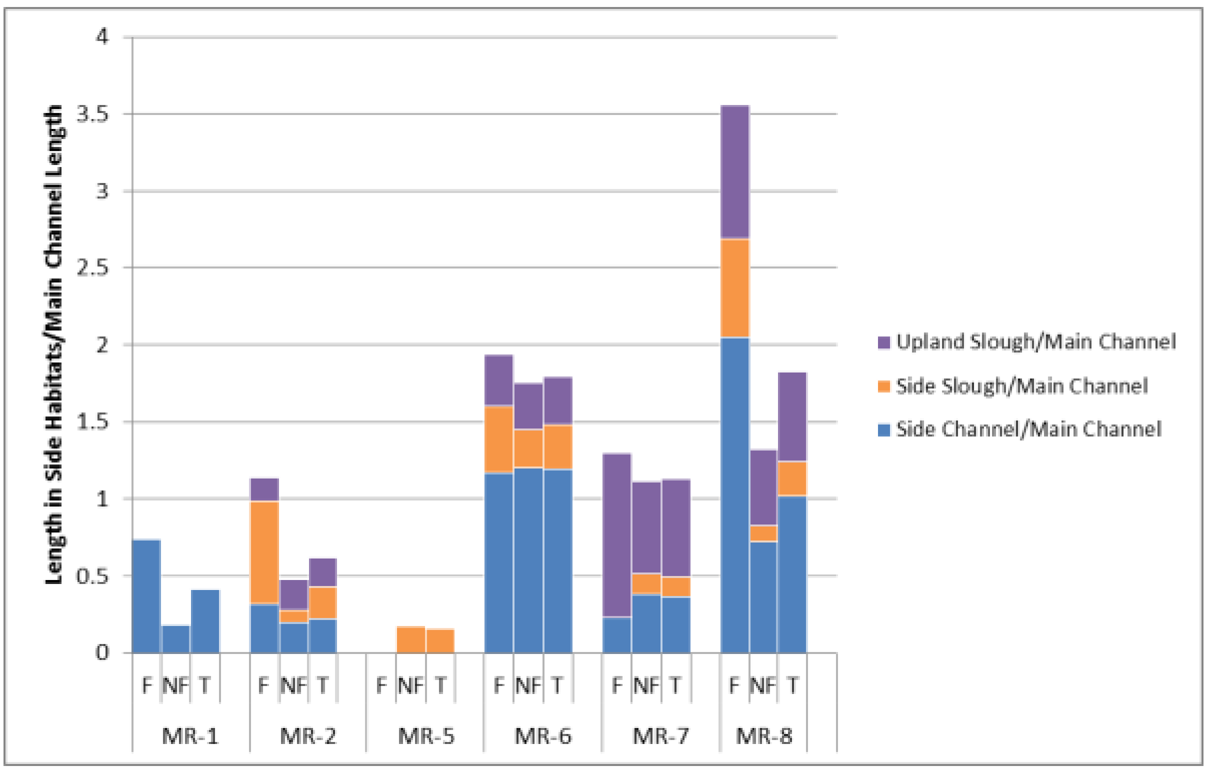


Figure 5.2-2. Side channel, side slough, and upland slough lengths per mile of main channel by geomorphic reach and Focus Area (F), non-Focus Area (NF), and total (T).

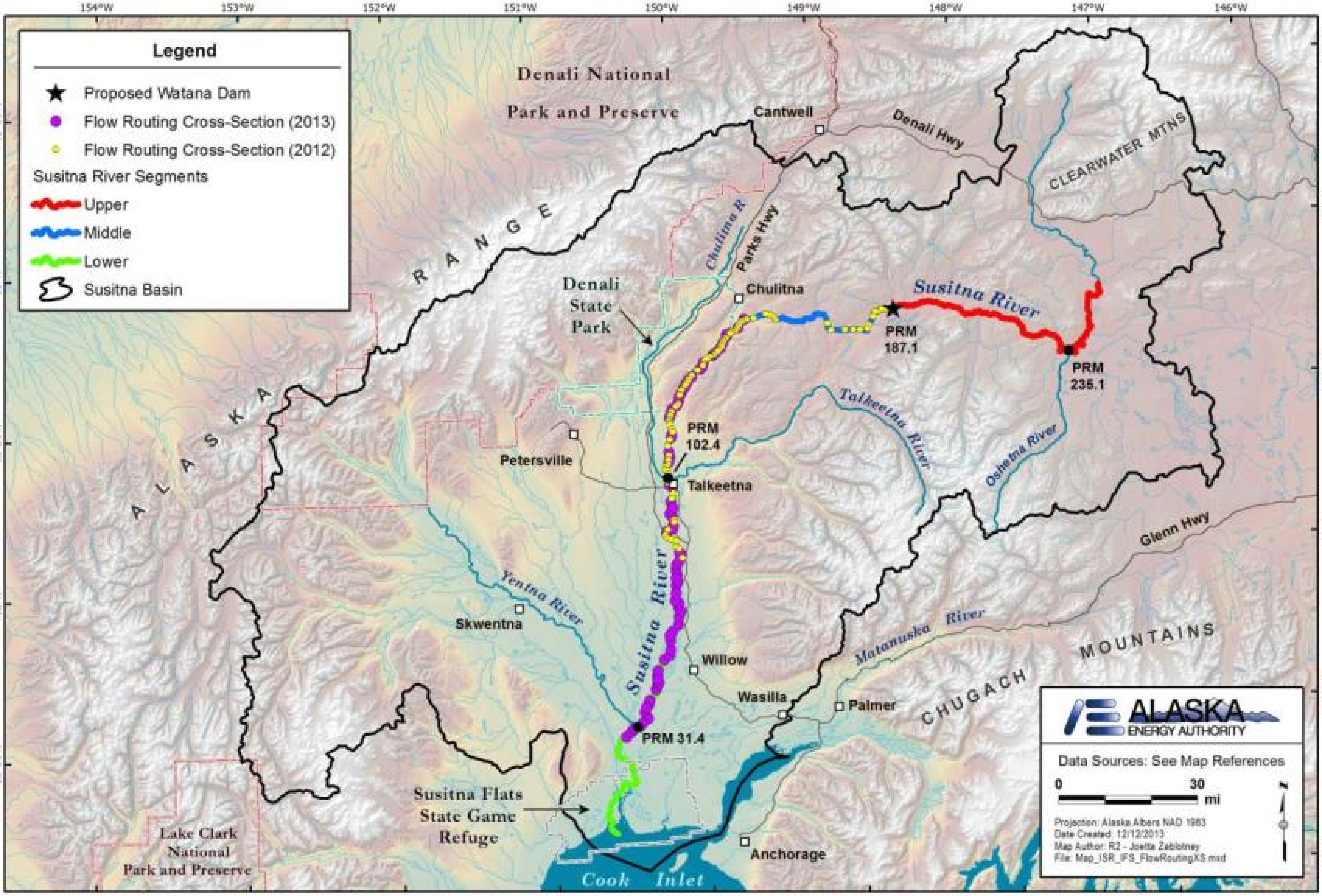


Figure 5.3-1. Location of 2012 and 2013 flow routing cross-sections.

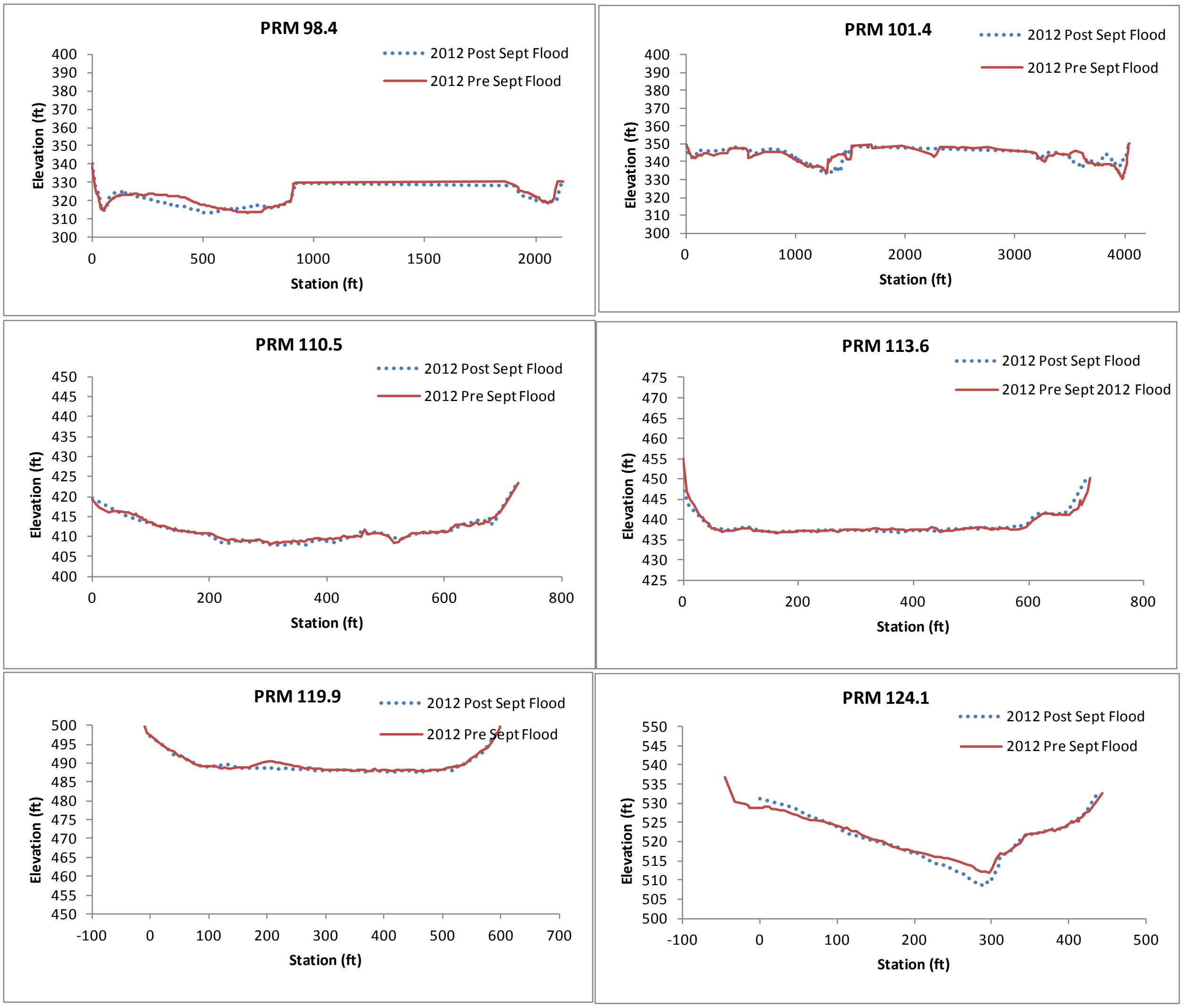


Figure 5.3-2. Pre and post September 2012 flood channel comparison for project river mile's 98.4, 101.4, 110.5, 113.6, 119.9, and 124.1.

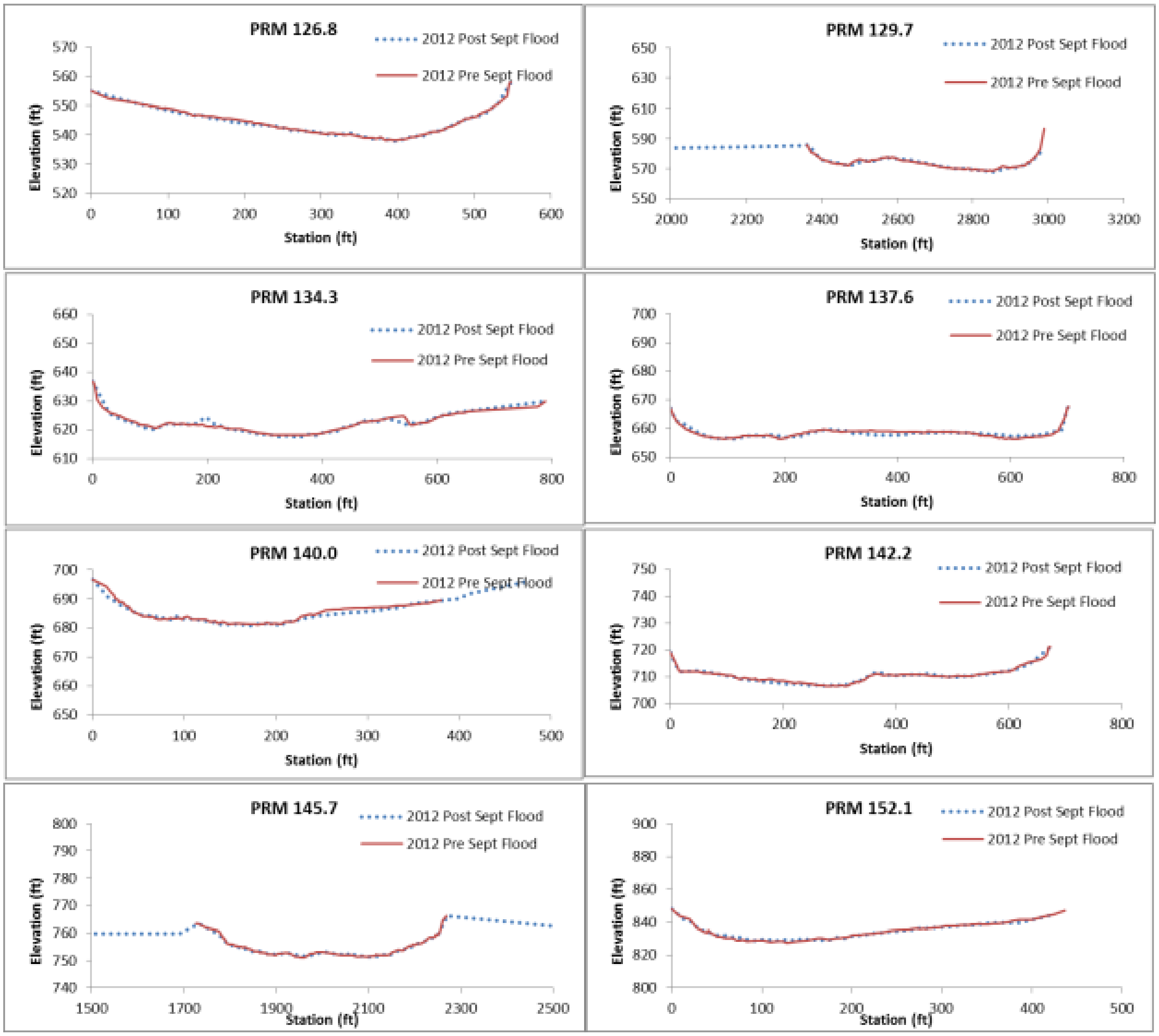


Figure 5.3-3. Pre and post September 2012 flood channel comparison for project river mile's 126.8, 129.7, 134.3, 137.6, 140.0, 142.2, 145.7, and 152.1.

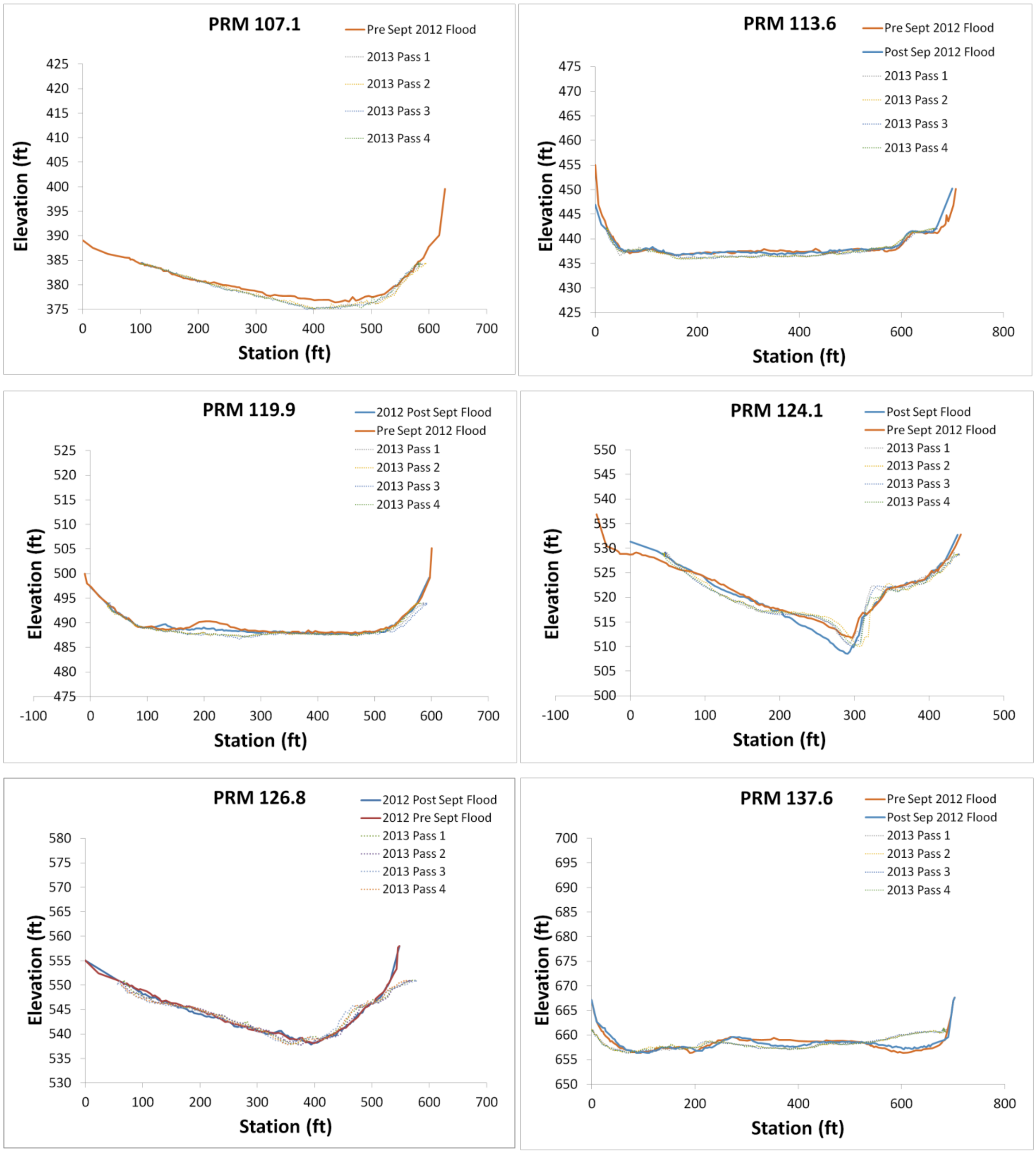
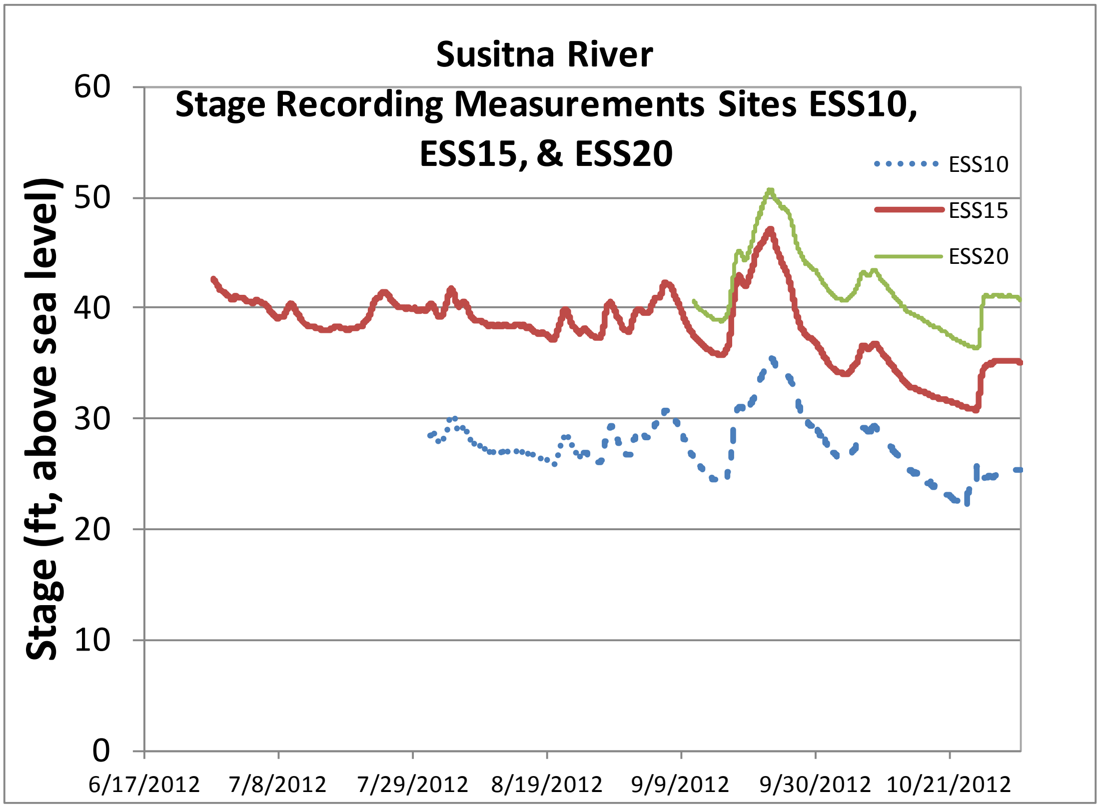


Figure 5.3-4. Comparison of cross-sectional profiles collected in 2012 and 2013.



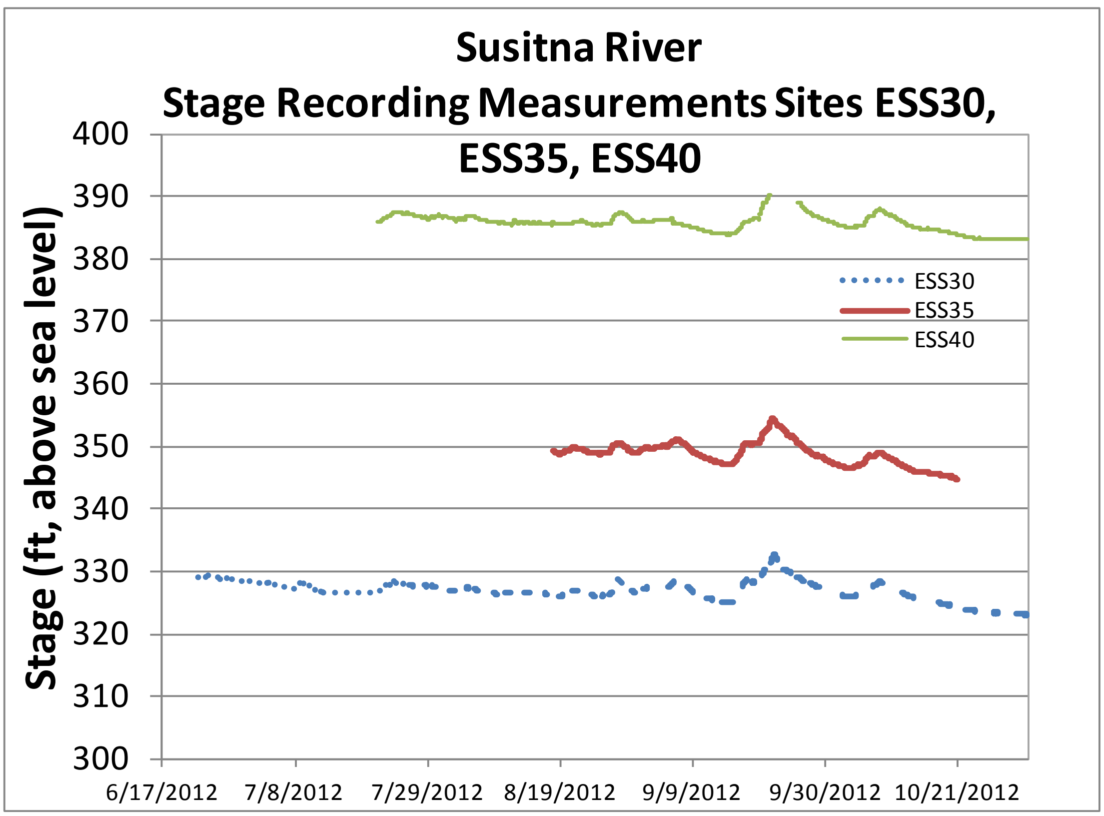
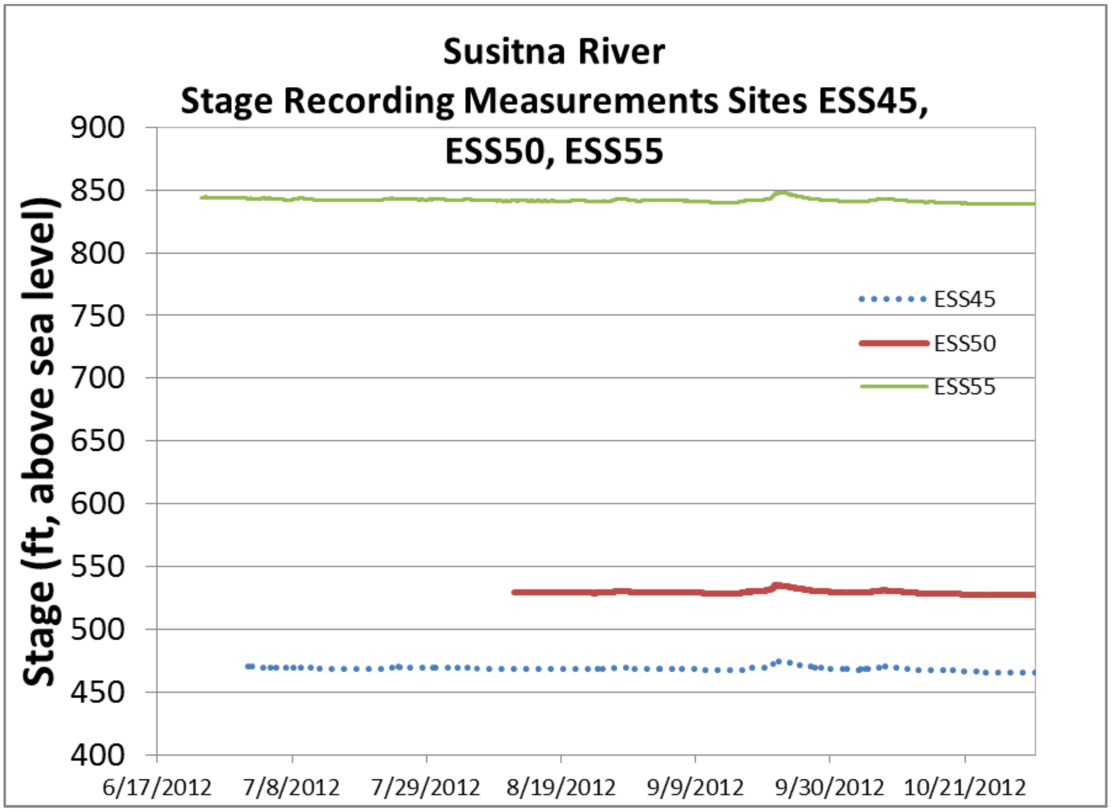


Figure 5.3-5. Stage readings for mainstem Susitna River sites ESS10-ESS40 for available data from June through October 2012.See Figure 4.4-1 for site locations.



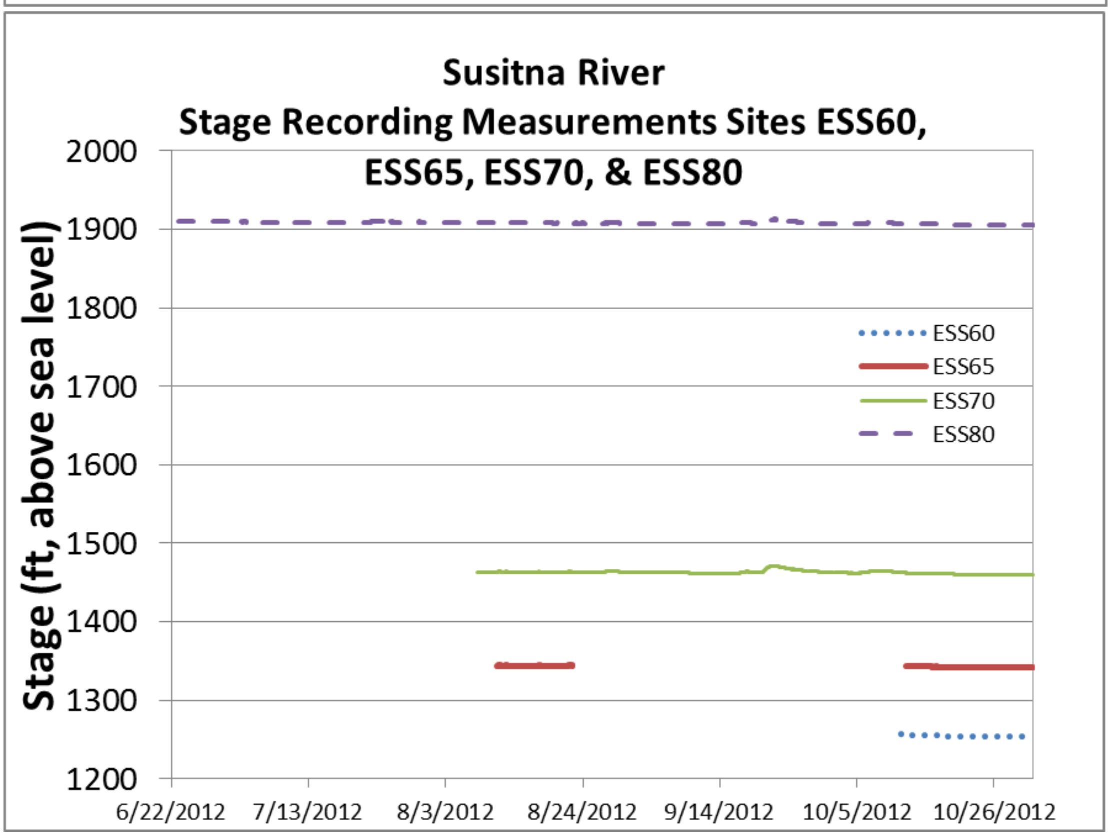


Figure 5.3-6. Stage readings for mainstem Susitna River sites ESS45-ESS80 for available data from June through October 2012. See Figure 4.4-1 for site locations.

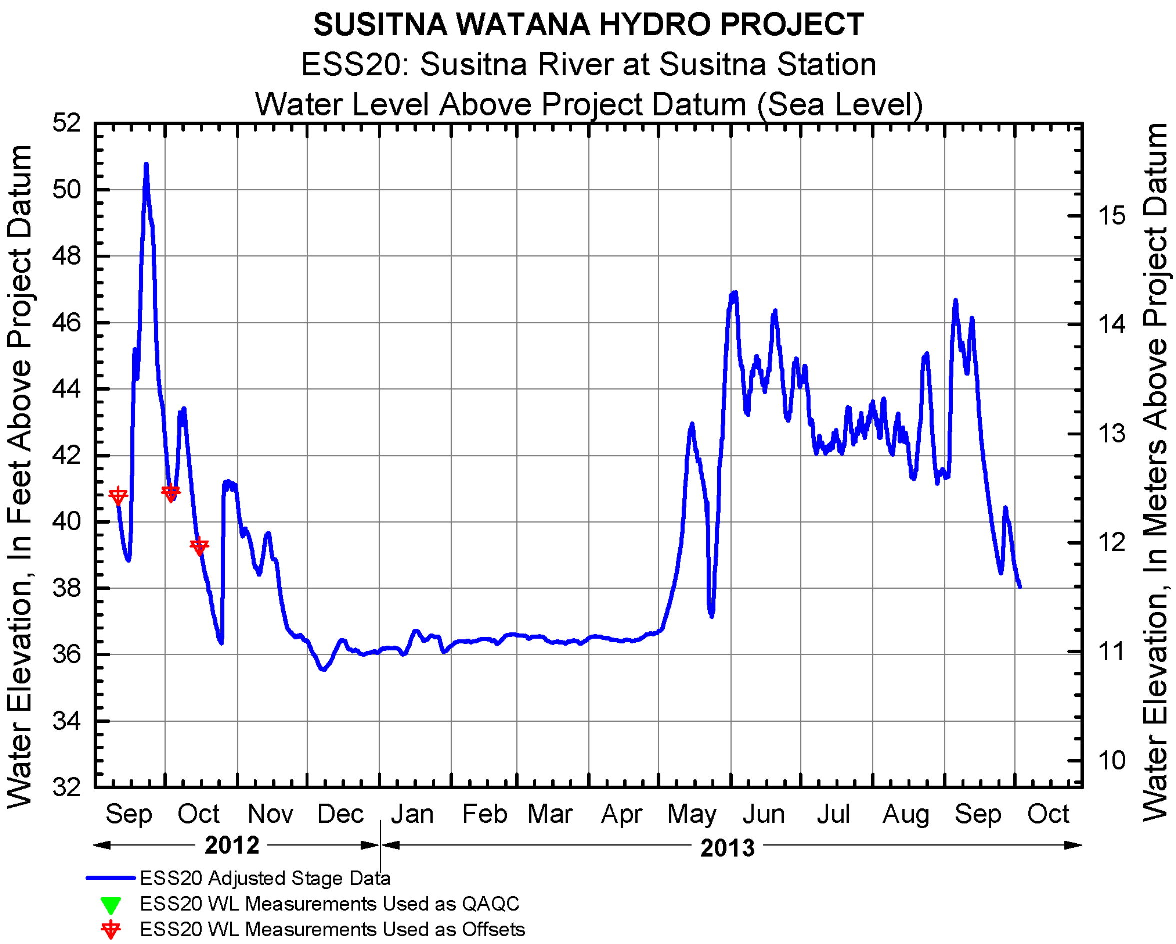


Figure 5.3-7. Example mainstem Susitna River data at station ESS20 for 2012 and 2013. See Figure 4.4-1 for site locations.

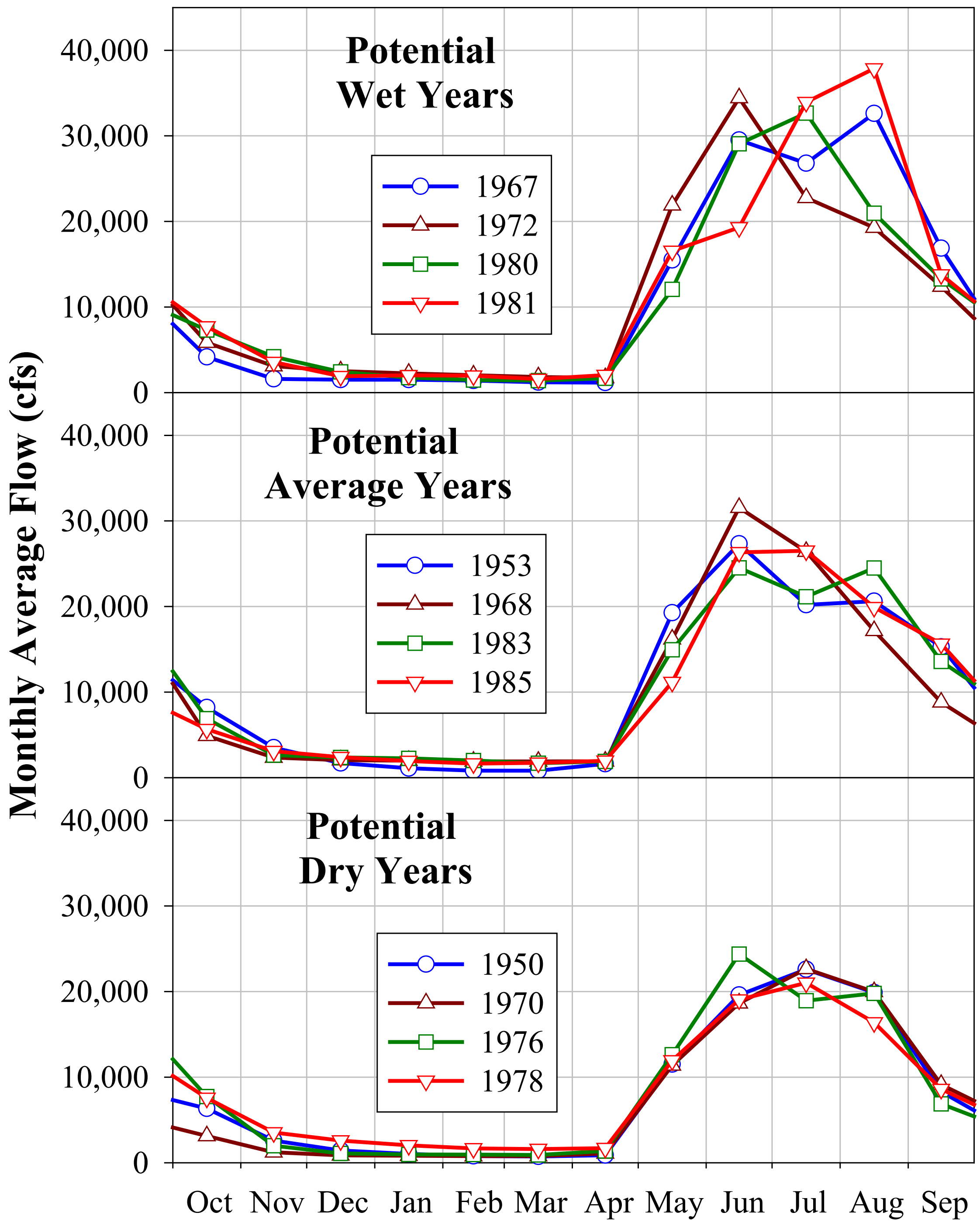


Figure 5.3-8. Monthly average flow for potential wet, average, and dry representative years using a linear scale.

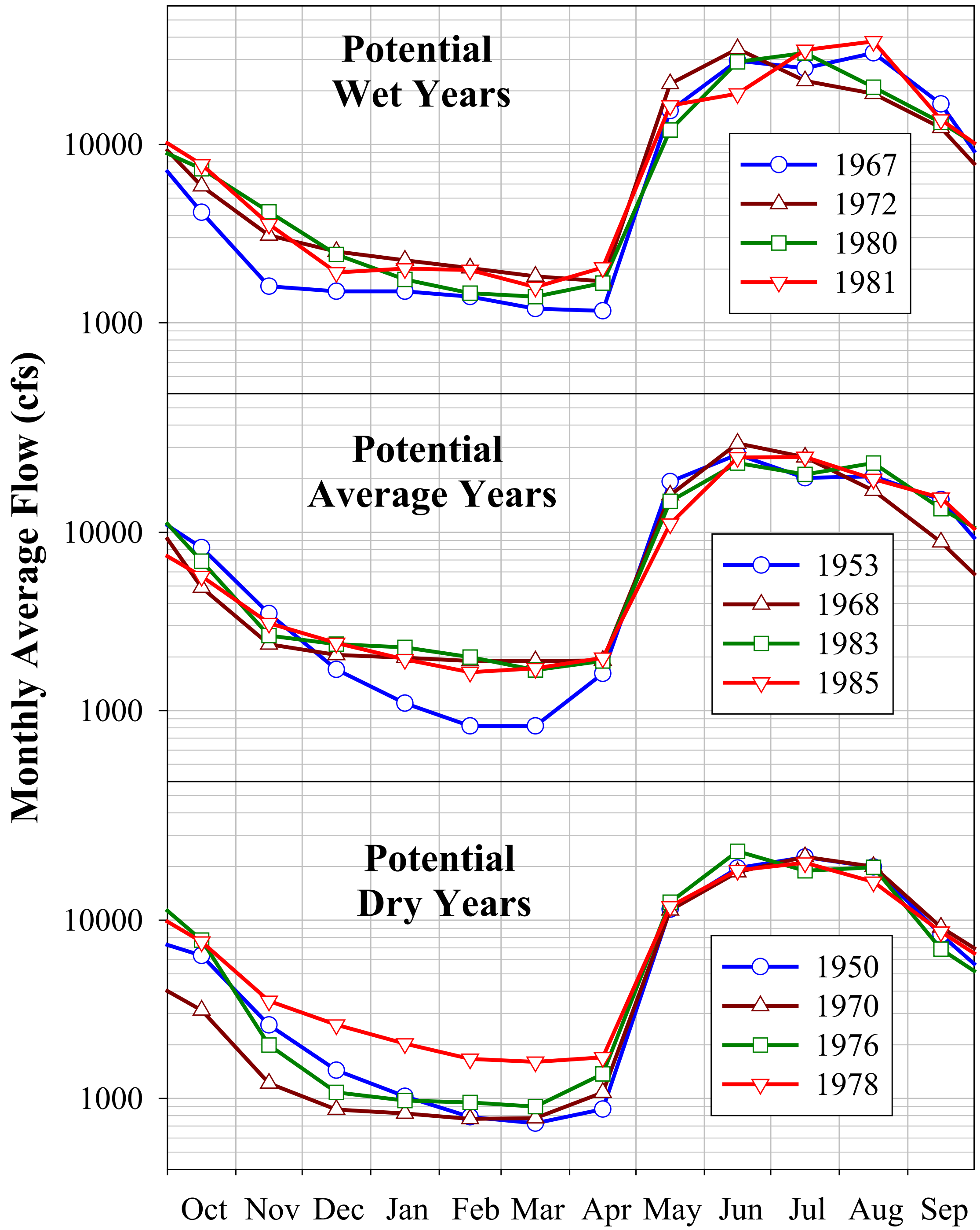


Figure 5.3-9. Monthly average flow for potential wet, average, and dry representative years using a log scale.

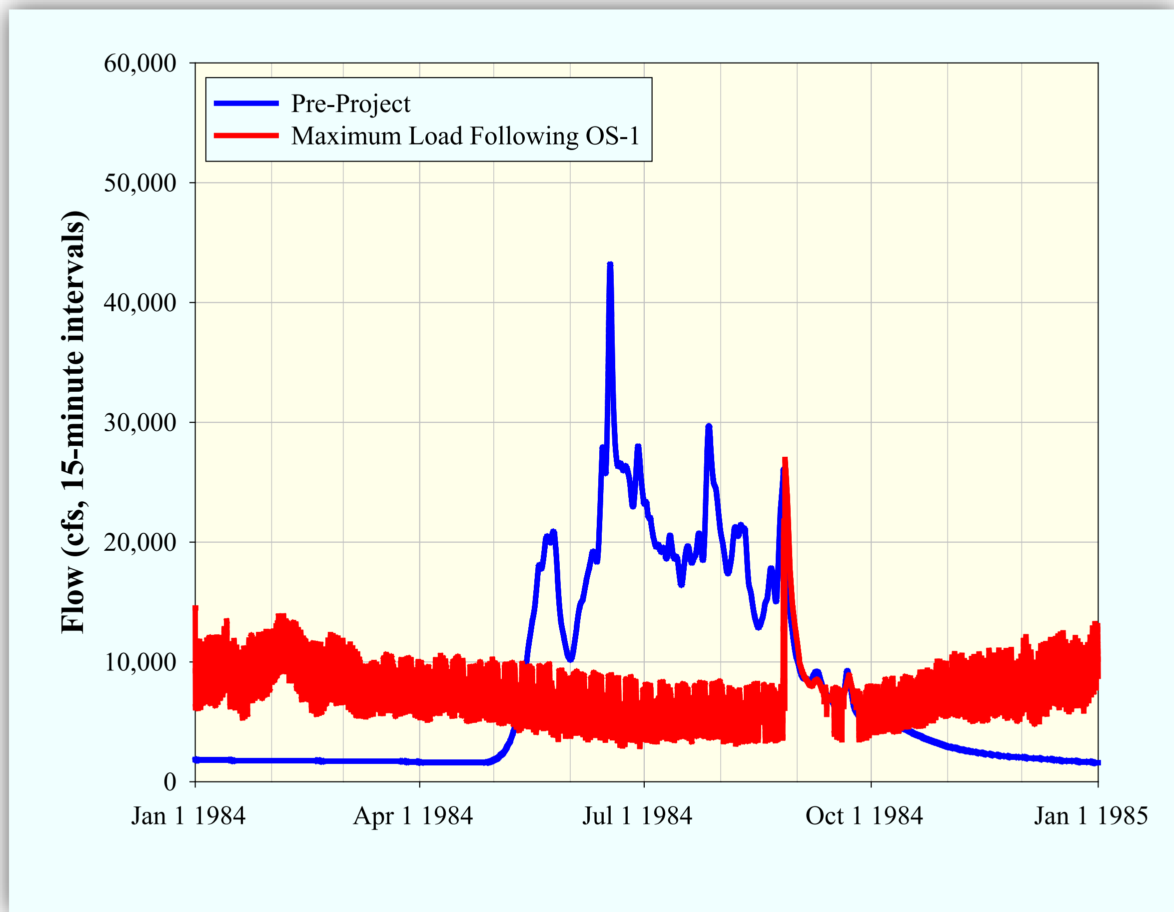


Figure 5.4-1. Flow releases from the proposed Watana Dam site, input to the flow routing model for the Pre-Project and Maximum Load Following OS-1 scenarios during calendar year 1984.

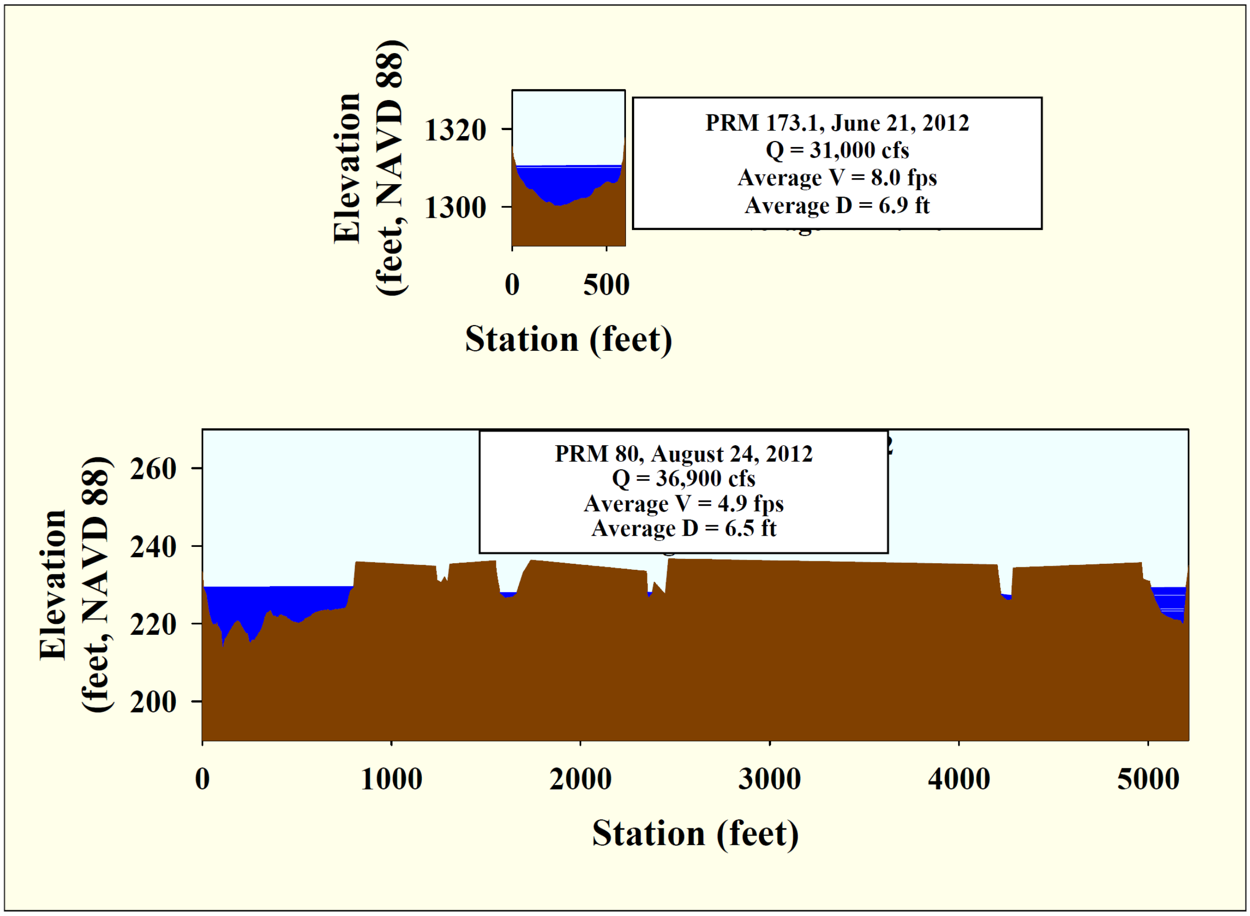


Figure 5.4-2. Examples of cross-sections established on the Susitna River in 2012 at PRM 173.1 on June 21, 2012 and PRM 80 on August 24, 2012.

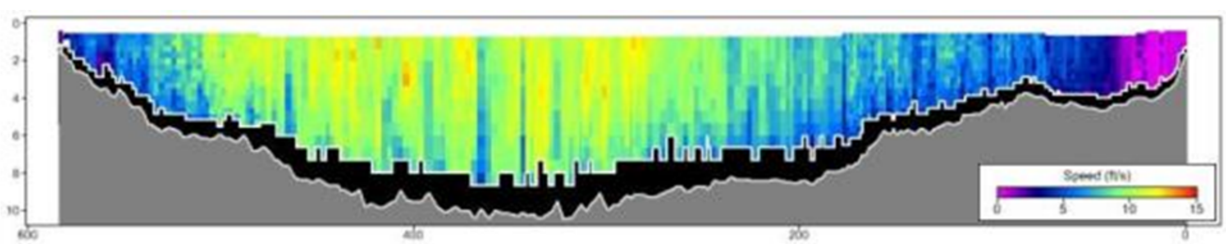


Figure 5.4-3. Output from ADCP from one pass across the Susitna River at PRM 173.1 on June 21, 2012.

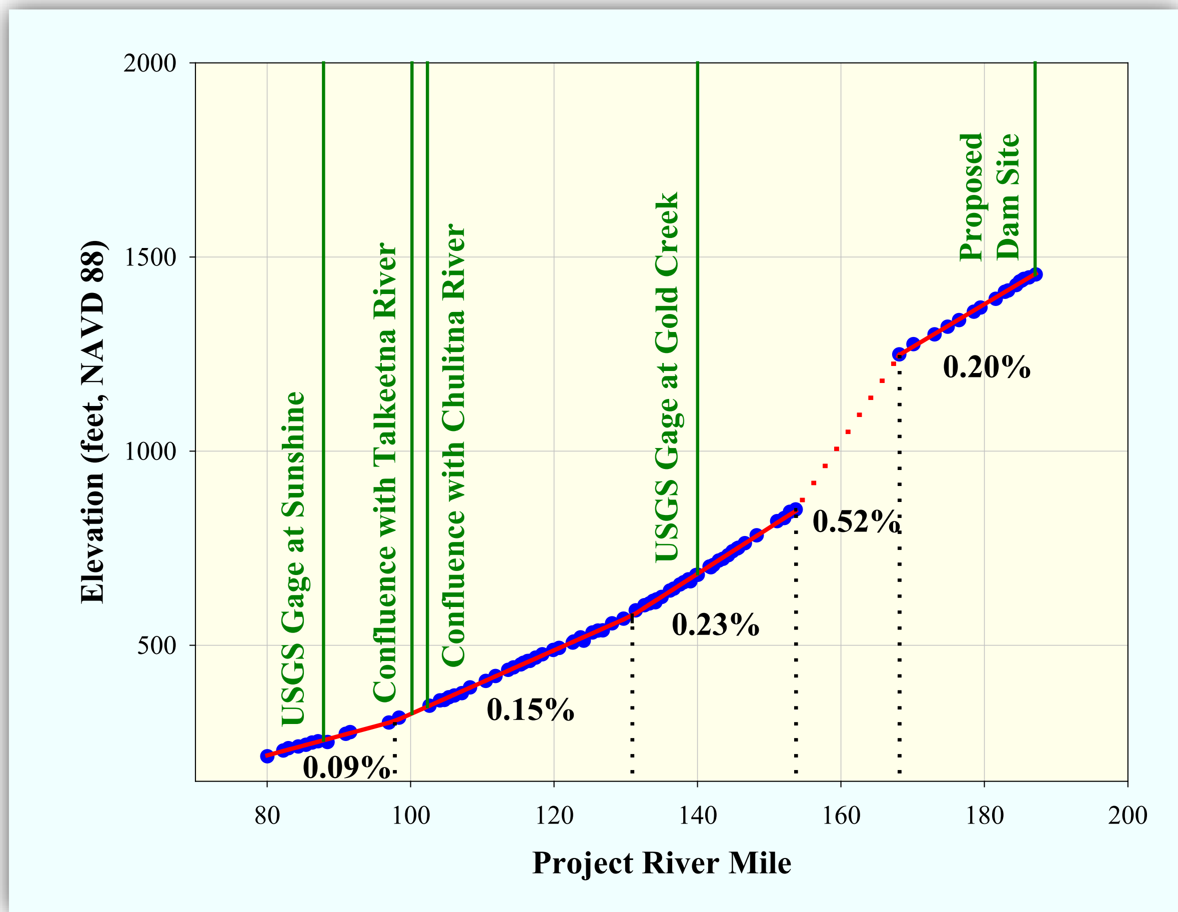


Figure 5.4-4. Longitudinal thalweg profile of the Susitna River extending from PRM 80.0 to PRM 187.2 (Devils Canon is represented by the dashed red line).

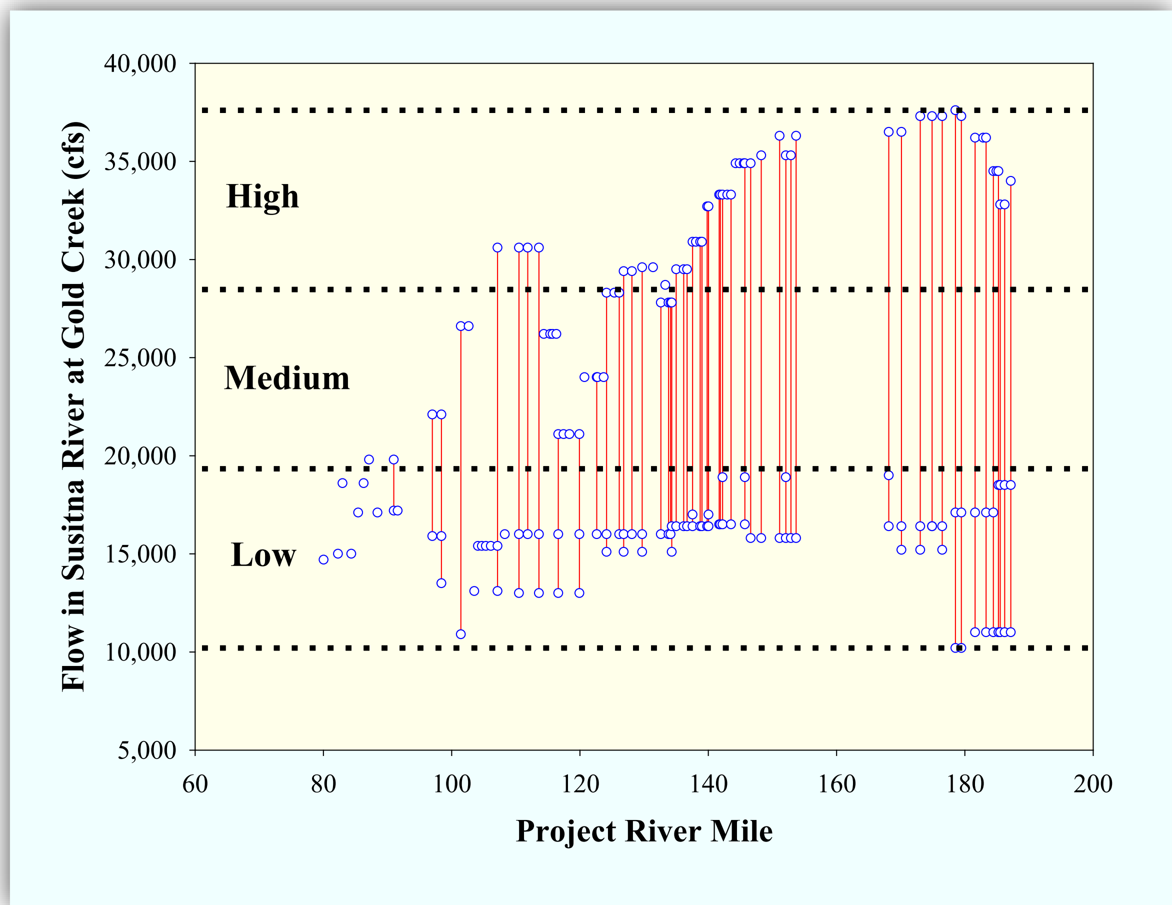


Figure 5.4-5. Locations of flow measurements in the Susitna River in 2012, and classification of flows as low, medium, or high based on concurrent measurements in the Susitna River at Gold Creek (USGS Gage No. 15292000).

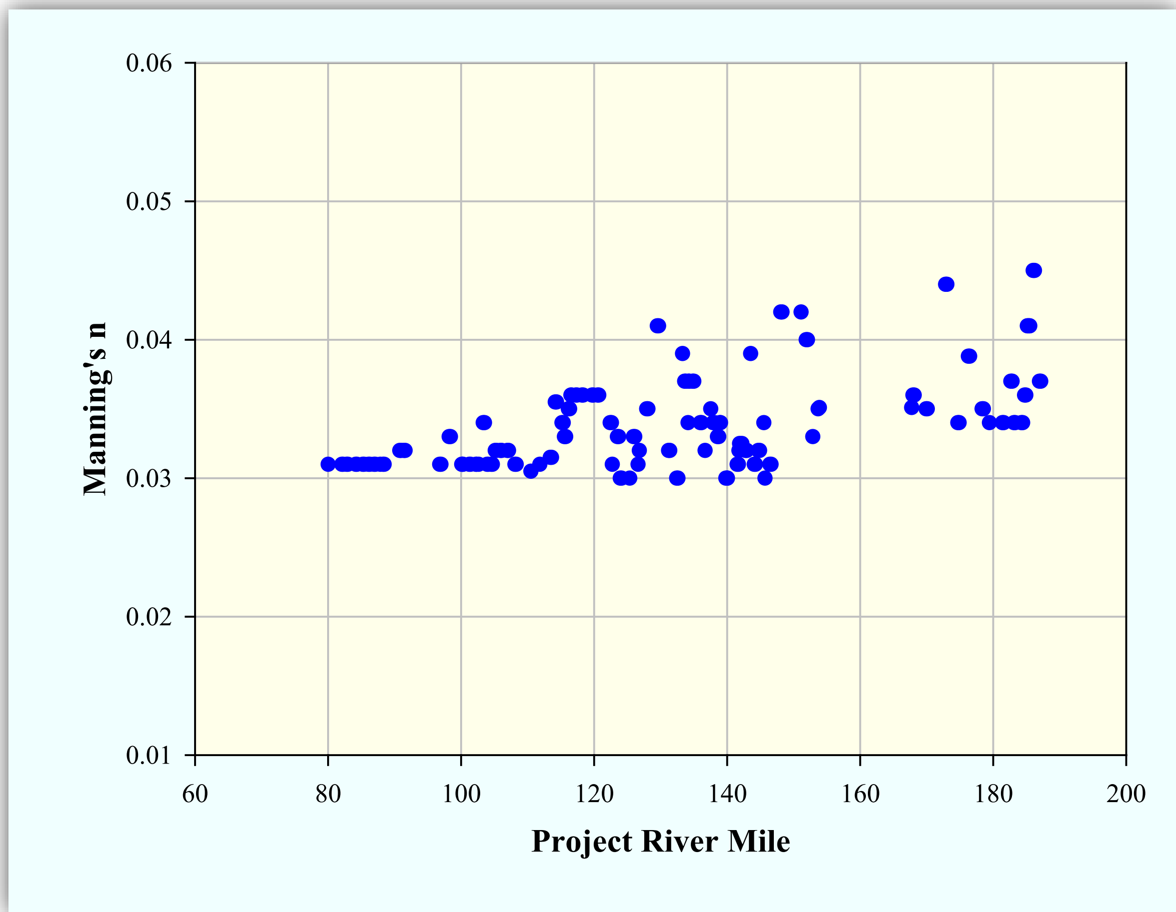


Figure 5.4-6. Manning's n channel roughness coefficients derived from steady-state calibration of flow routing model for 88 cross-sections of the Susitna River surveyed in 2012.

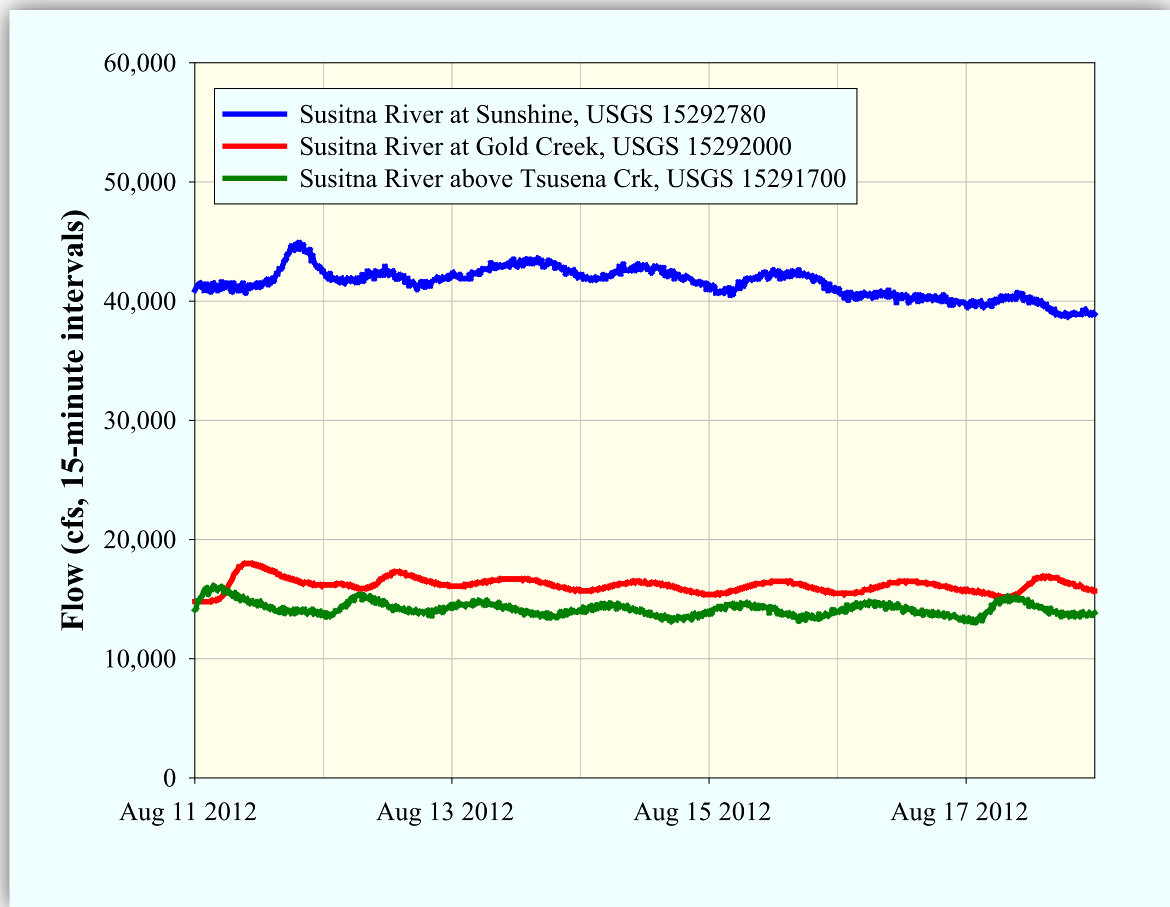


Figure 5.4-7. Flow hydrographs measured at 15-minute intervals by the U.S. Geological Survey in the Susitna River at Sunshine (Gage No. 15292780), at Gold Creek (Gage No. 15292000), and above Tsusena Creek (Gage No. 15291700) during the week of August 11 to 17, 2012, when there were diurnal pulses associated with glacial melt.

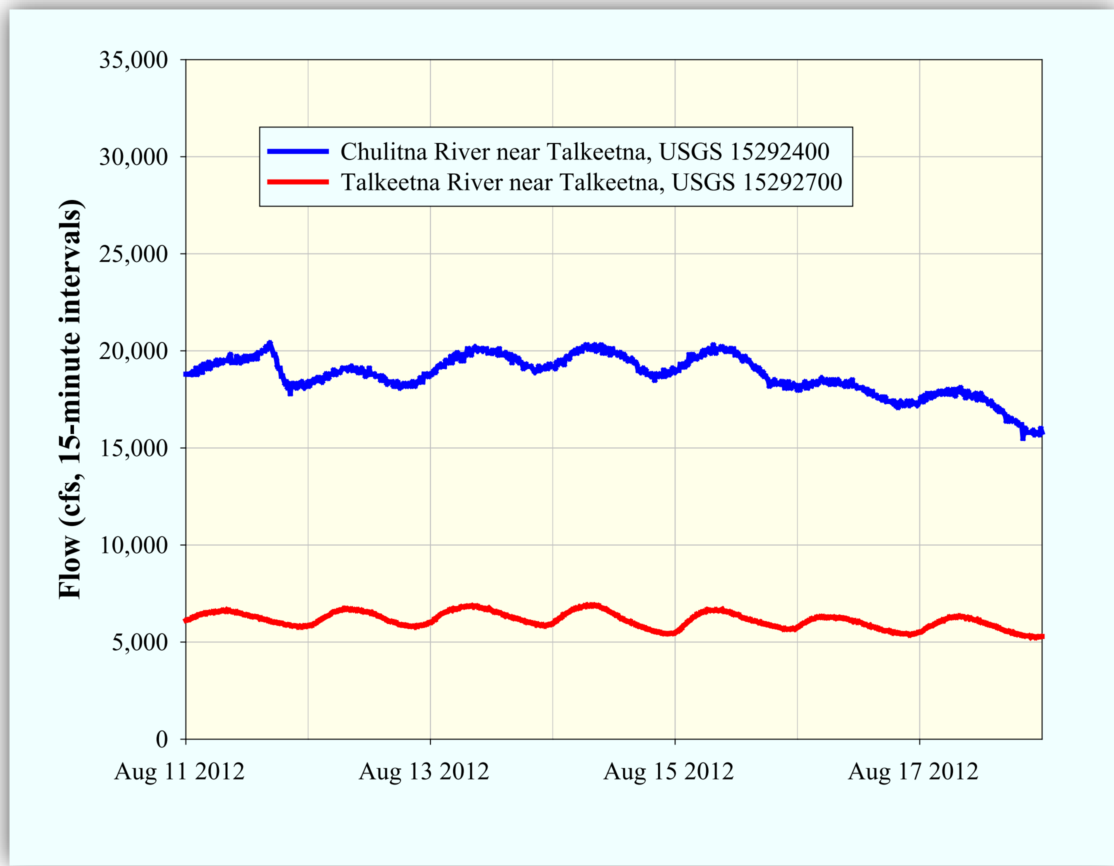


Figure 5.4-8. Flow hydrographs measured at 15-minute intervals by the U.S. Geological Survey in the Chulitna River near Talkeetna (Gage No. 15292400) and in the Talkeetna River near Talkeetna (Gage No. 15292700) during the week of August 11 to 17, 2012, when there were diurnal pulses associated with glacial melt.

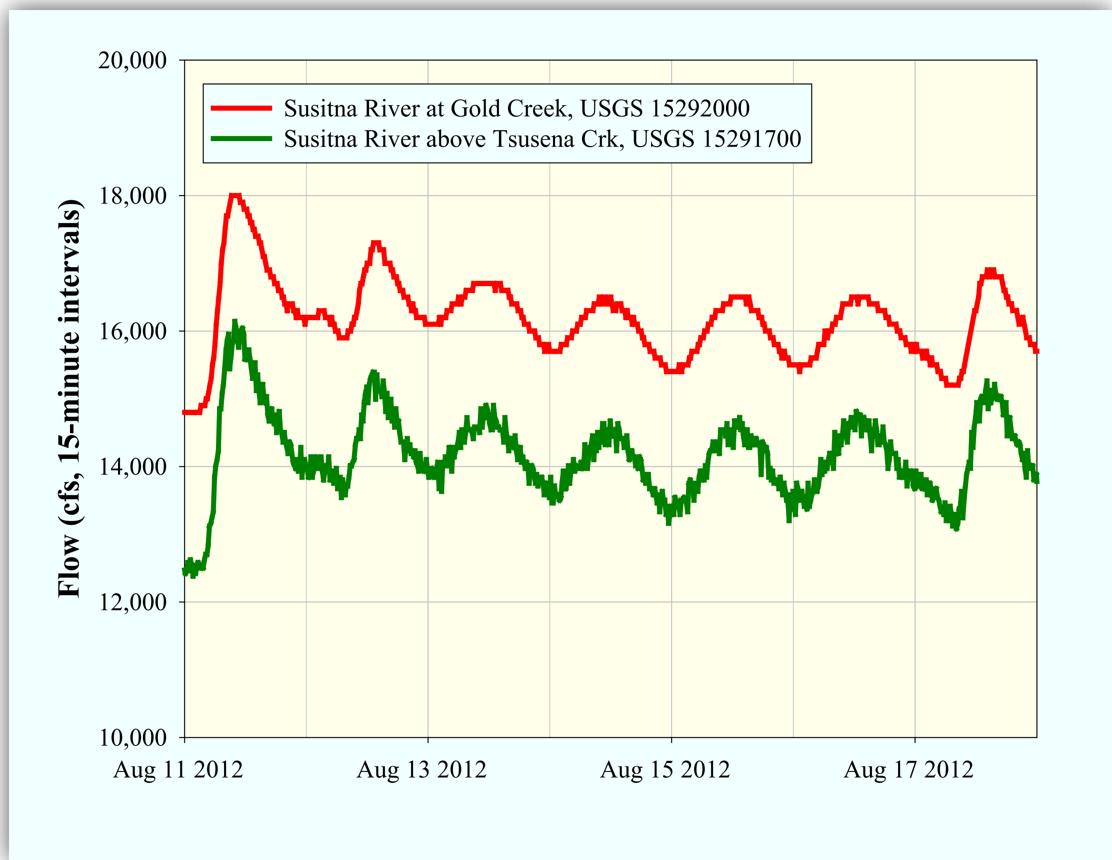


Figure 5.4-9. Flow hydrographs measured at 15-minute intervals by the U.S. Geological Survey in the Susitna River at Gold Creek (Gage No. 15292000) and above Tsusena Creek (Gage No. 15291700, shifted forward by 6.4 hours) during the week of August 11 to 17, 2012.

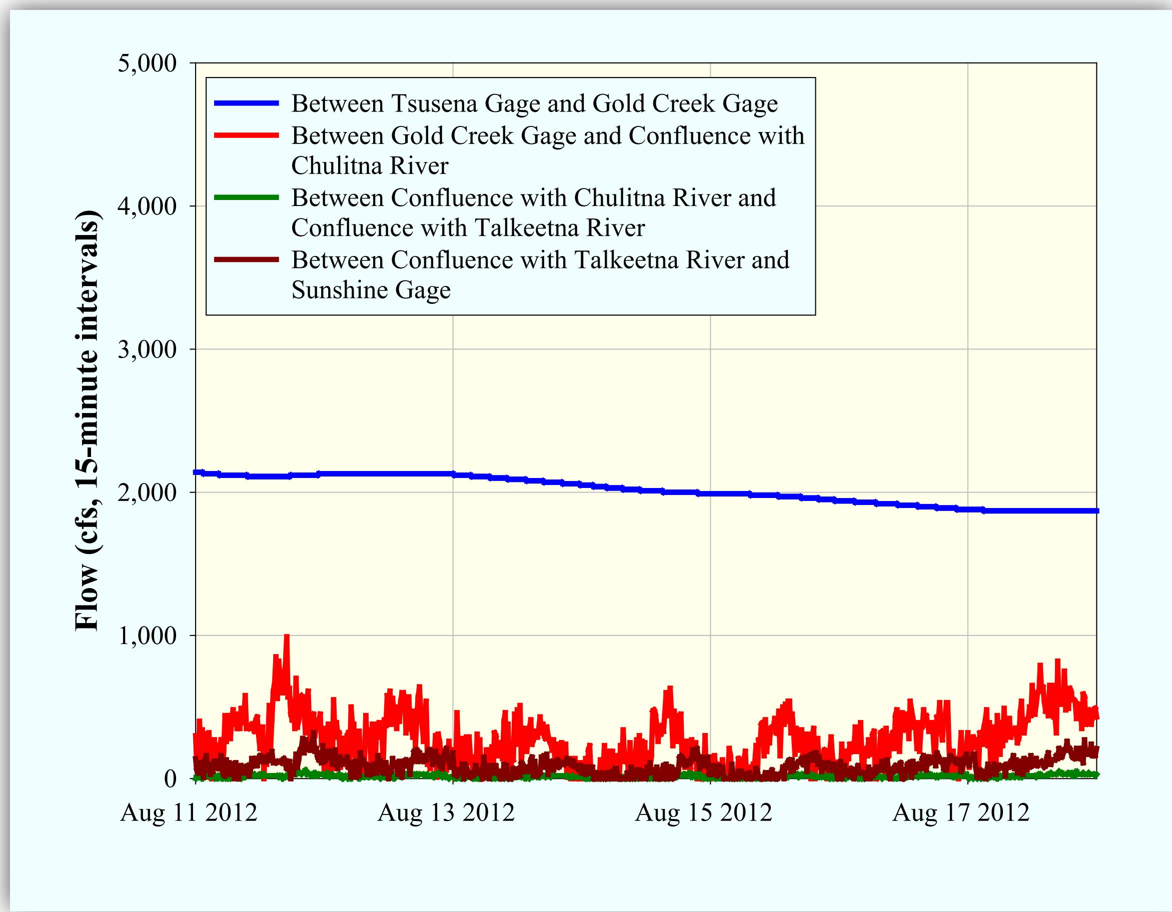


Figure 5.4-10. Ungaged lateral inflow hydrographs at 15-minute intervals to the Susitna River to four reaches between Tsusena Gage and Sunshine Gage, August 11 to 17, 2012.

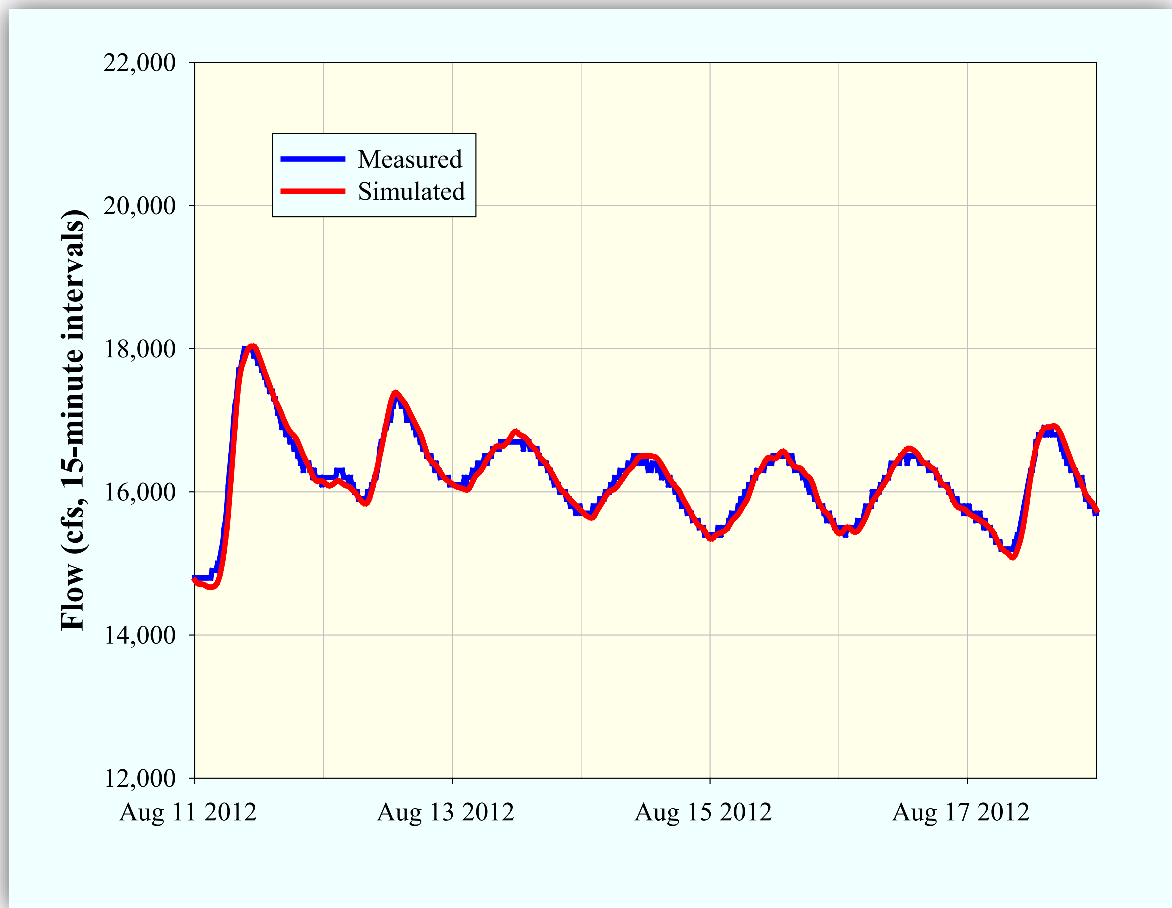


Figure 5.4-11. Comparison of measured versus simulated flow hydrographs in the Susitna River at Gold Creek (USGS Gage No. 15292000) during the period from August 11 to August 17, 2012, when there were distinct diurnal flow fluctuations associated with glacial melt.

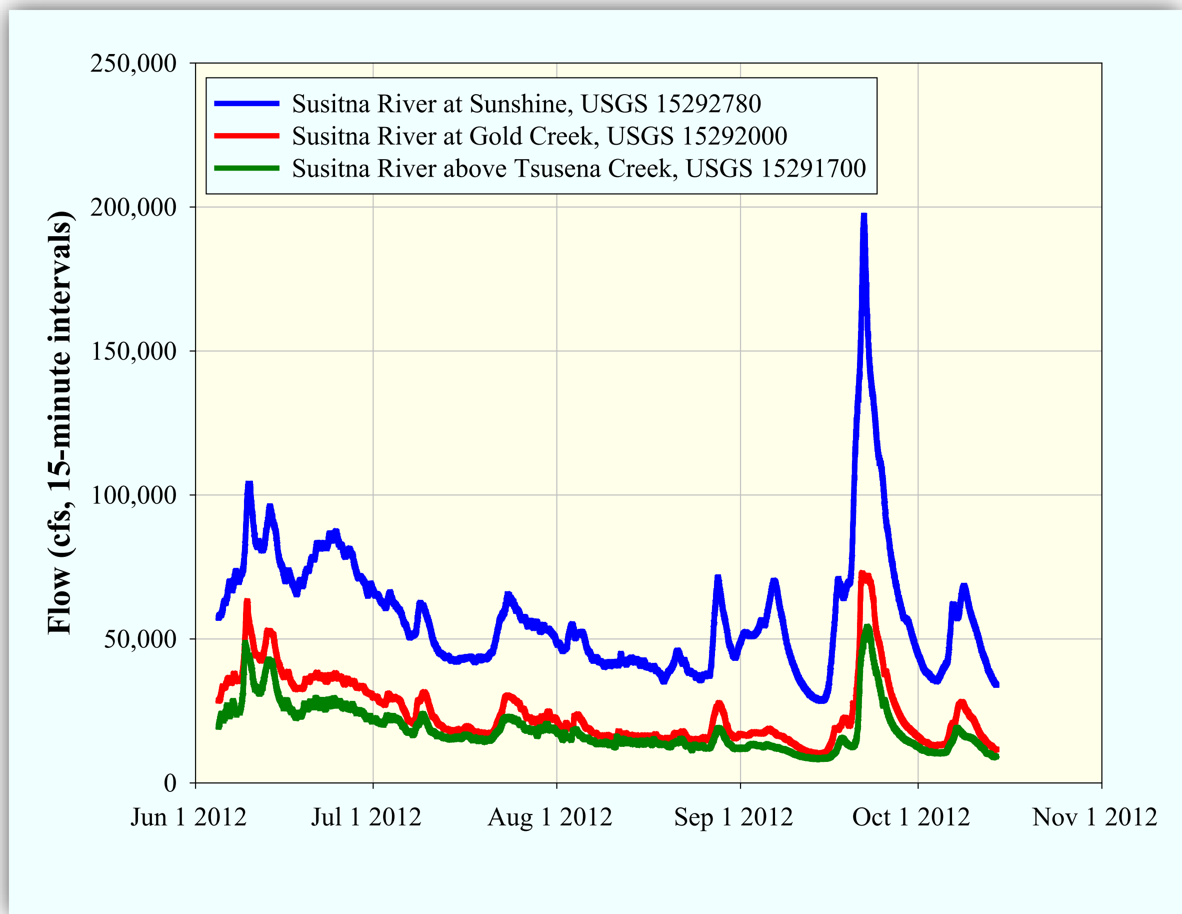


Figure 5.4-12. Flow hydrographs measured at 15-minute intervals by the U.S. Geological Survey in the Susitna River at Sunshine (Gage 15292780), at Gold Creek (Gage 15292000), and above Tsusena Creek (USGS 15291700) during the period from June 4 to October 14, 2012.

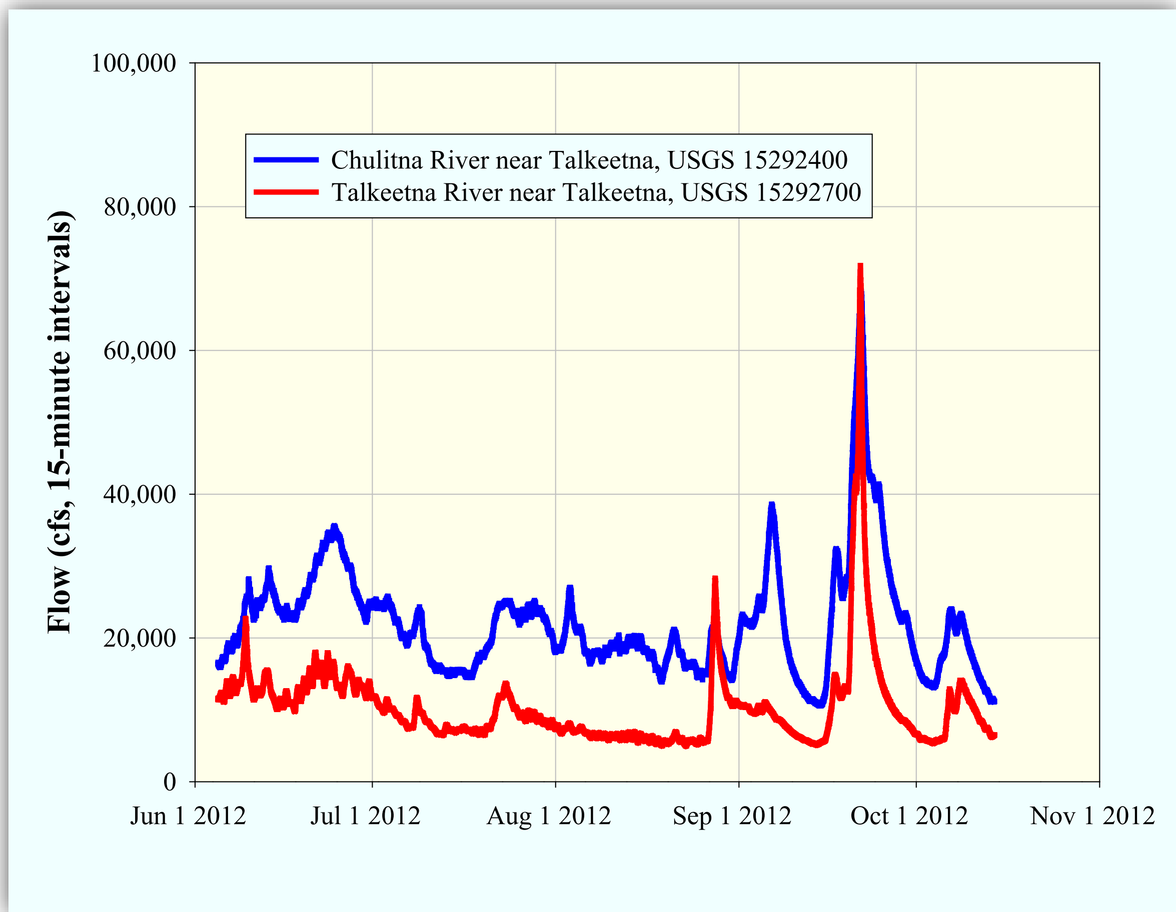


Figure 5.4-13. Flow hydrographs measured at 15-minute intervals by the U.S. Geological Survey in the Chulitna River near Talkeetna (Gage No. 15292400) and in the Talkeetna River near Talkeetna (Gage No. 15292700) during the period from June 4 to October 14, 2012.

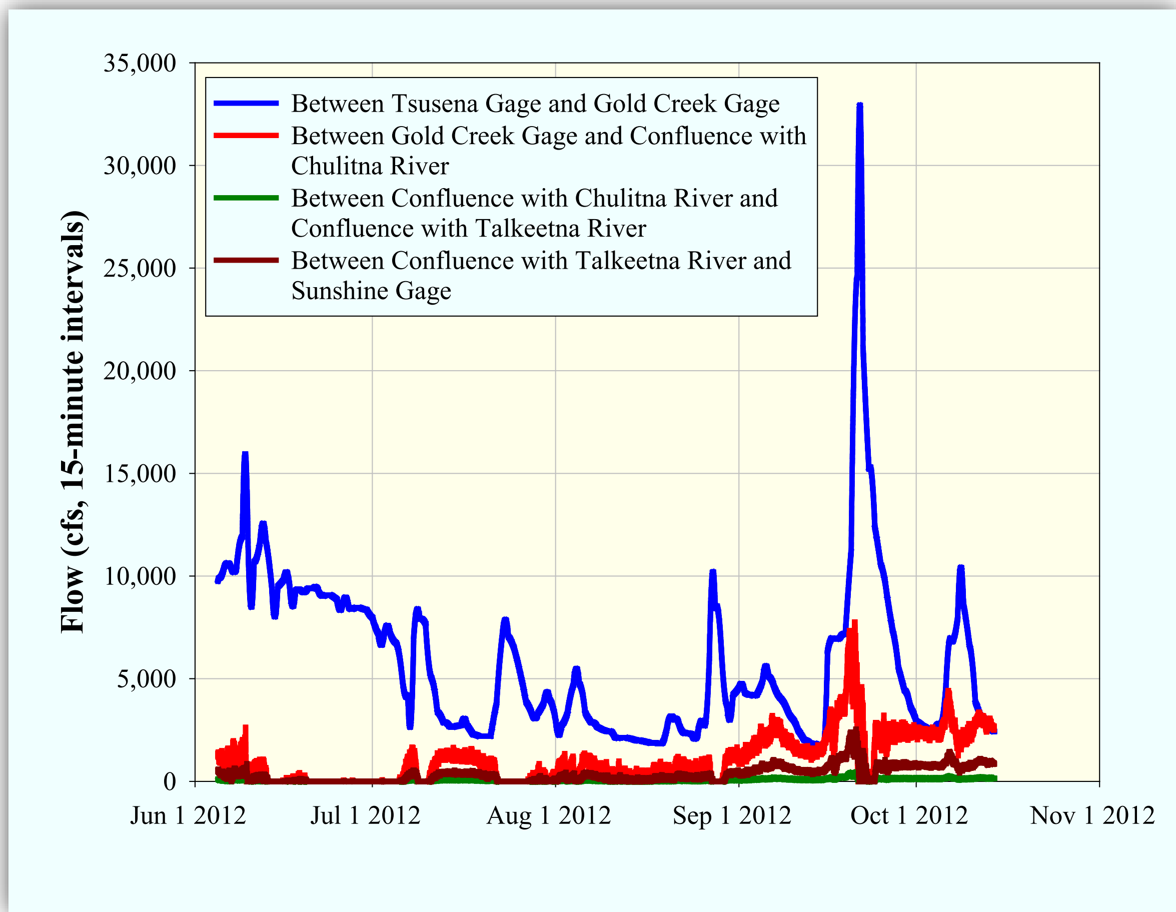


Figure 5.4-14. Ungaged lateral inflow hydrographs at 15-minute intervals to the Susitna River to four reaches between Tsusena Gage and Sunshine Gage during the period from June 4 to October 14, 2012.

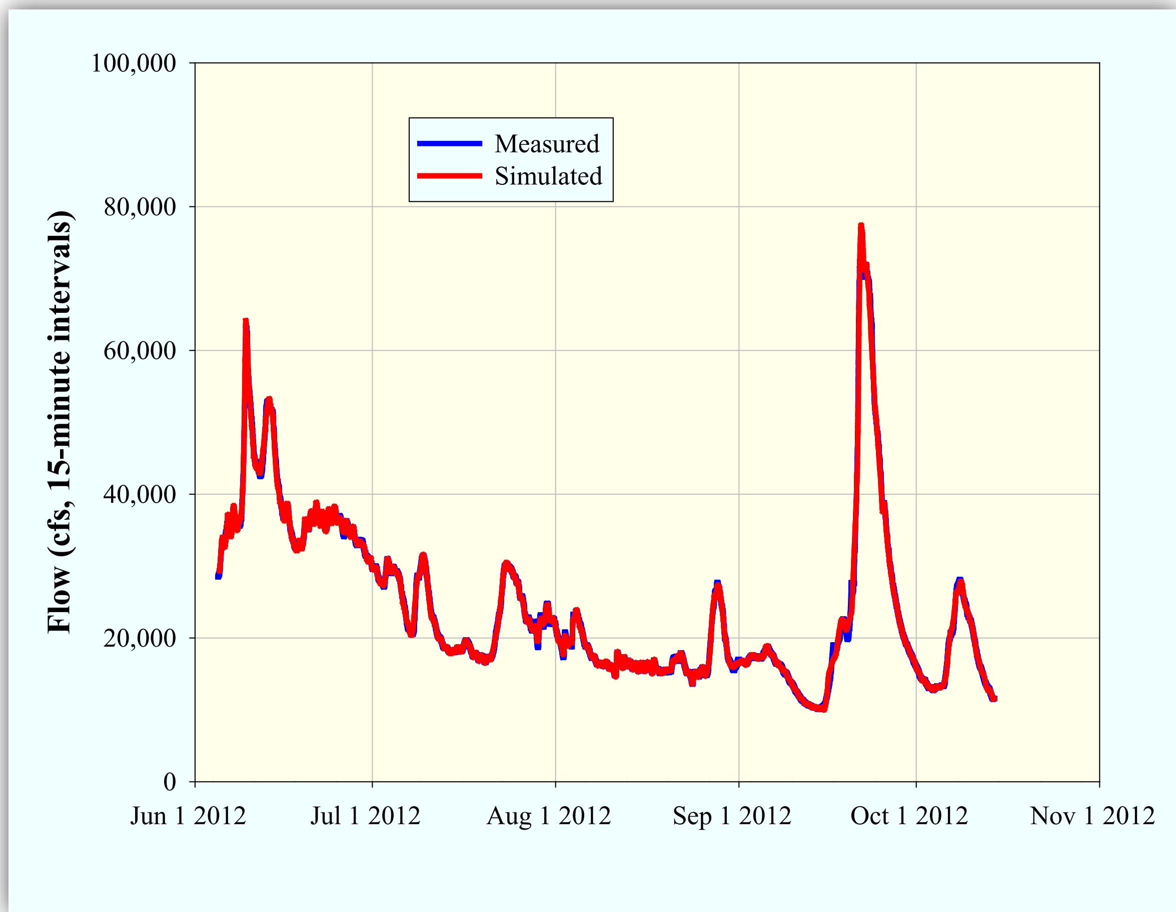


Figure 5.4-15. Comparison of measured versus simulated flow hydrographs in the Susitna River at Gold Creek (USGS Gage No. 15292000) during the period from June 4 to October 14, 2012.

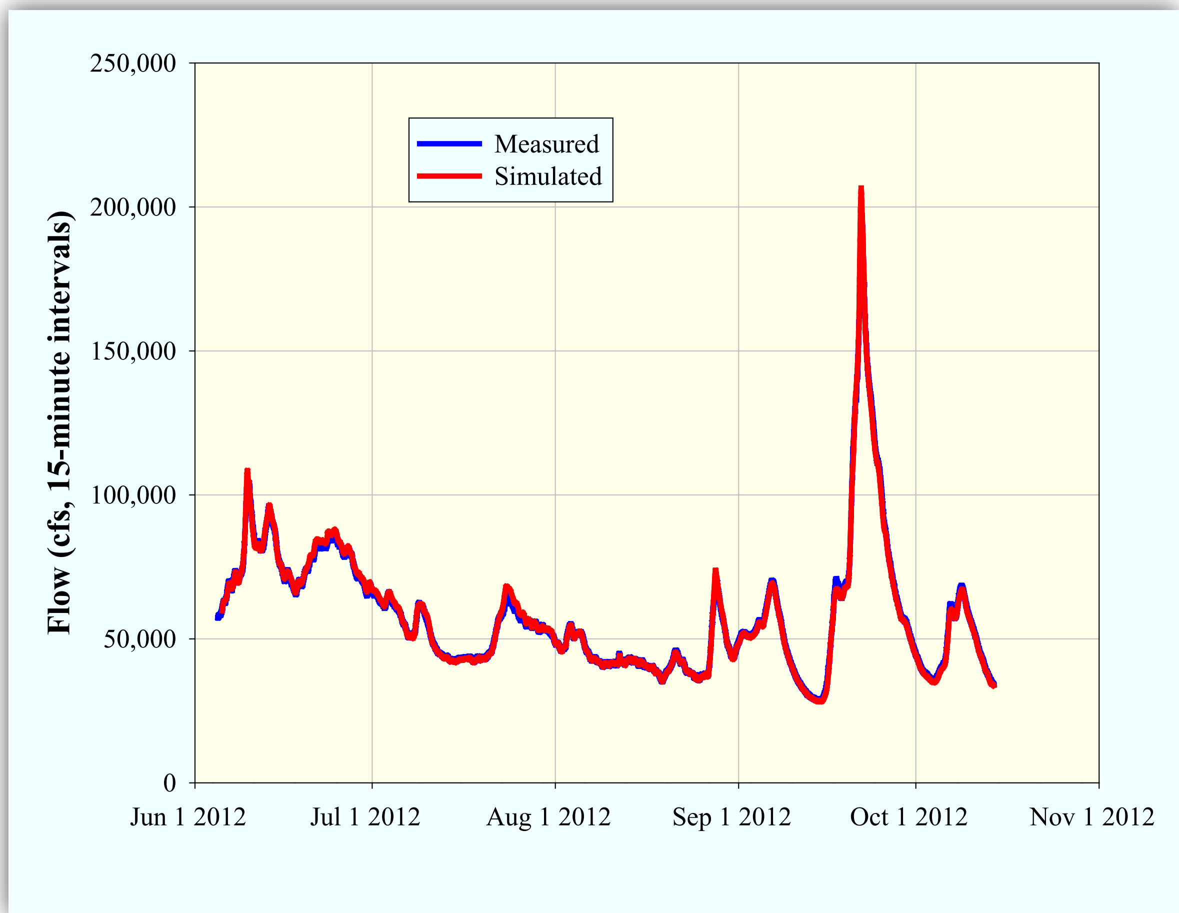


Figure 5.4-16. Comparison of measured versus simulated flow hydrographs in the Susitna River at Sunshine (USGS Gage No. 15292780) during the period from June 4 to October 14, 2012.

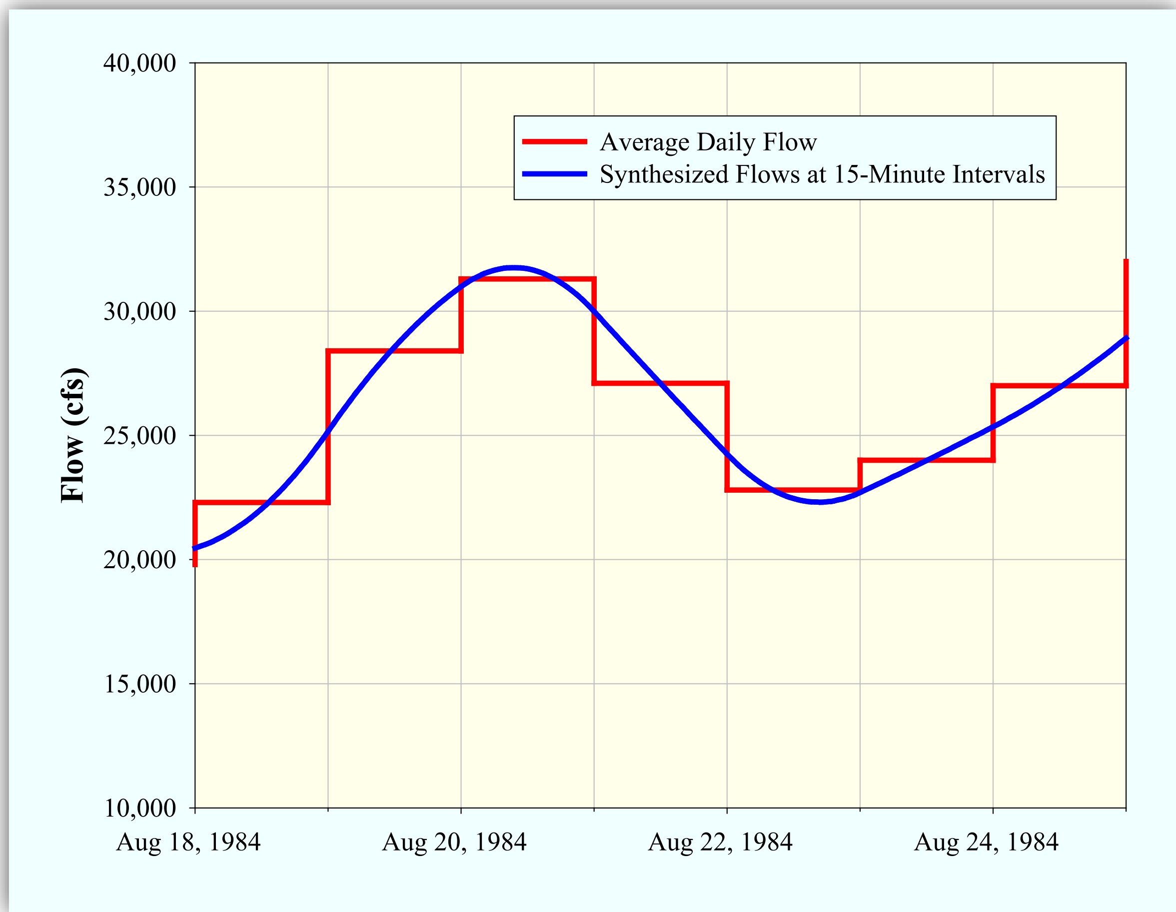


Figure 5.4-17. Illustration of 15-minute flow hydrograph, synthesized from available daily flows. The synthesized 15-minute flow hydrograph does not account for potential diurnal variation associated with glacial melt.

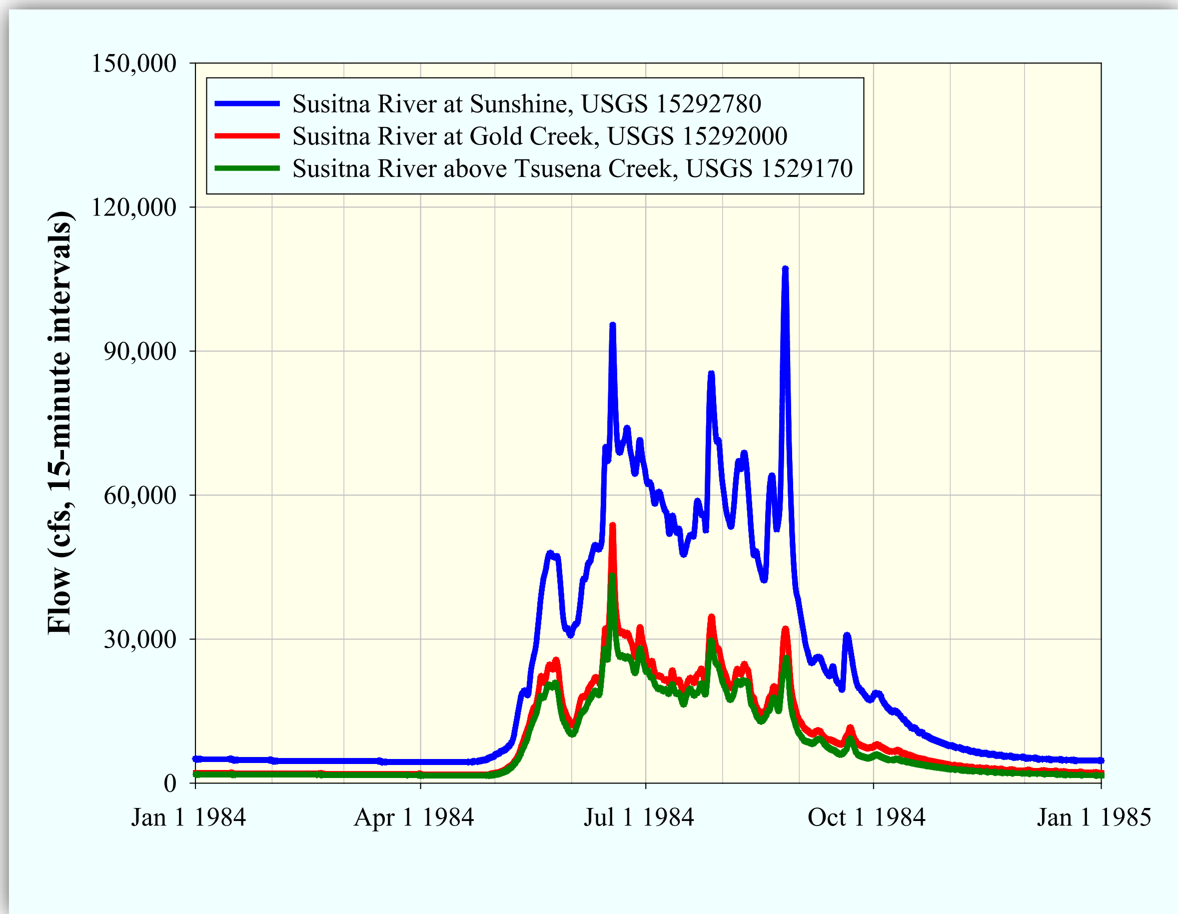


Figure 5.4-18. Flow hydrographs synthesized at 15-minute intervals from daily flows reported by the U.S. Geological Survey in the Susitna River at Sunshine (Gage No. 15292780), at Gold Creek (Gage No. 15292000), and above Tsusena Creek (Gage No. 15291700) during calendar year 1984.

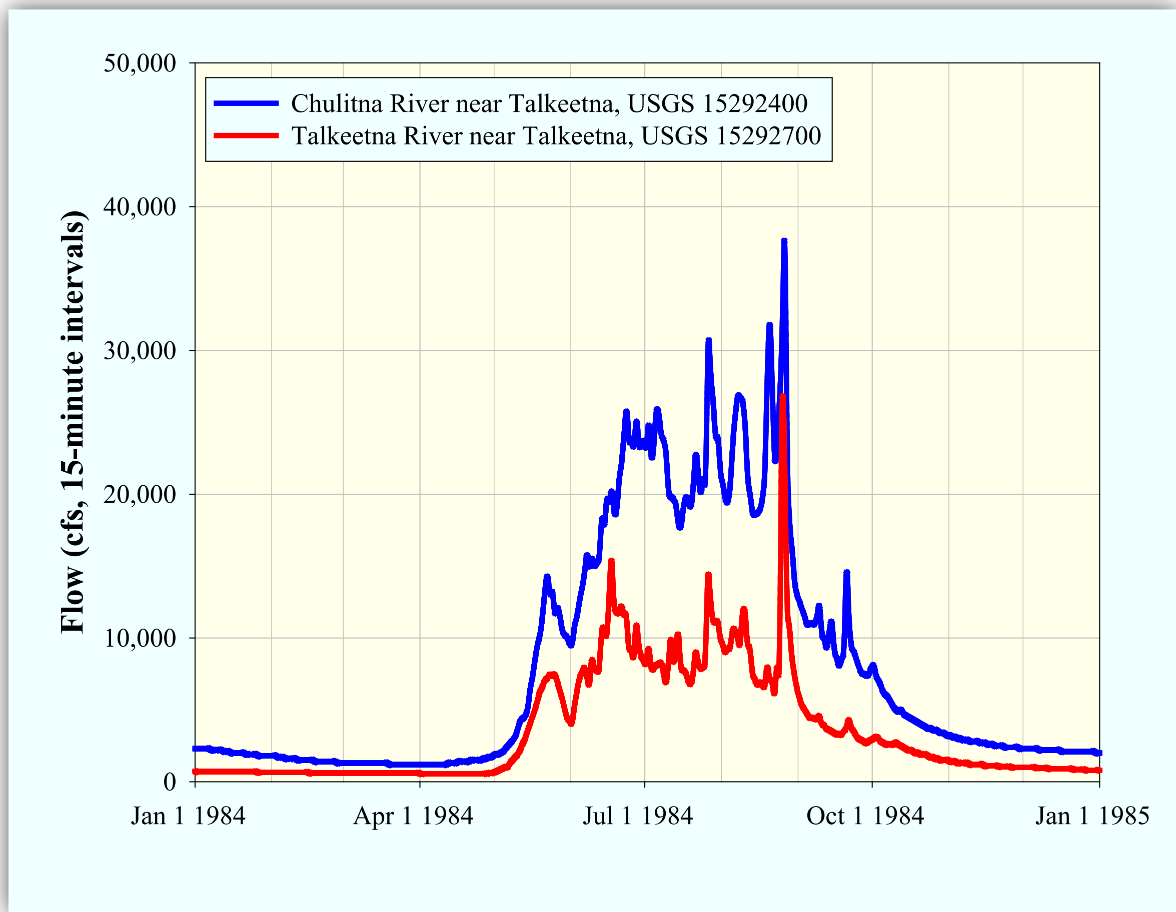


Figure 5.4-19. Flow hydrographs synthesized at 15-minute intervals from daily flows reported by the U.S. Geological Survey in the Chulitna River near Talkeetna (Gage No. 15292400) and in the Talkeetna River near Talkeetna (Gage No. 15292700) during calendar year 1984.

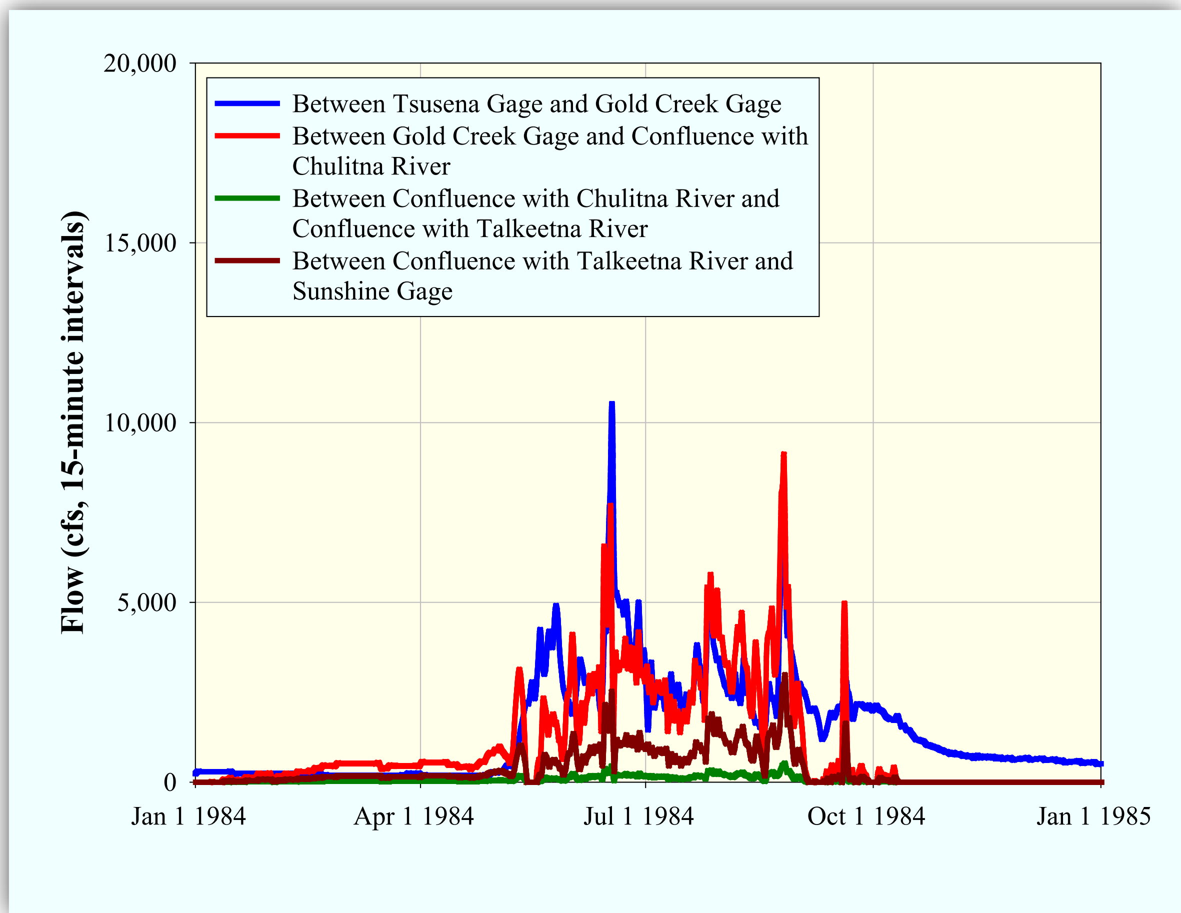


Figure 5.4-20. Ungaged lateral inflow hydrographs at 15-minute intervals to the Susitna River to four reaches between Tsusena Gage (15291700) and Sunshine Gage (15292780) during calendar year 1984.

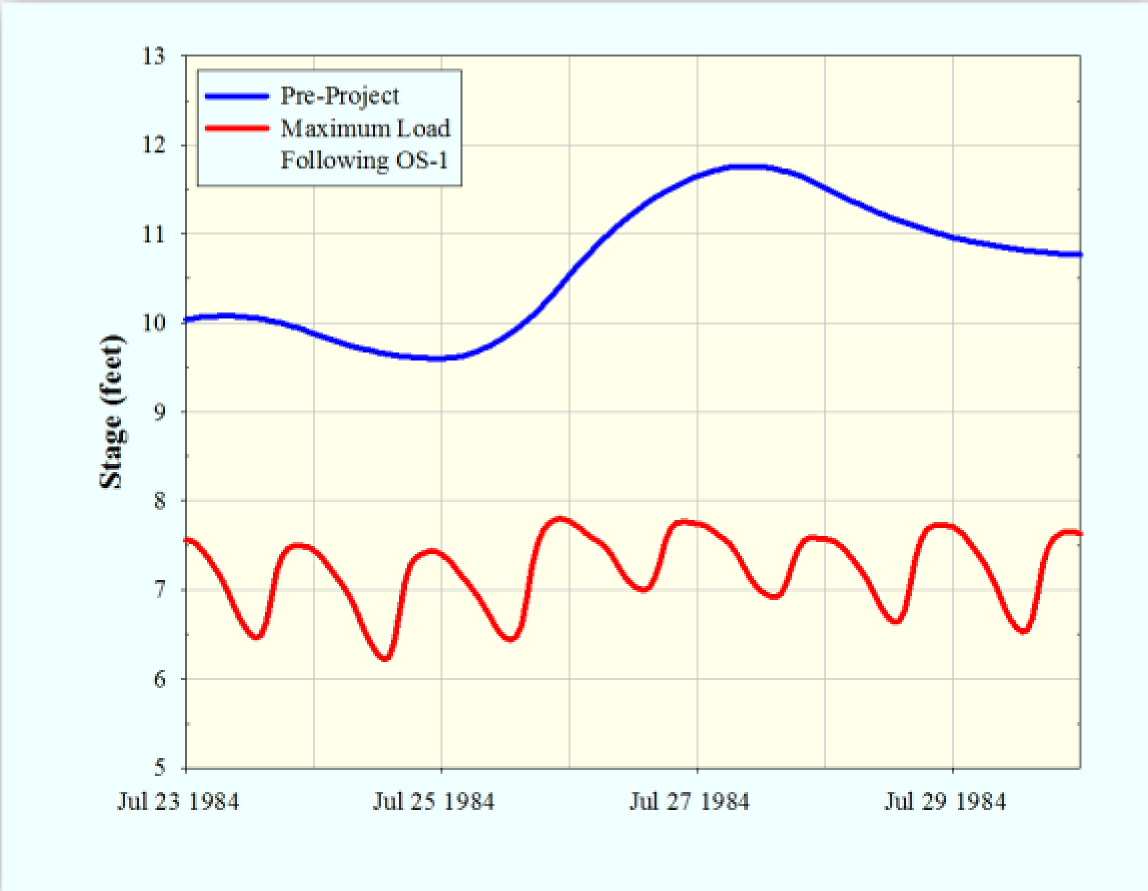


Figure 5.4-21. Predicted stage hydrographs in the Susitna River at Gold Creek (USGS Gage No. 15292000) under Pre-Project and Maximum Load Following OS-1 conditions during the week of July 23 to July 29, 1984. Pre-Project conditions do not account for potential diurnal fluctuations associated with glacial melt.

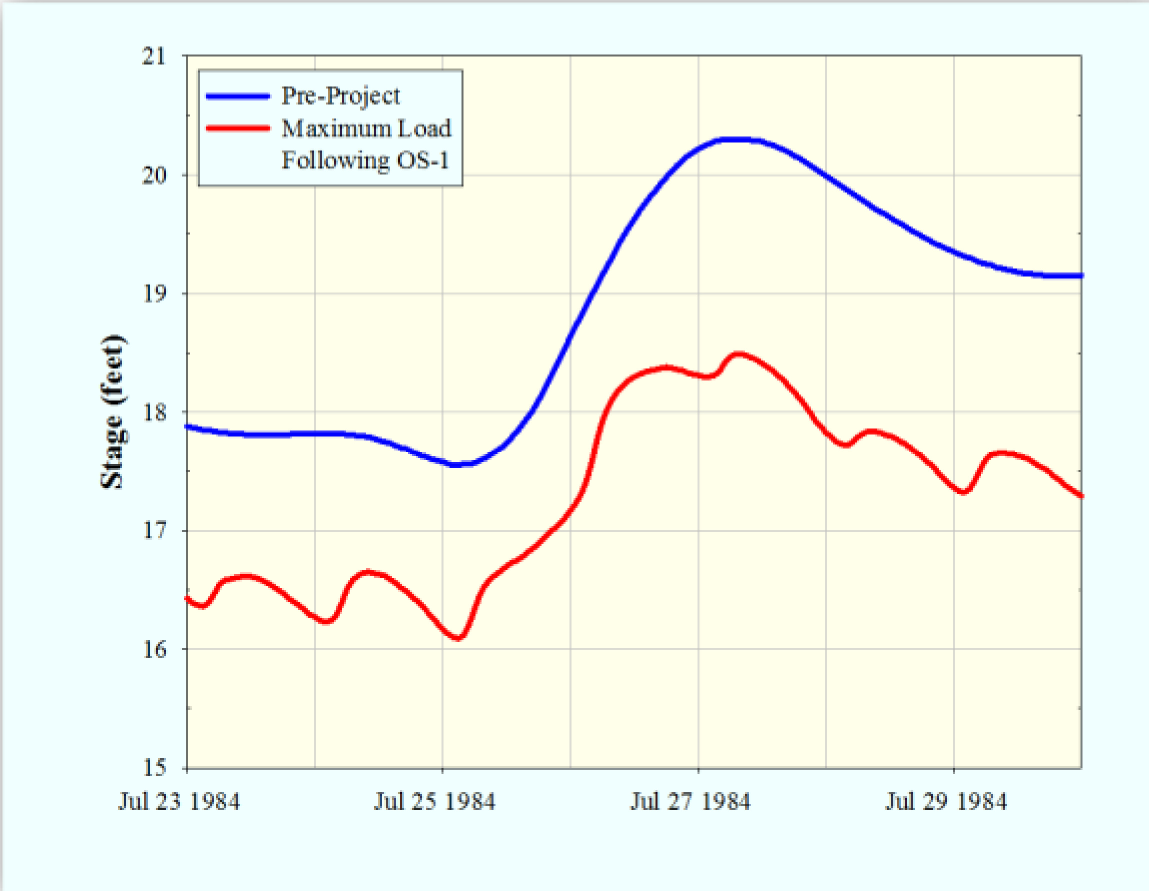


Figure 5.4-22. Predicted stage hydrographs in the Susitna River at Sunshine (USGS Gage No. 15292780) under Pre-Project and Maximum Load Following OS-1 conditions during the week of July 23 to July 29, 1984. Pre-Project conditions do not account for potential diurnal fluctuations associated with glacial melt.

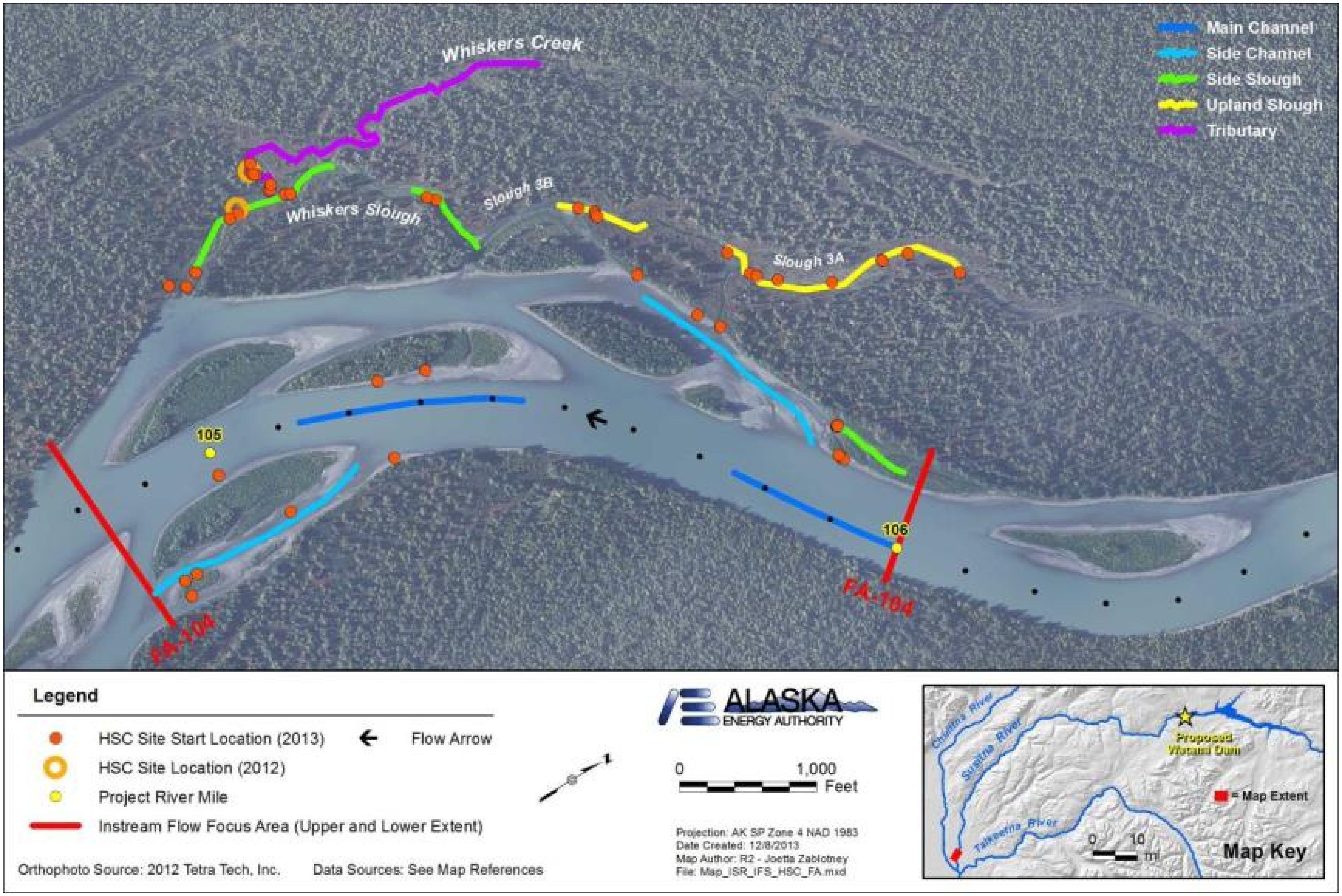


Figure 5.5-1. Map showing FA-104 (Whiskers Slough) with randomly selected habitat segments and the location of each 2013 HSC sampling event within the Middle Segment of the Susitna River, Alaska.

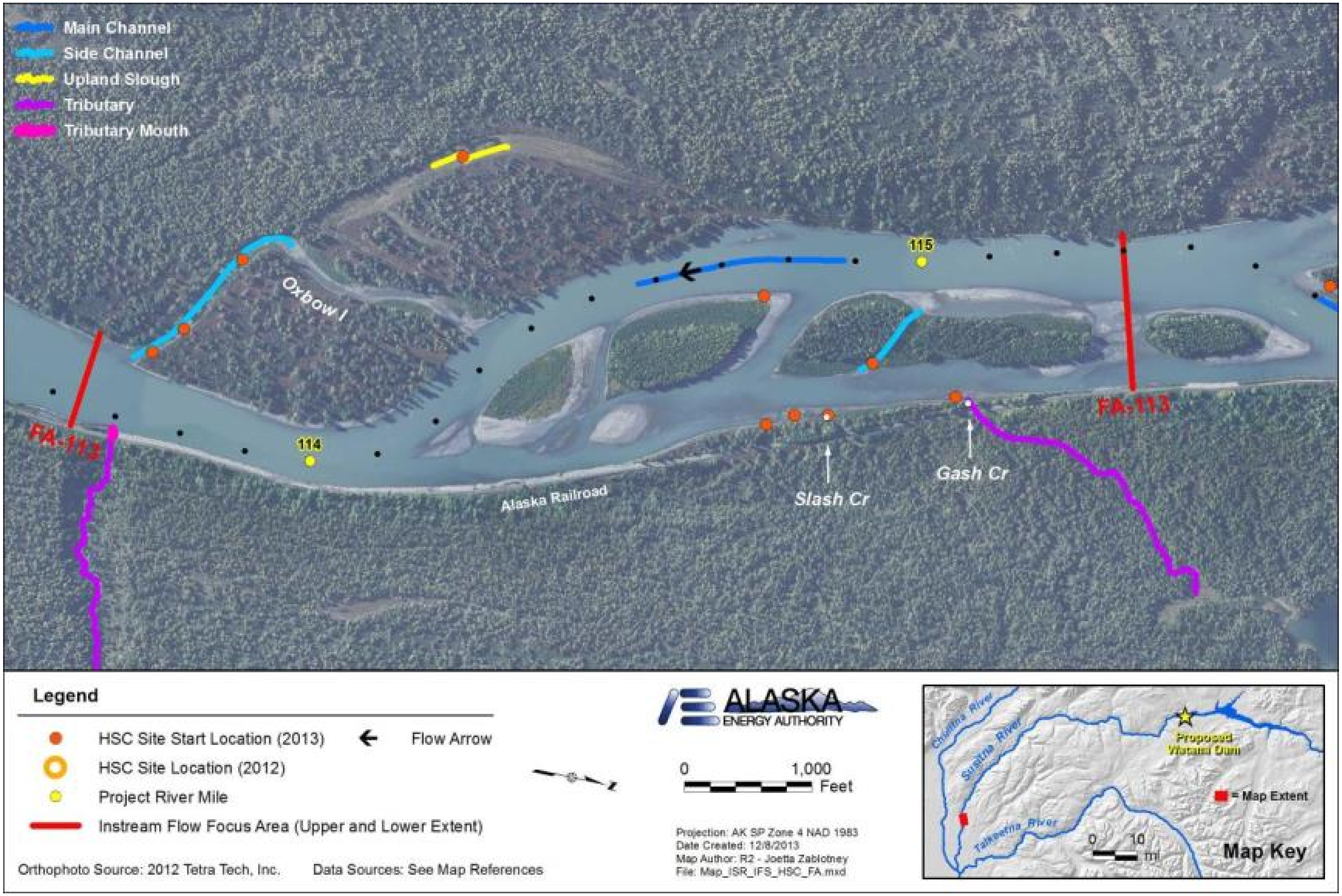


Figure 5.5-2. Map showing FA-113 (Oxbow I) with randomly selected habitat segments and the location of each 2013 HSC sampling event within the Middle Segment of the Susitna River, Alaska.

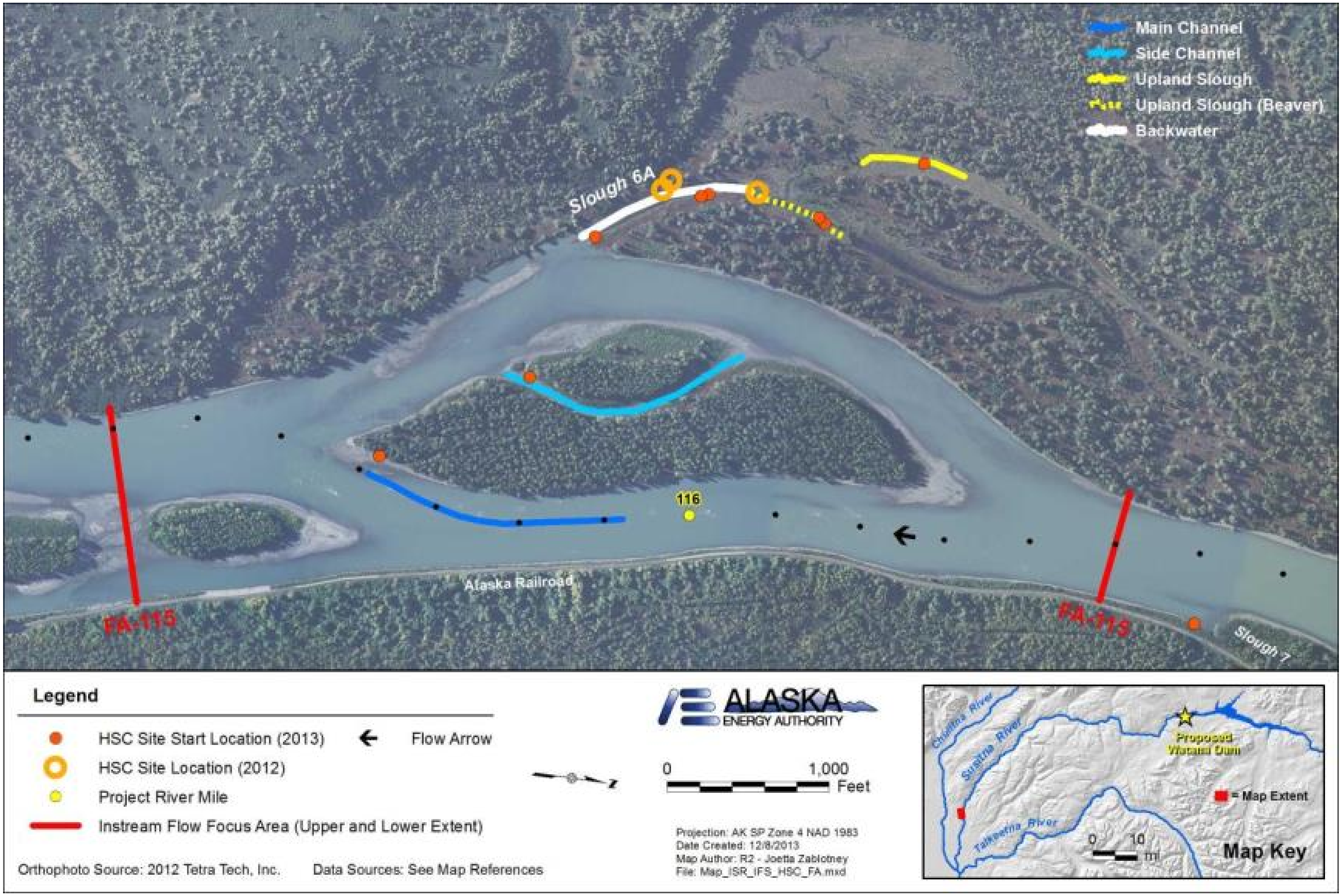


Figure 5.5-3. Map showing FA-115 (Slough 6A) with randomly selected habitat segments and the location of each 2013 HSC sampling event within the Middle Segment of the Susitna River, Alaska.

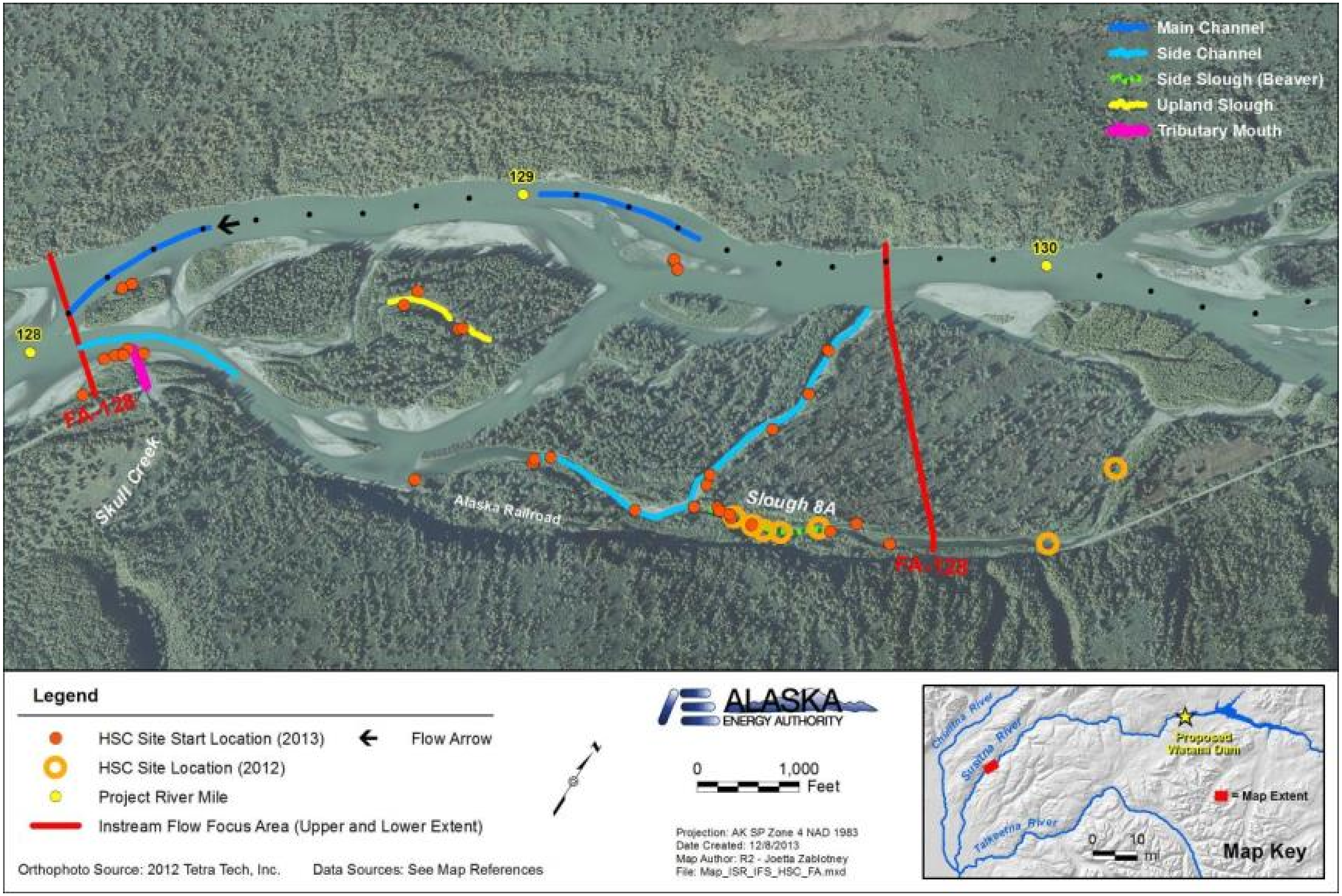


Figure 5.5-4. Map showing FA-128 (Slough 8A) with randomly selected habitat segments and the location of each 2013 HSC sampling event within the Middle Segment of the Susitna River, Alaska.

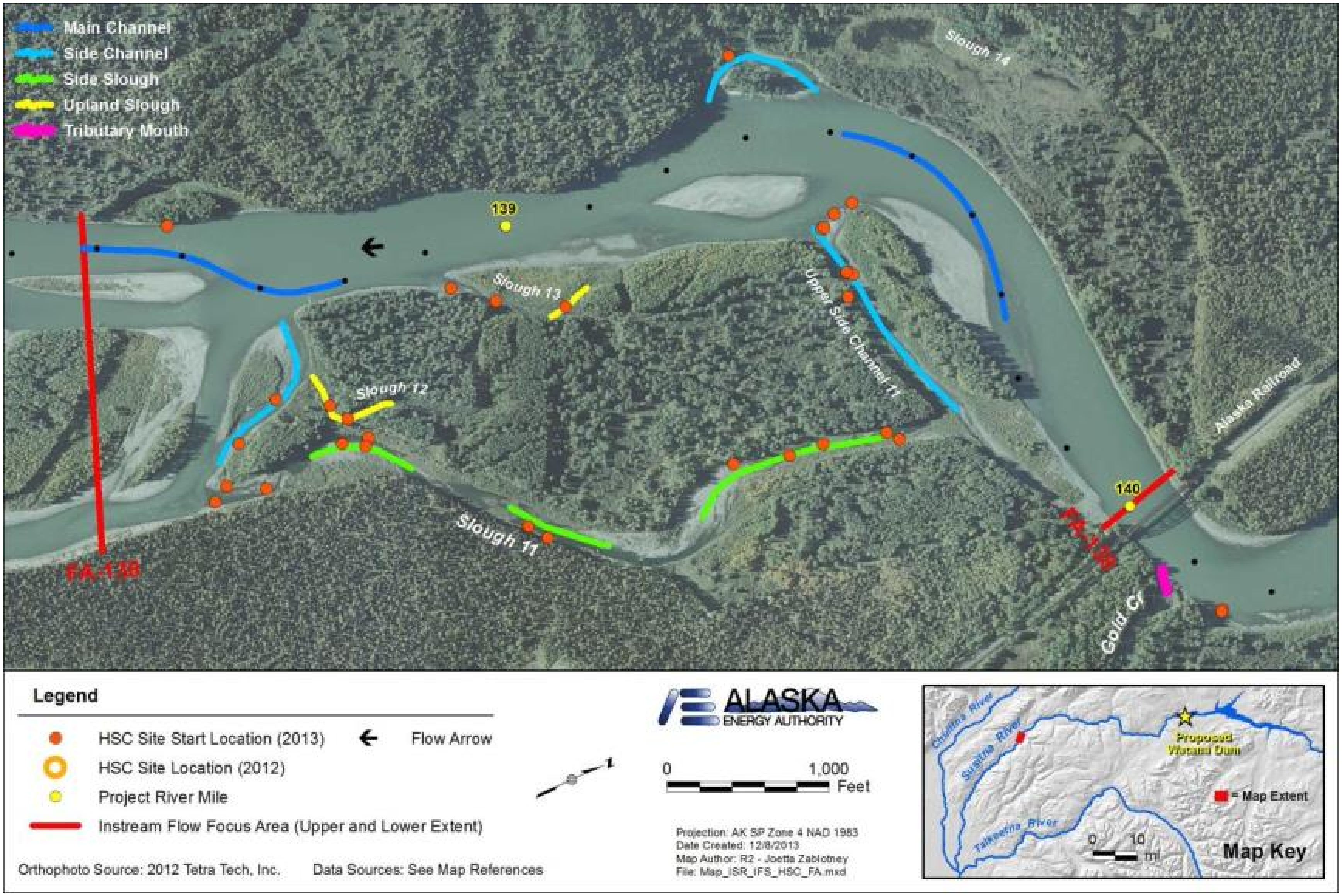


Figure 5.5-5. Map showing FA-138 (Gold Creek) with randomly selected habitat segments and the location of each 2013 HSC sampling event within the Middle Segment of the Susitna River, Alaska.

Figure 5.5-6. Map showing FA-141 (Indian River) with randomly selected habitat segments and the location of each 2013 HSC sampling event within the Middle Segment of the Susitna River, Alaska.

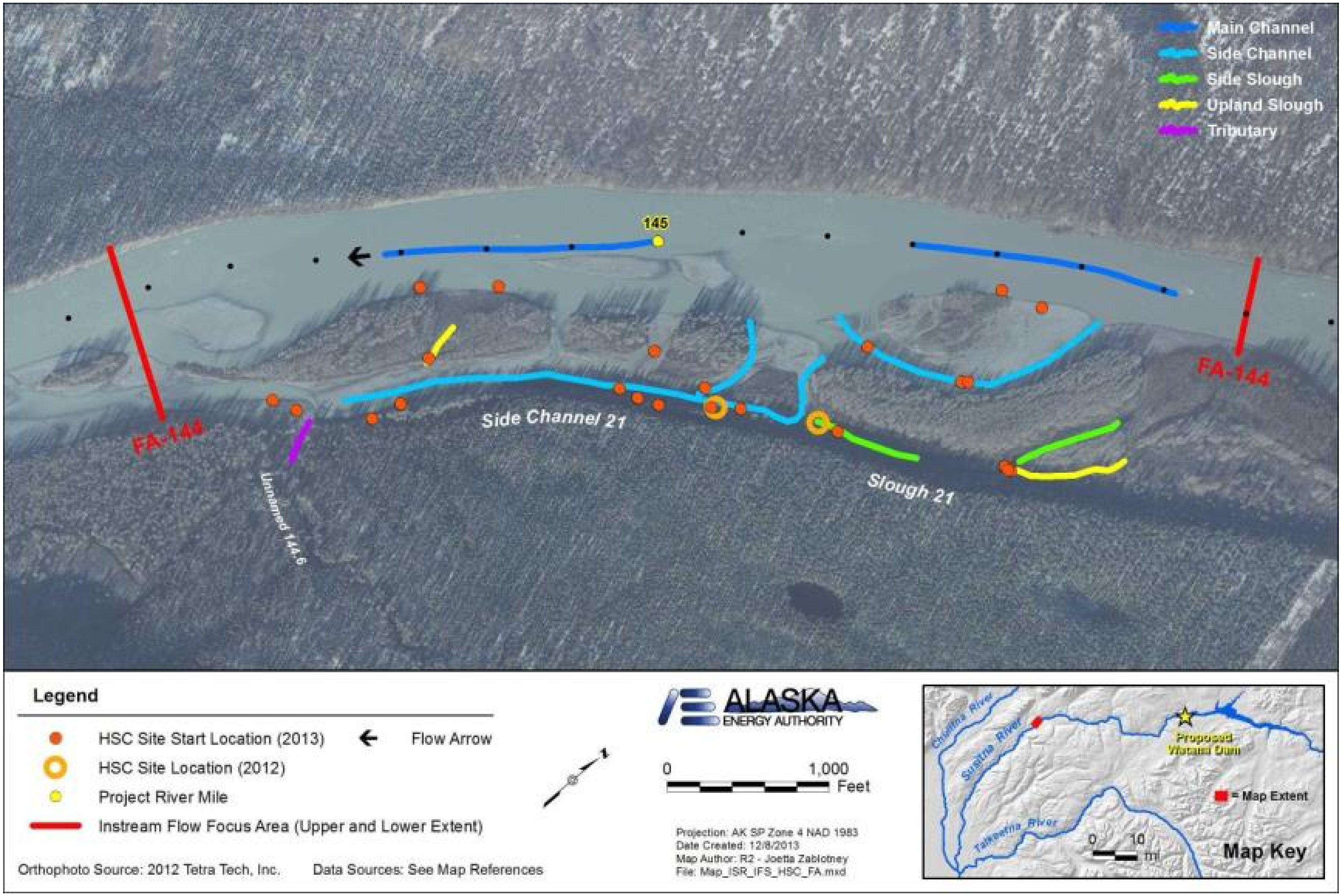


Figure 5.5-7. Map showing FA-144 (Slough 21) with randomly selected habitat segments and the location of each 2013 HSC sampling event within the Middle Segment of the Susitna River, Alaska.

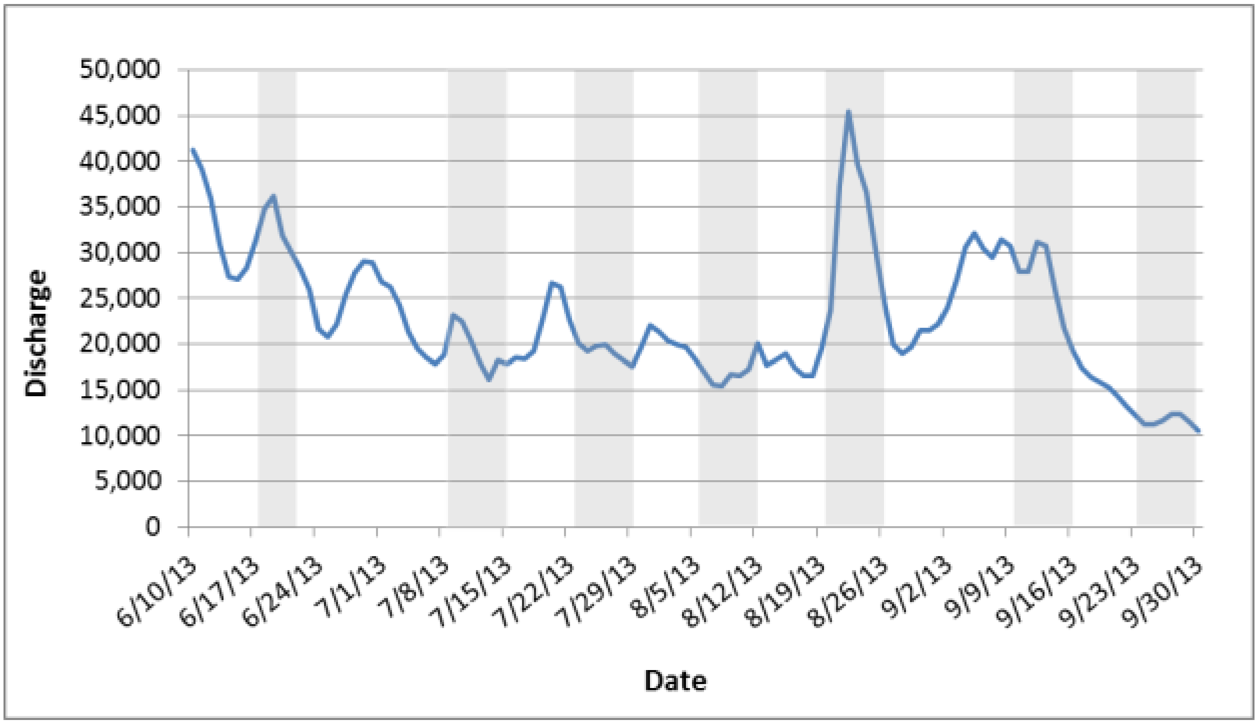
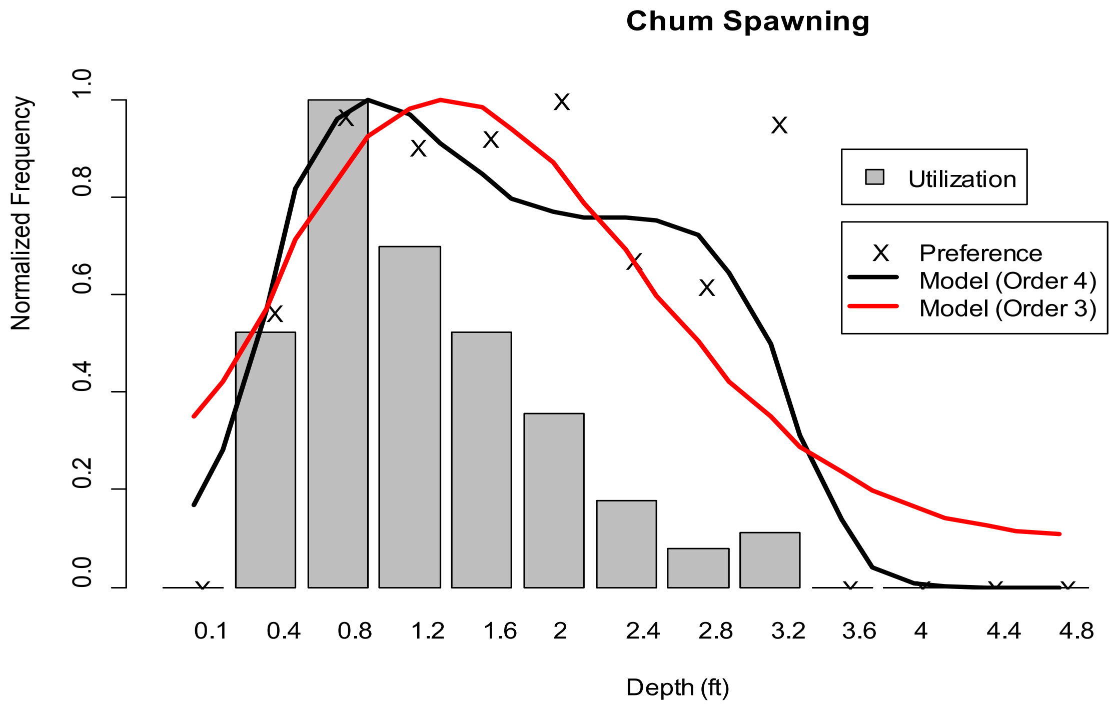


Figure 5.5-8. Average daily discharge as reported at the Gold Creek gage (USGS Gage No. 15292000) during each of the seven HSC sampling session (vertical gray bars) complete during the summer of 2013 in the Middle River Segment of the Susitna River, Alaska.



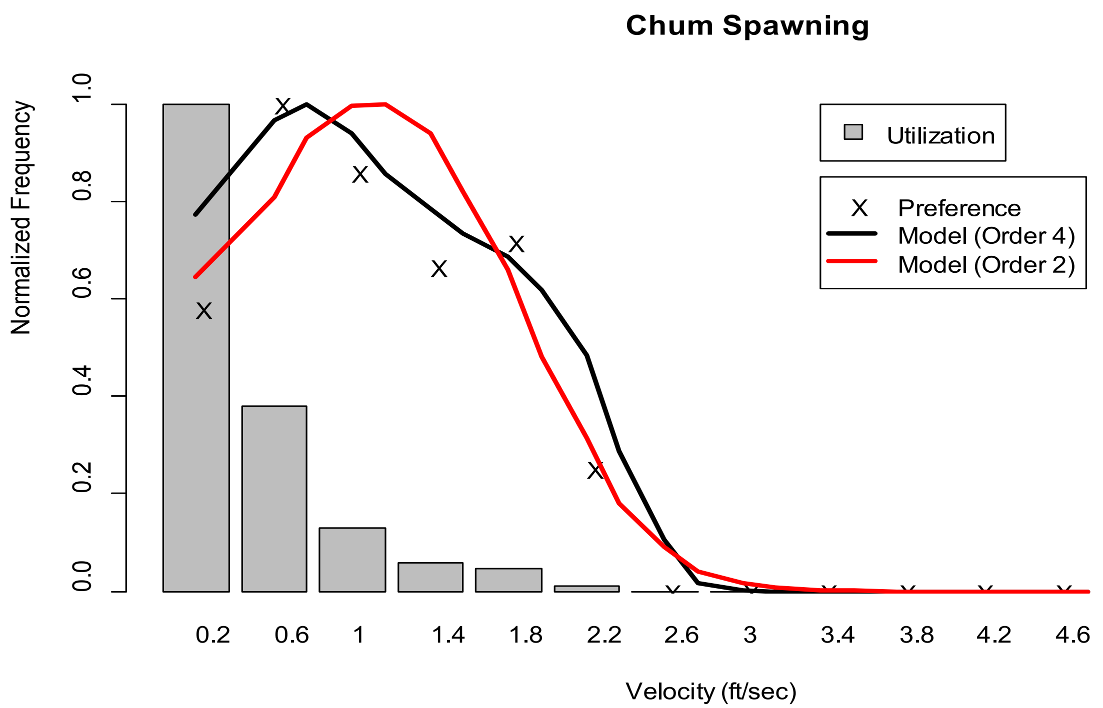


Figure 5.5-9. Example comparison of depth (top) and velocity (bottom) habitat suitability for chum spawning based on utilization and preference, all normalized to have maximum suitability of 1.

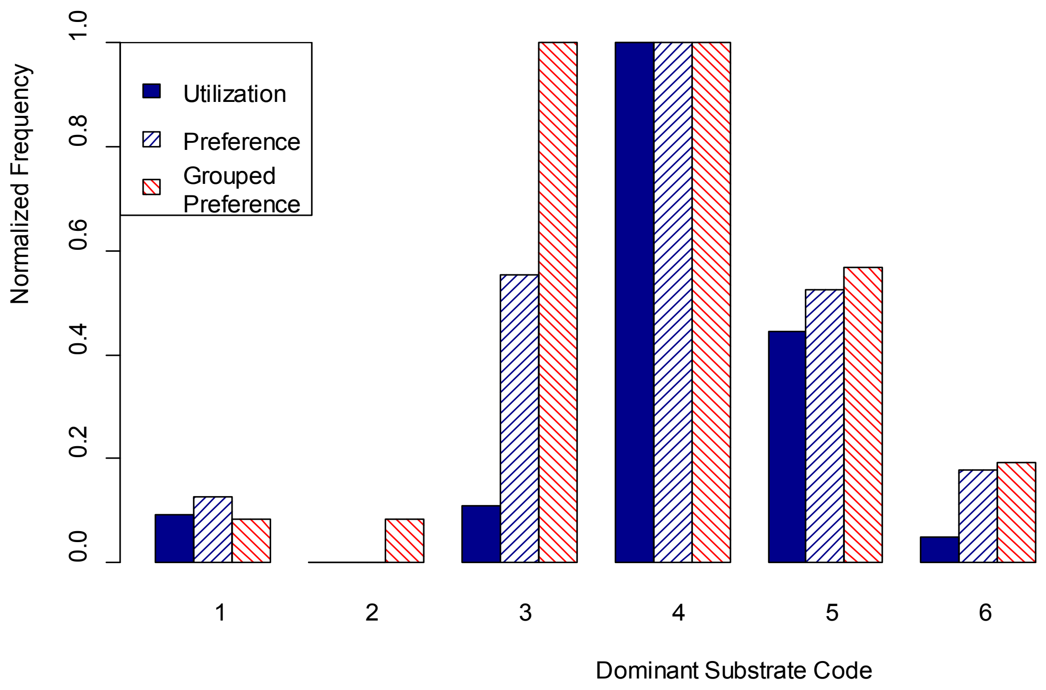


Figure 5.5-10. Comparison of substrate habitat suitability for chum spawning based on utilization and preference, all normalized to have maximum suitability of 1.

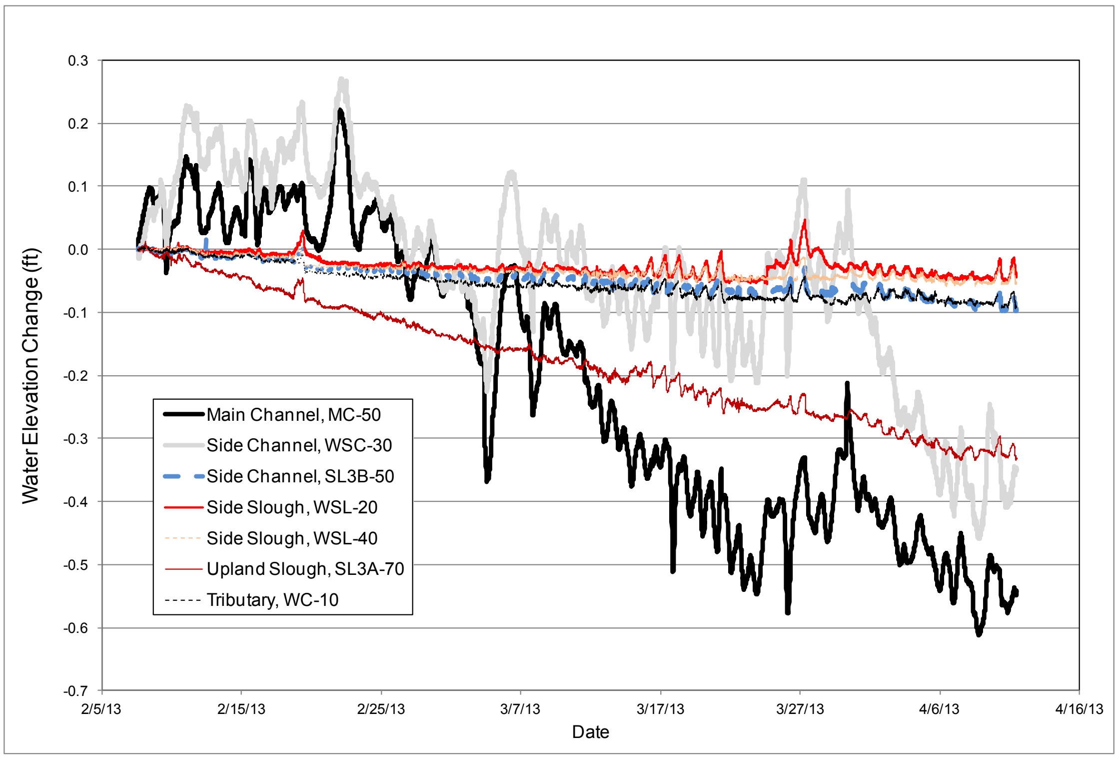


Figure 5.5-11. Comparison of change in normalized water surface elevation among continuous monitoring sites in FA-104 (Whiskers Slough) during February through April 2013. Elevations were normalized to zero at the start of main channel stage data collection on February 7. Habitat designations are based on 2012 Middle Susitna River remote line habitat mapping (HDR 2013).

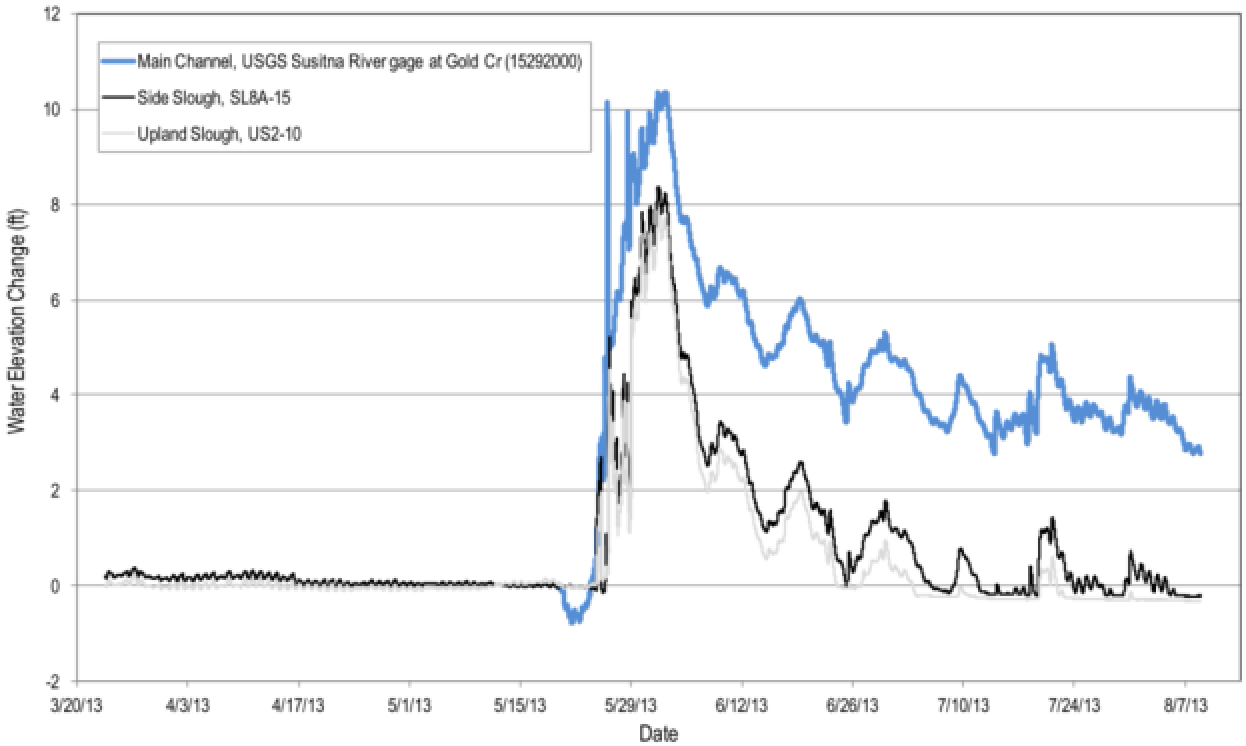


Figure 5.5-12. Comparison of change in normalized water surface elevation among continuous monitoring sites in FA-128 (Slough 8A) during March through early August 2013. Elevations were normalized to zero at time of ice-free main channel stage data collection on May 20. Habitat designations are based on 2012 Middle Susitna River remote line habitat mapping (HDR 2013).

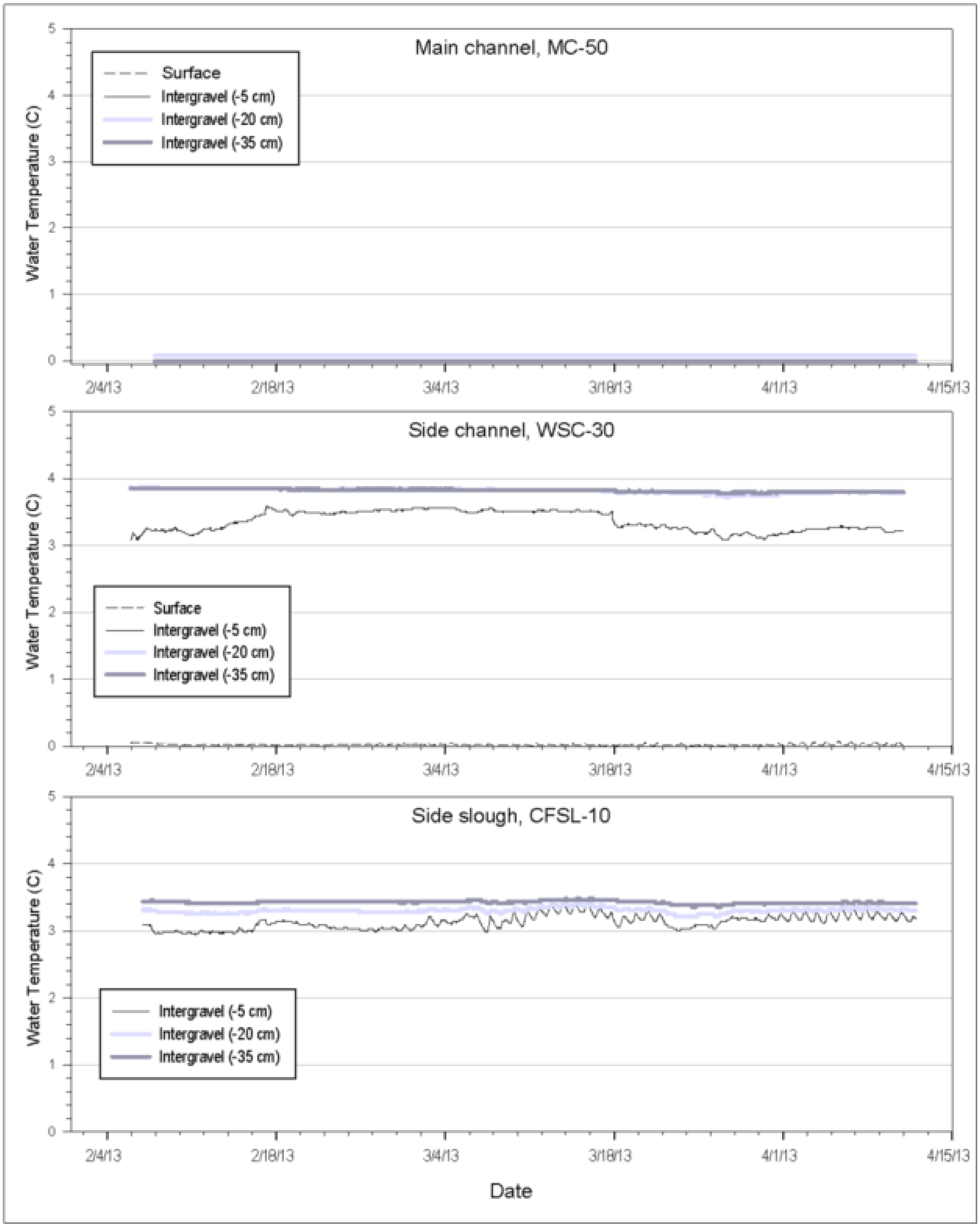


Figure 5.5-13. Water temperature recorded above the substrate surface and at intergravel depths of 5 cm, 20 cm, and 35 cm at main channel (MC-50), side channel (WSC-30) and side slough (CFSL-10) continuous monitoring sites in FA-104 (Whiskers Slough) during February - April 2013. Habitat designations are based on 2012 Middle Susitna River remote line habitat mapping (HDR 2013).

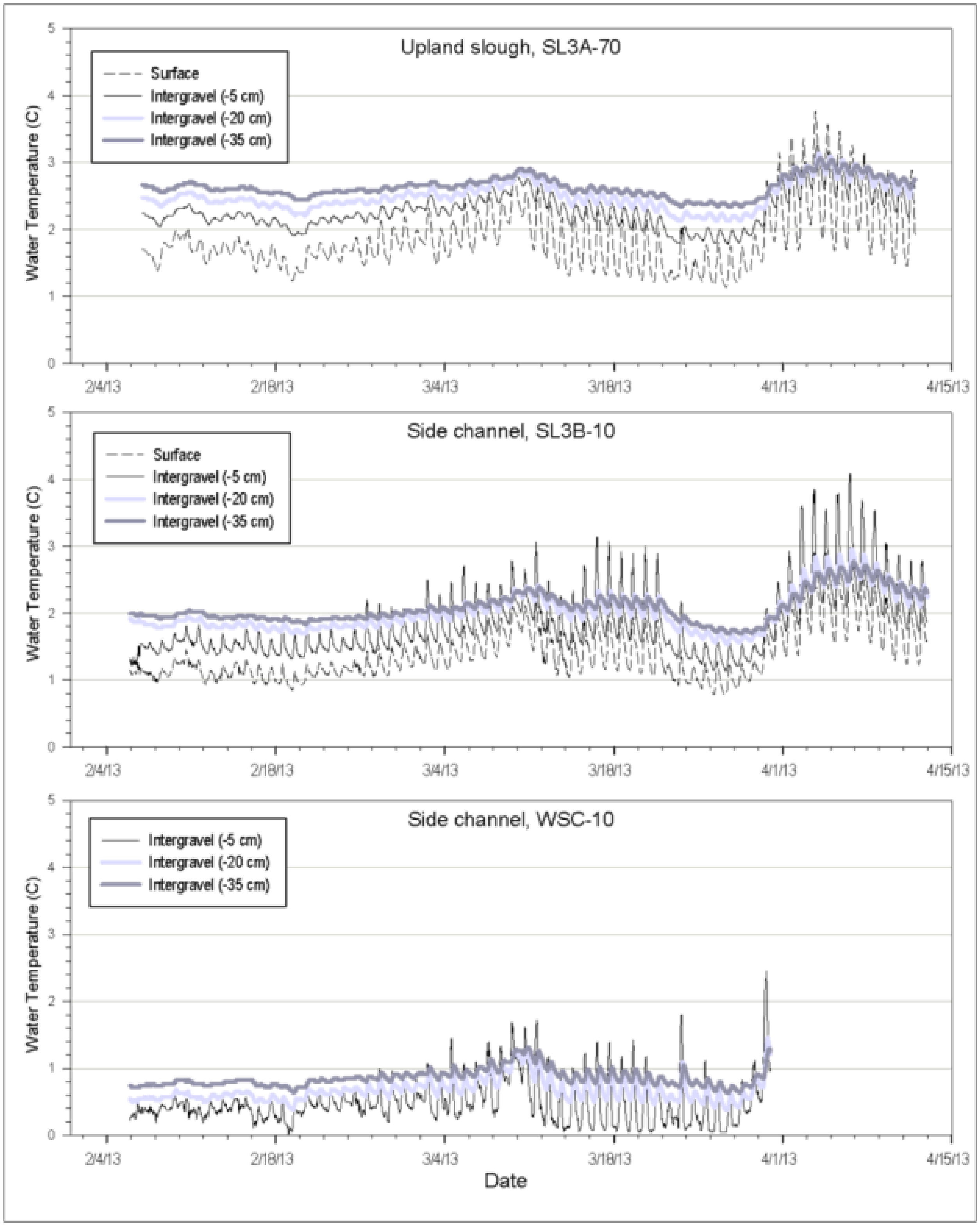


Figure 5.5-14. Water temperature recorded above the substrate surface and at intergravel depths of 5 cm, 20 cm, and 35 cm at upland slough (SL3A-70) and side channel (SL3B-10, WSC-10) continuous monitoring sites in FA-104 (Whiskers Slough) during February - April 2013. Habitat designations are based on 2012 Middle Susitna River remote line habitat mapping (HDR 2013).

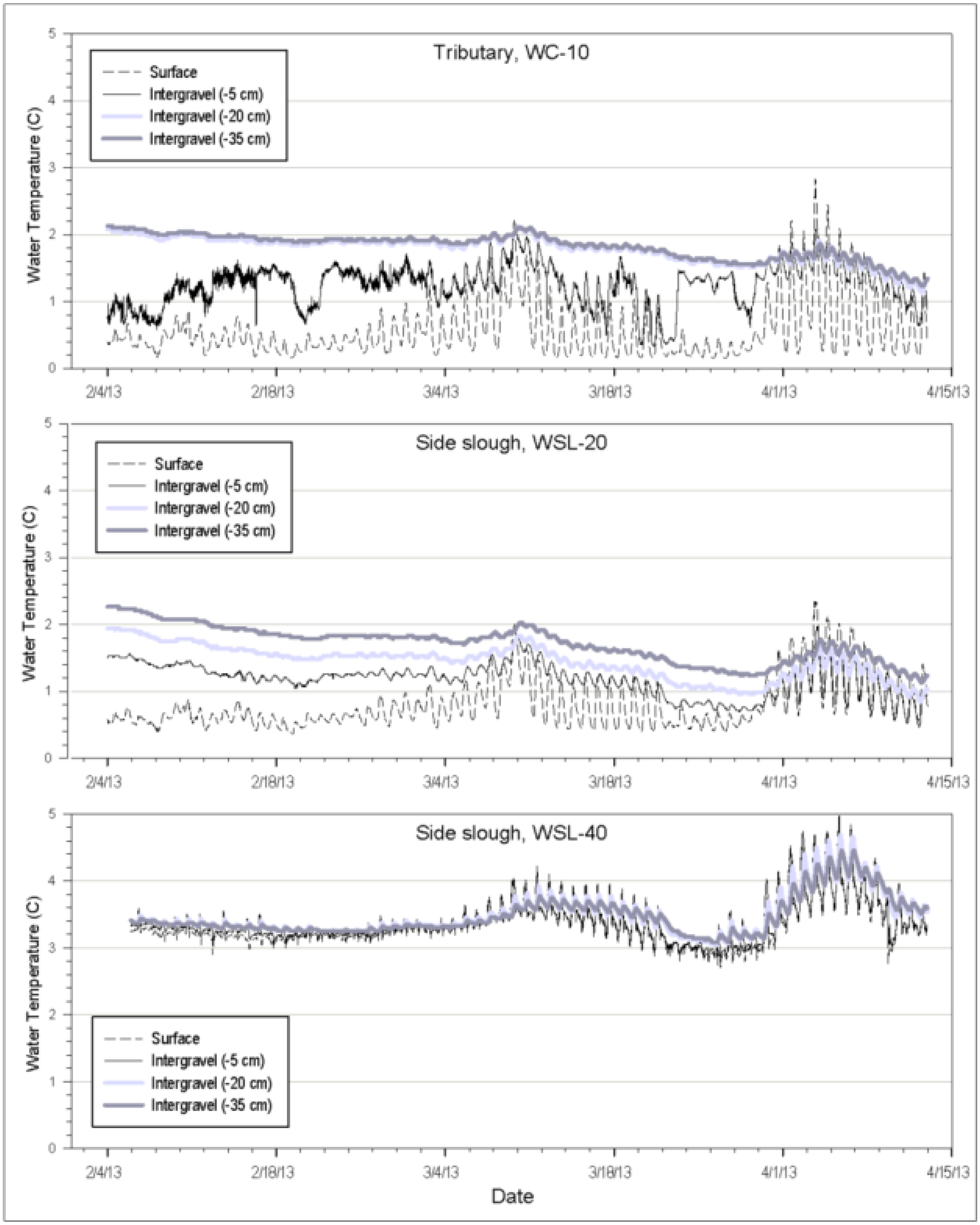


Figure 5.5-15. Water temperature recorded above the substrate surface and at intergravel depths of 5 cm, 20 cm, and 35 cm at tributary (WC-10) and side slough (WS-20, WS-40) continuous monitoring sites in FA-104 (Whiskers Slough) during February - April 2013. Habitat designations are based on 2012 Middle Susitna River remote line habitat mapping (HDR 2013).

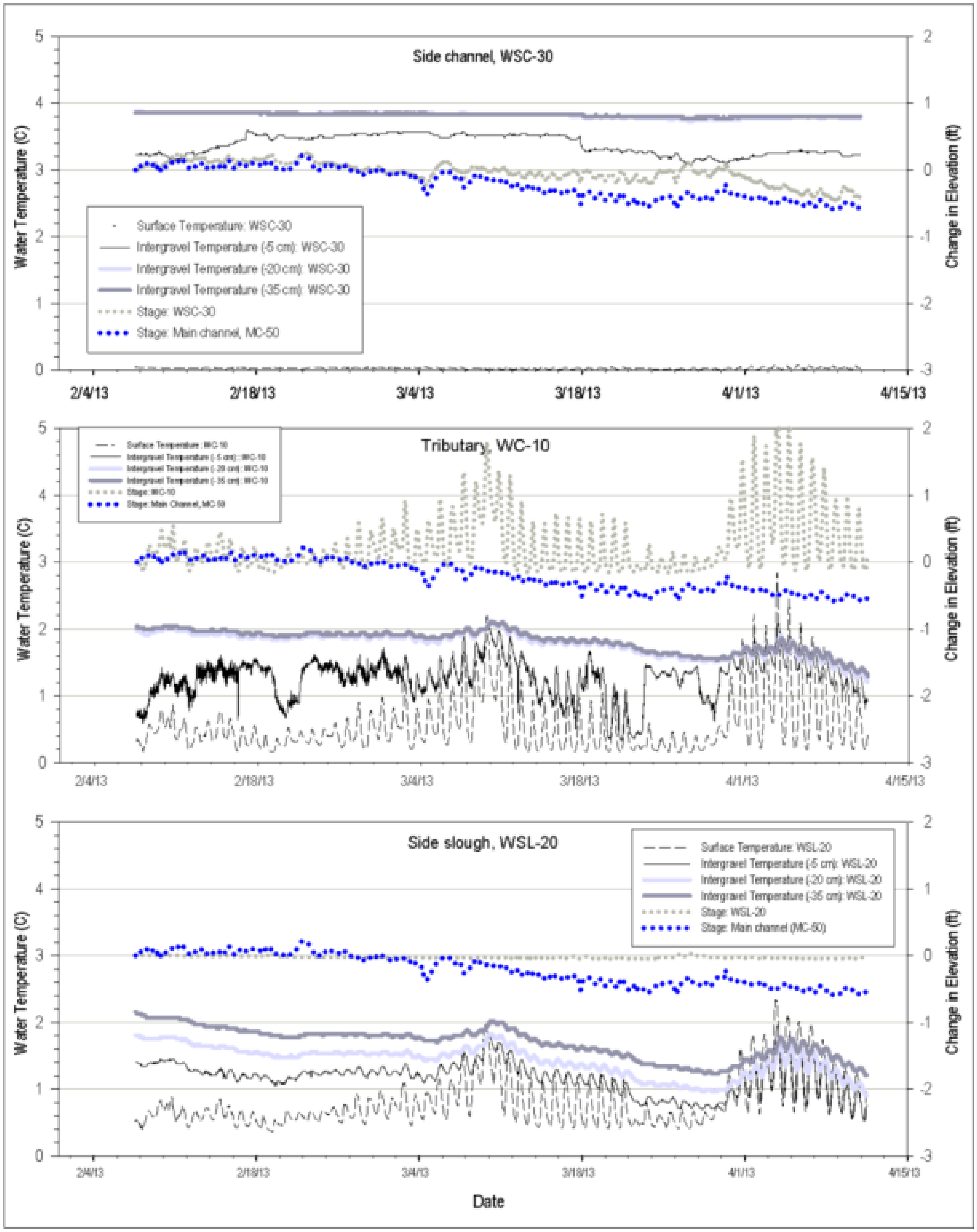


Figure 5.5-16. Comparison of continuous surface and intergravel water temperatures at side channel (WSC-30), tributary (WC-10) and side slough (WSL-20) sites relative to change in normalized water surface elevation at each site and at main channel site MC-50. Water elevations were normalized to zero at the start of main channel stage data collection on February 7, 2013.

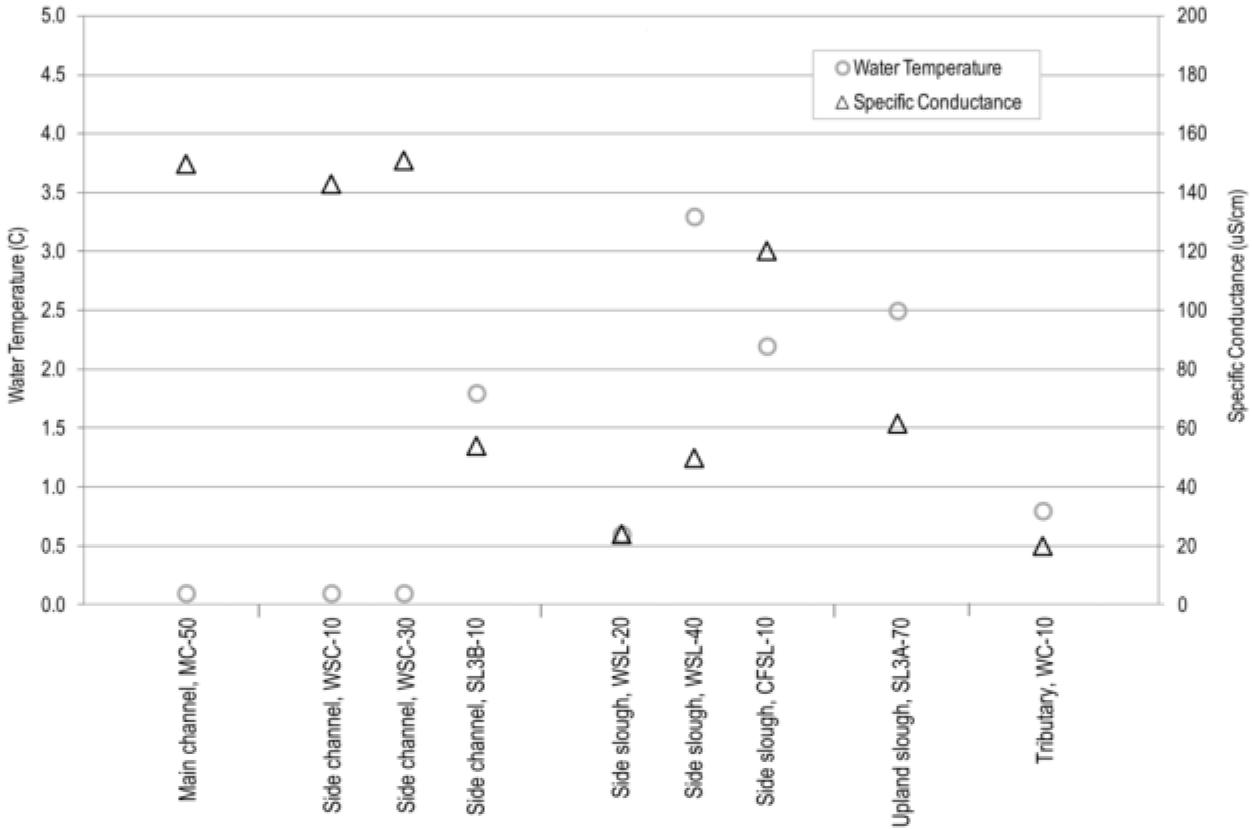


Figure 5.5-17. Instantaneous measurements of surface water temperature and specific conductance recorded at sites in FA-104 (Whiskers Slough) during April 2013, by habitat type. Habitat designations are based on 2012 Middle Susitna River remote line habitat mapping (HDR 2013).

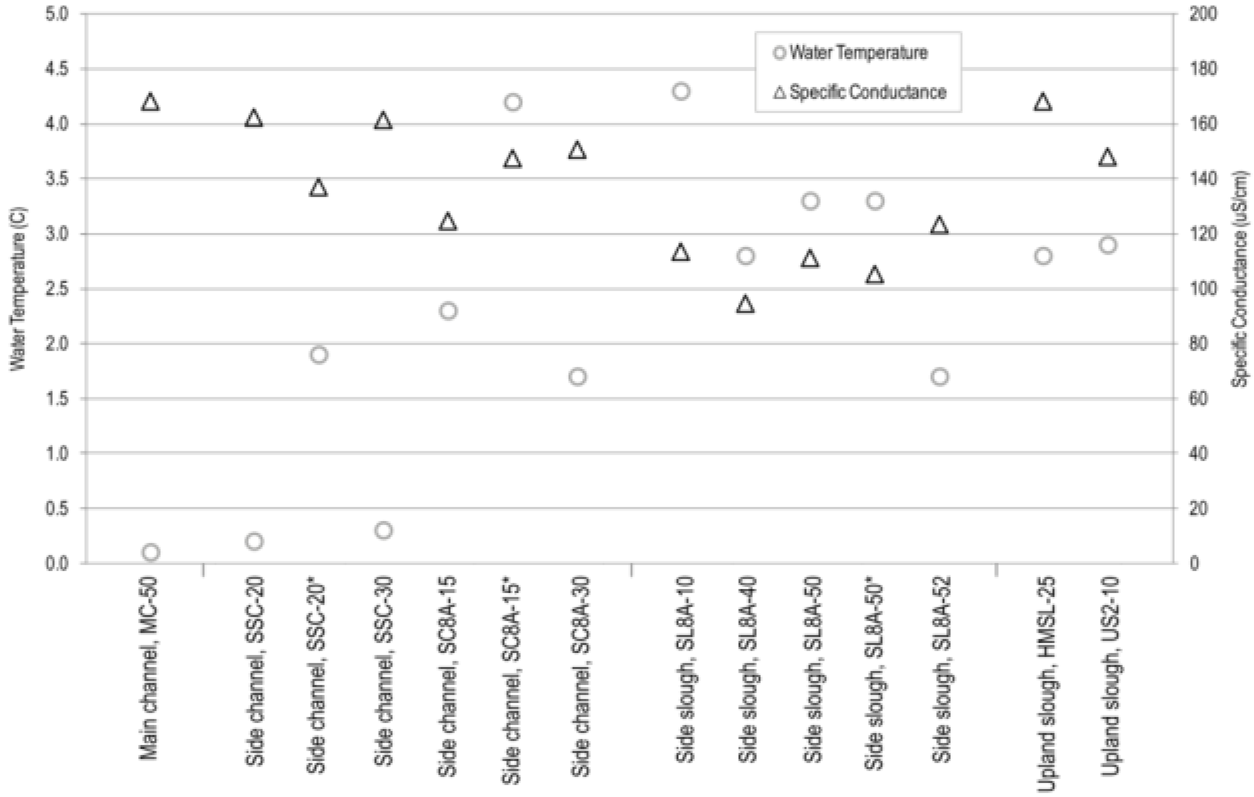


Figure 5.5-18. Instantaneous measurements of surface water temperature and specific conductance recorded at sites in FA-128 (Slough 8A) during April 2013, by habitat type. Asterisks represent measurements of bank seepage. Habitat designations are based on 2012 Middle Susitna River remote line habitat mapping (HDR 2013).

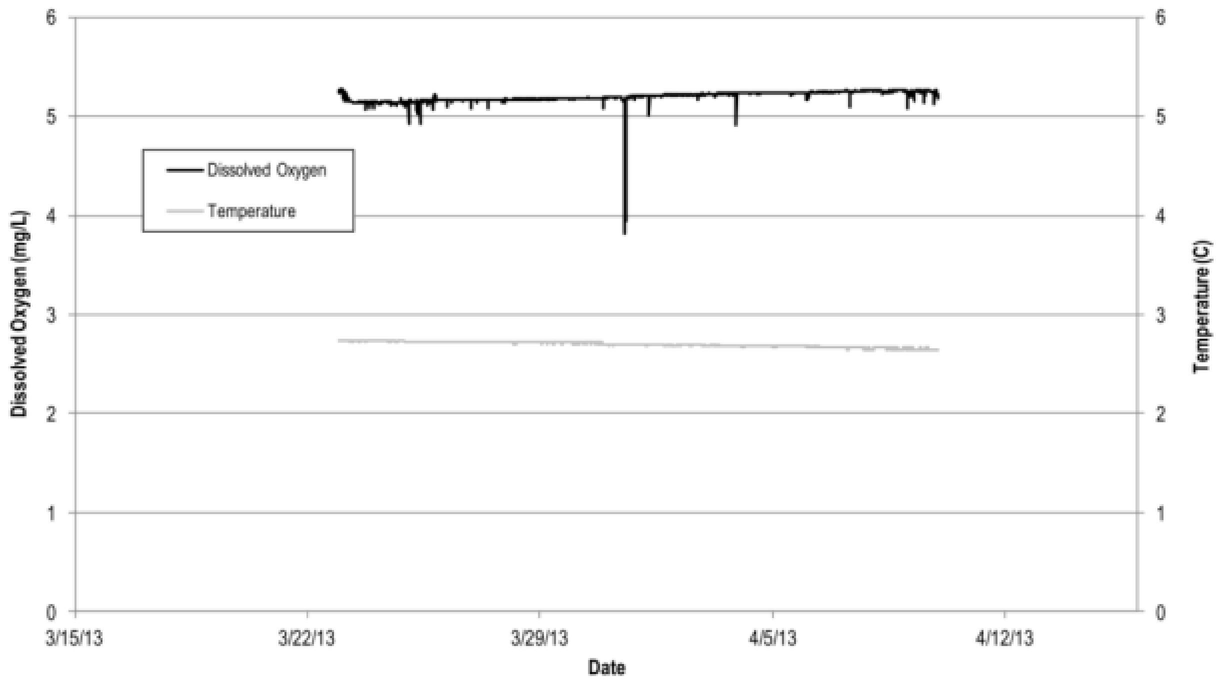


Figure 5.5-19. Continuous intergravel dissolved oxygen and temperature data recorded at FA-128 (Slough 8A) site SL8A-15 during March and April 2013.

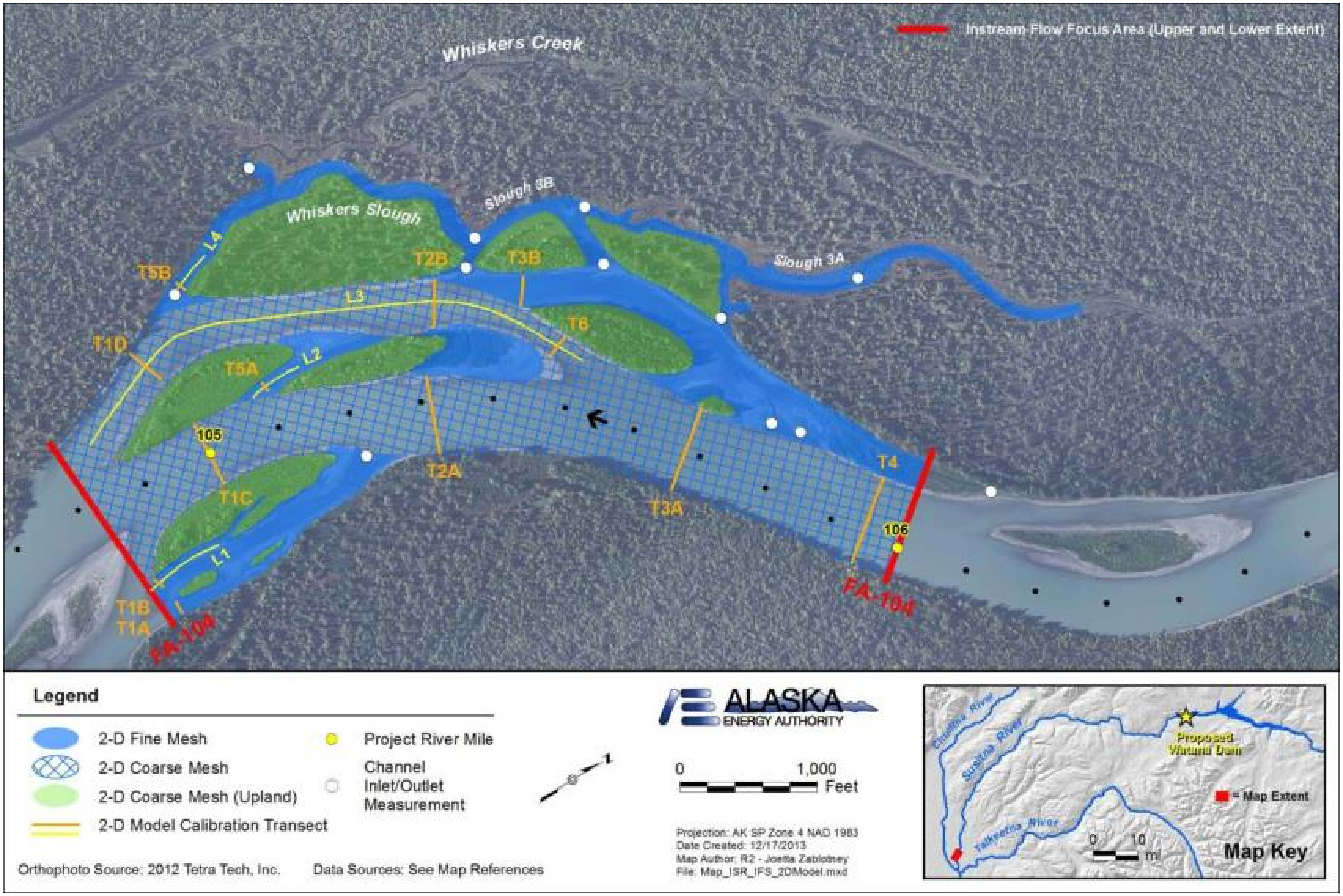


Figure 5.6-1. FA-104 (Whiskers Slough) showing fine and course mesh overlays, channel inlet and outlet measurement locations, and alignment of 2013 calibration transects.

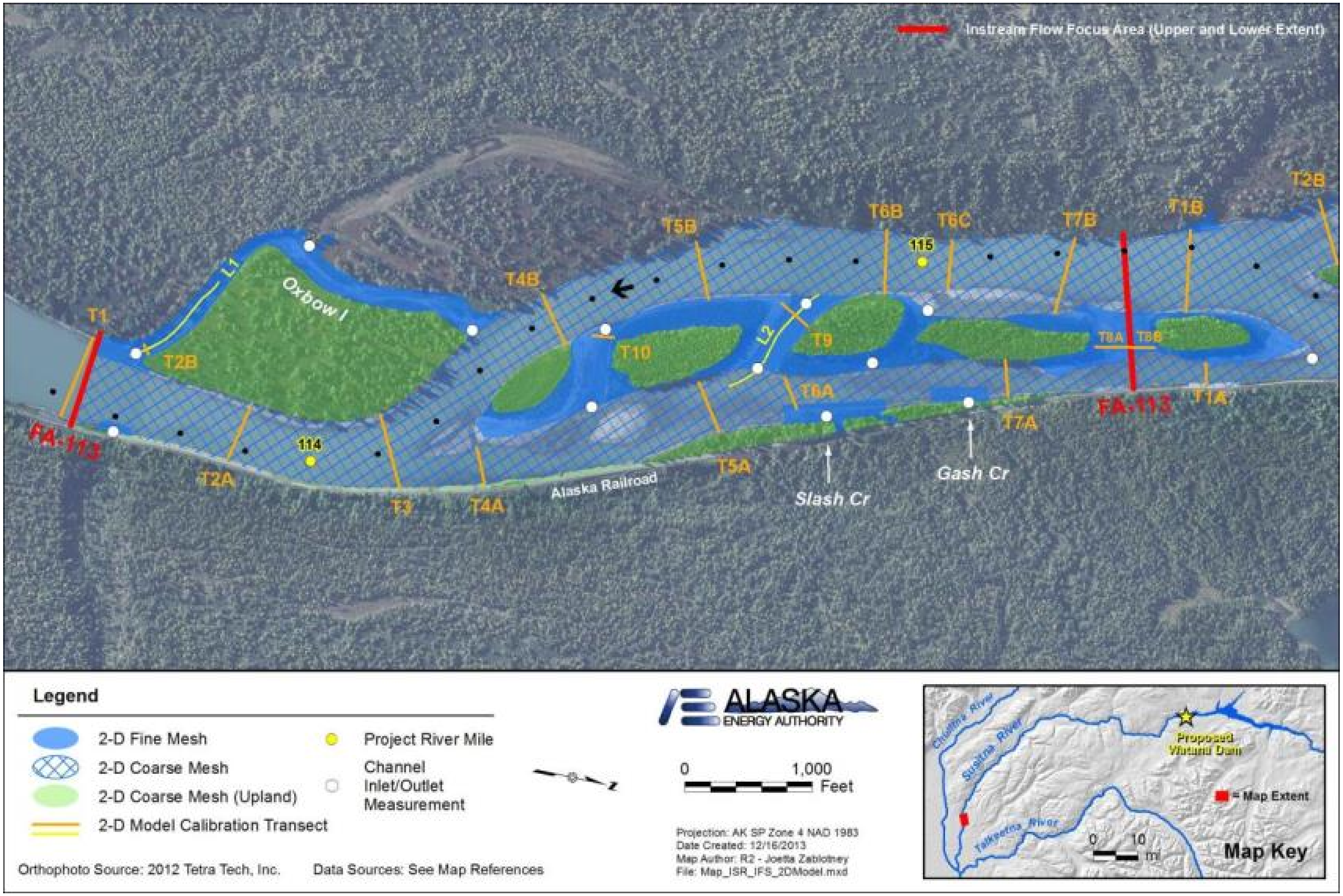


Figure 5.6-2. FA-113 (Oxbow 1) showing fine and course mesh overlays, channel inlet and outlet measurement locations, and alignment of 2013 calibration transects.

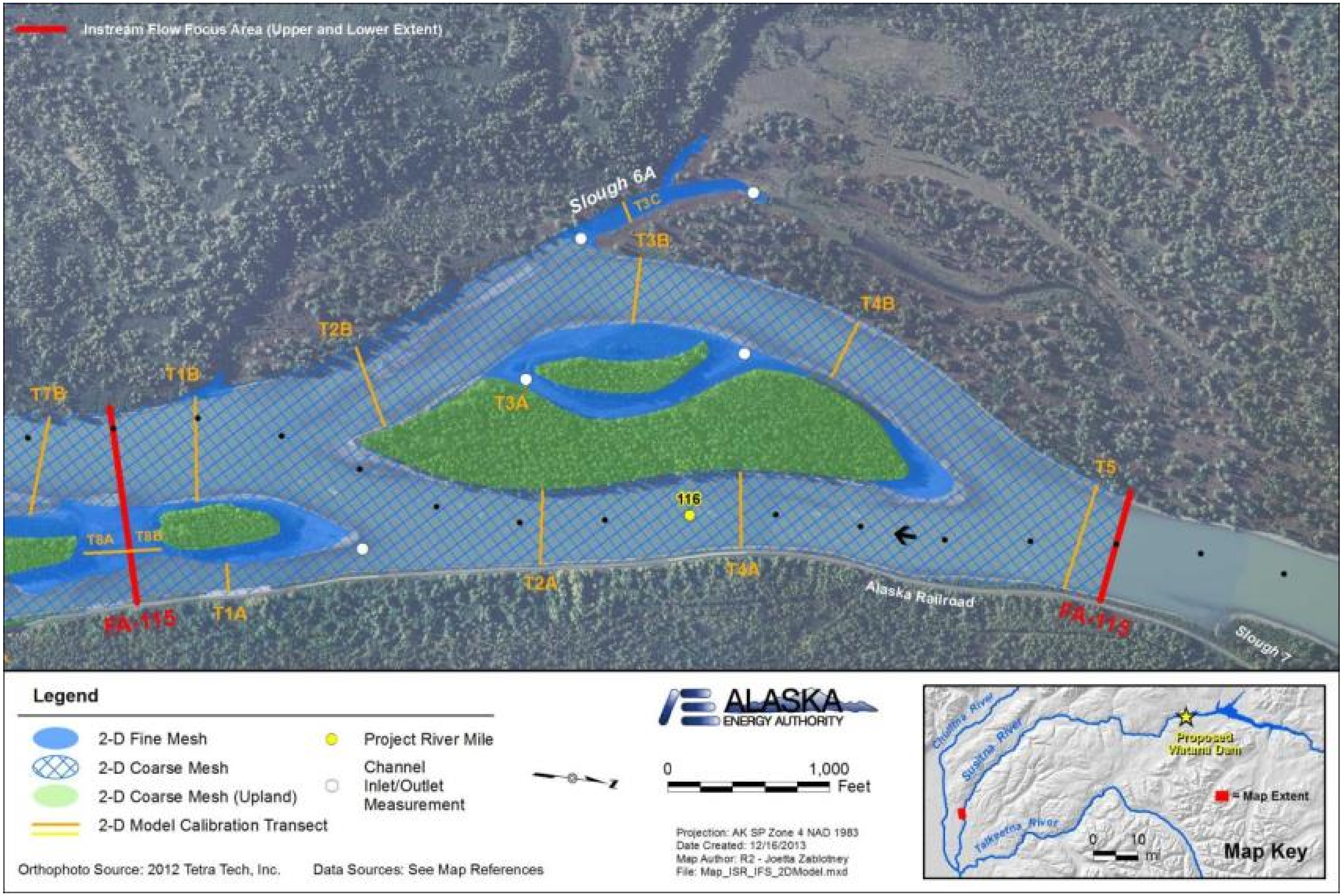


Figure 5.6-3. FA-115 (Slough 6A) showing fine and course mesh overlays, channel inlet and outlet measurement locations, and alignment of 2013 calibration transects.

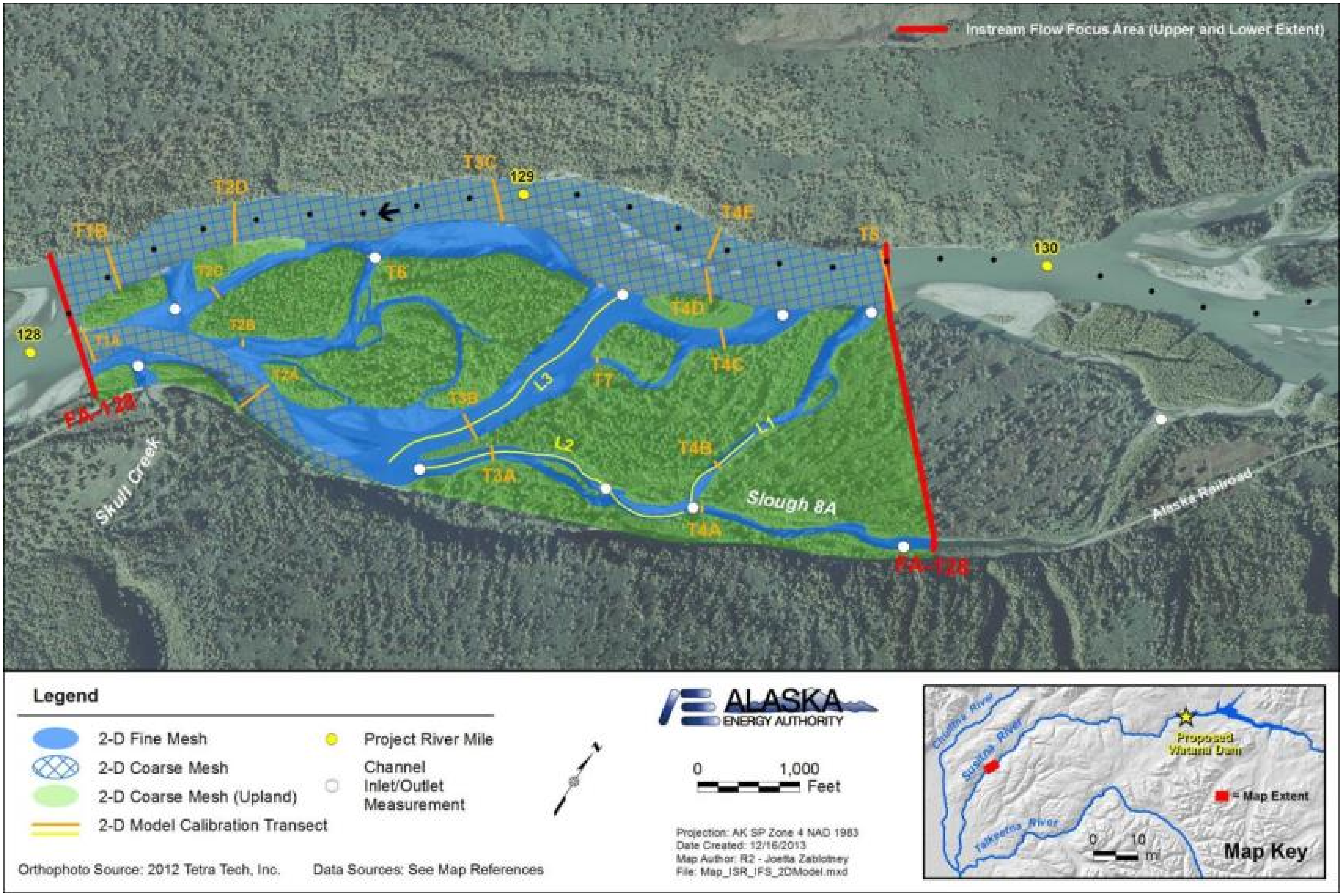


Figure 5.6-4. FA-128 (Slough 8A) showing fine and course mesh overlays, channel inlet and outlet measurement locations, and alignment of 2013 calibration transects.

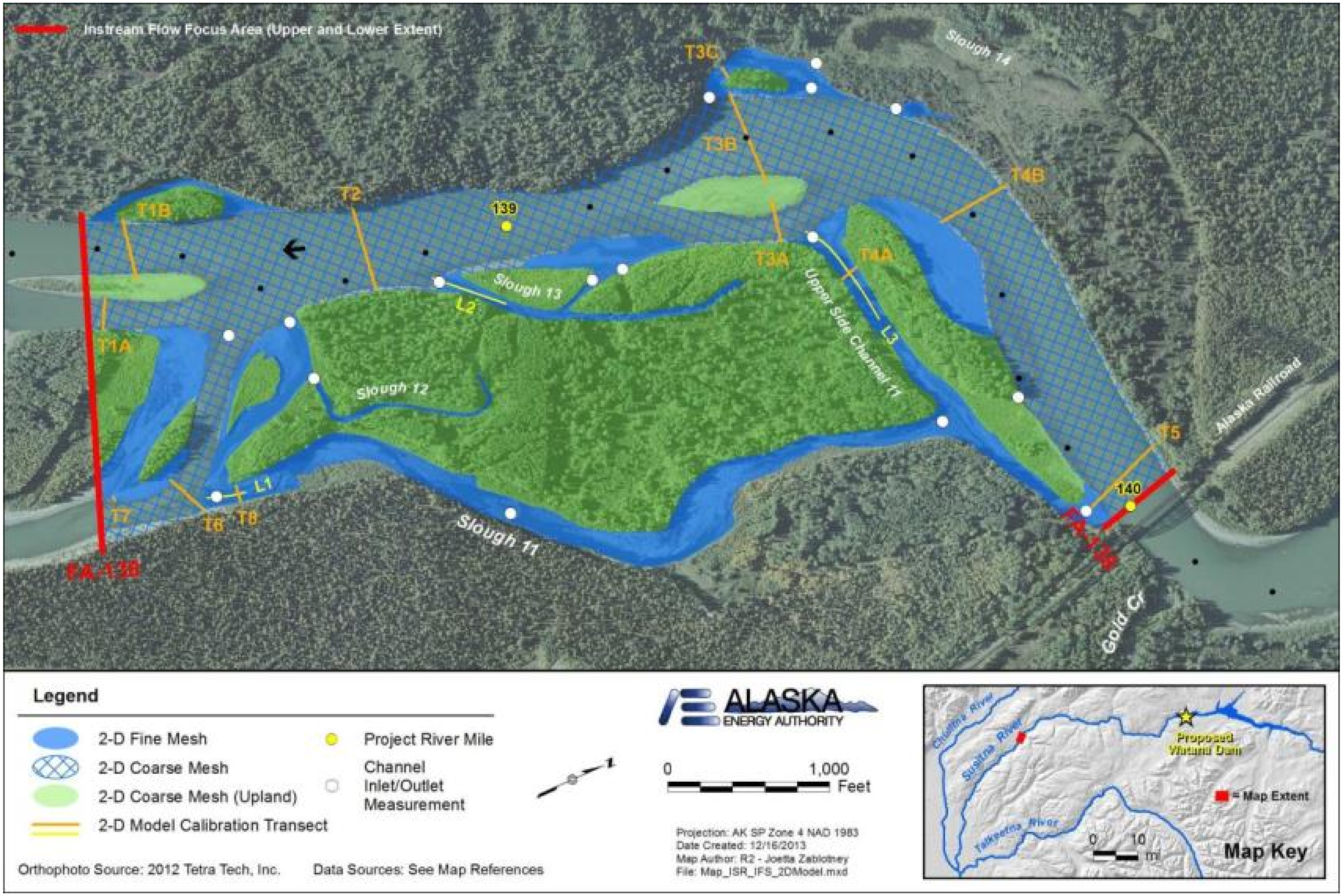


Figure 5.6-5. FA-138 (Gold Creek) showing fine and course mesh overlays, channel inlet and outlet measurement locations, and alignment of 2013 calibration transects.

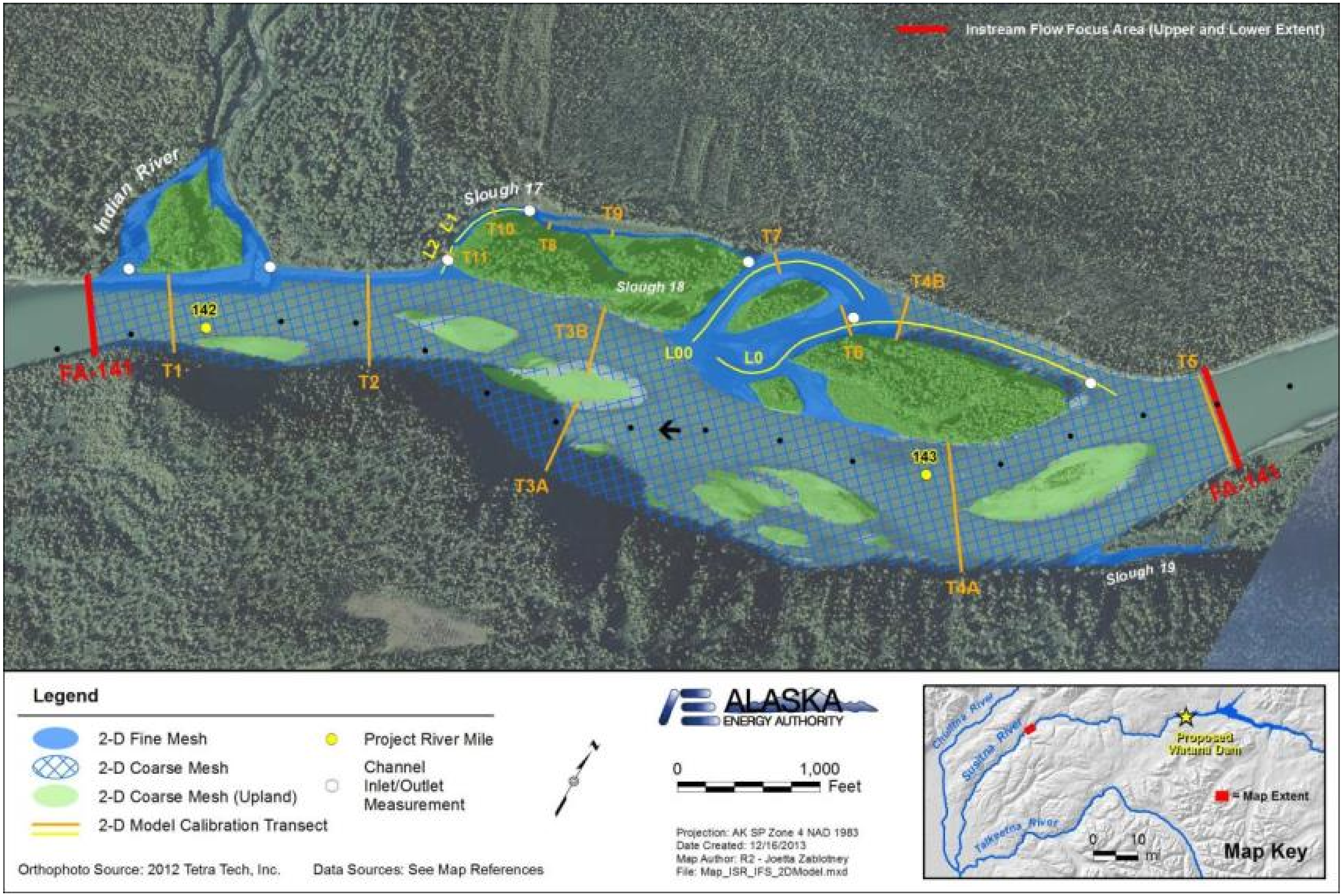


Figure 5.6-6. FA-141 (Indian River) showing fine and course mesh overlays, channel inlet and outlet measurement locations, and alignment of 2013 calibration transects.

Figure 5.6-7. FA-144 (Slough 21) showing fine and course mesh overlays, channel inlet and outlet measurement locations, and alignment of 2013 calibration transects.

Point_ID	X_ft	Y_ft	Bed_Elev_ft	Area_ft2	Water_Elev_ft	Water_Depth_ft	Vel_Mag_ft_p_s
227	1612401.91	3058516.72	365.97	804.87	366.60	0.62	3.36
228	1612430.58	3058520.68	365.51	825.12	366.56	1.06	3.74
229	1612459.26	3058524.63	365.25	845.13	366.56	1.31	3.91
230	1612487.93	3058528.58	365.12	865.22	366.55	1.43	3.91
231	1612516.60	3058532.54	364.96	885.44	366.52	1.56	3.89
232	1612545.28	3058536.49	364.80	905.33	366.49	1.70	3.85
233	1612573.95	3058540.45	364.52	925.28	366.50	1.98	4.09
234	1612602.62	3058544.40	364.20	945.48	366.54	2.34	4.55

Figure 5.6-8. Example 2-D hydraulic model output for use as input to 2-D habitat model.

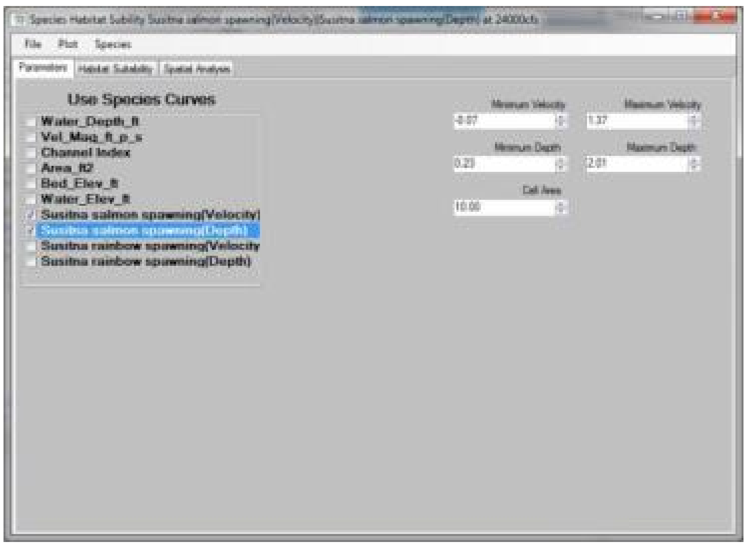


Figure 5.6-9. Screen shot of VB modeling showing potential configuration for parameters to be used in the habitat modeling.

Susitna
24000

Element	X_ft	Y_ft	Water_Deptl	Vel_Mag_ft_	Channel Inde	Area_ft2	Bed_Elev_ft	Water_Elev_	CombinedSuitability
224	1612317.31	3058505.34	1.45142063	1.89297965	1	671.973633	368.4555	369.906921	1
225	1612344.56	3058508.81	2.89994079	2.91381384	1	764.879395	367.00475	369.904691	0.5009
226	1612373.24	3058512.77	3.46214843	3.36780936	1	784.972656	366.46125	369.923358	0.3575
227	1612401.91	3058516.72	3.98751612	3.57528354	1	804.868164	365.9735	369.961016	0.292
228	1612430.58	3058520.68	4.48178826	3.68629196	1	825.115723	365.50725	369.989038	0.257
229	1612459.26	3058524.63	4.75105305	3.74198589	1	845.133301	365.2525	370.003553	0.2394
230	1612487.93	3058528.58	4.88657576	3.72980522	1	865.217773	365.12225	370.008826	0.2432
231	1612516.6	3058532.54	5.04314729	3.67187706	1	885.438965	364.96425	370.007397	0.2615
232	1612545.28	3058536.49	5.20718851	3.5695903	1	905.33252	364.7965	370.003689	0.2938
233	1612573.95	3058540.45	5.48707932	3.52104594	1	925.276367	364.5235	370.010579	0.3092
234	1612602.62	3058544.4	5.83765184	3.95456998	1	945.479981	364.1975	370.035152	0.1722

Figure 5.6-10. Example of tabular output from VB model for 2-D habitat analysis with new column of computed suitability highlighted.

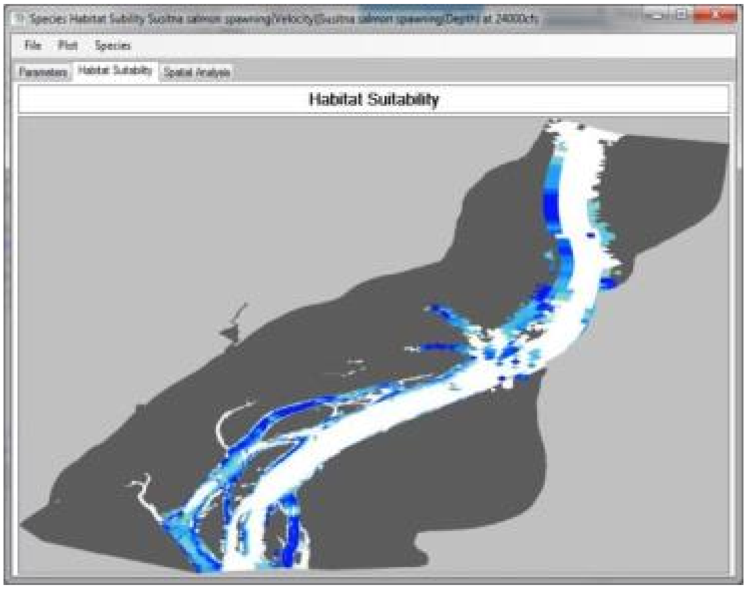


Figure 5.6-11. Example of graphic interface for VB model to provide preliminary display of results used as an initial check on model output.

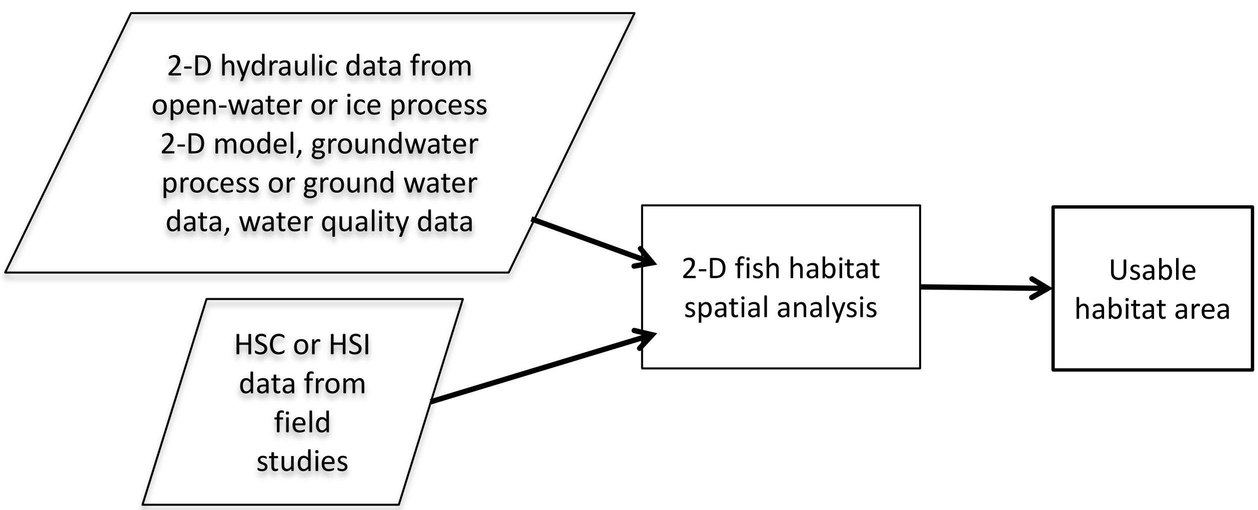


Figure 5.6-12. Generalized data flow for 2-D habitat modeling in the middle river Focus Areas.

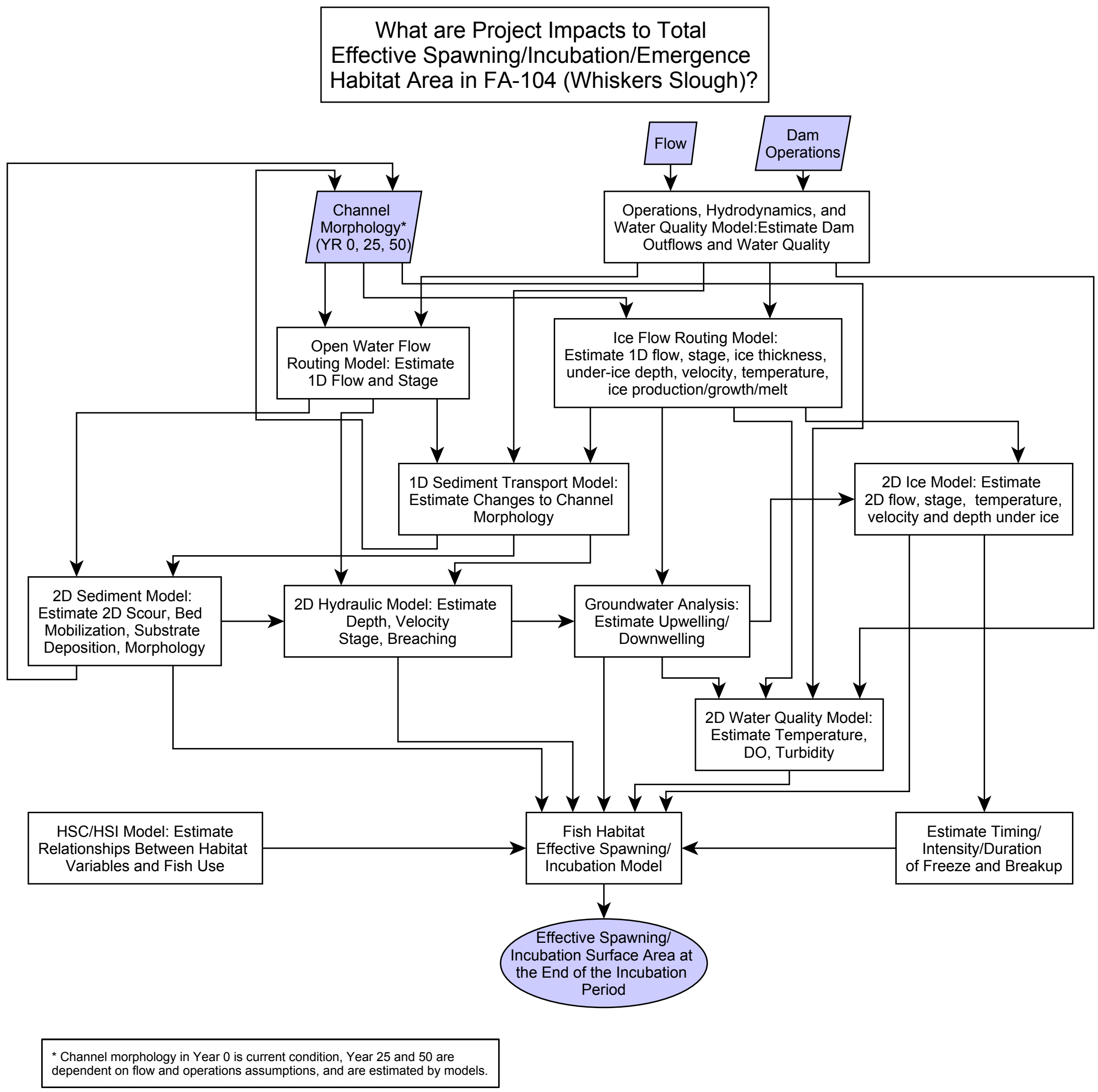


Figure 5.6-13. Example of data dependencies and data flow for Effective Spawning/Incubation Analysis in Middle River Focus Areas.

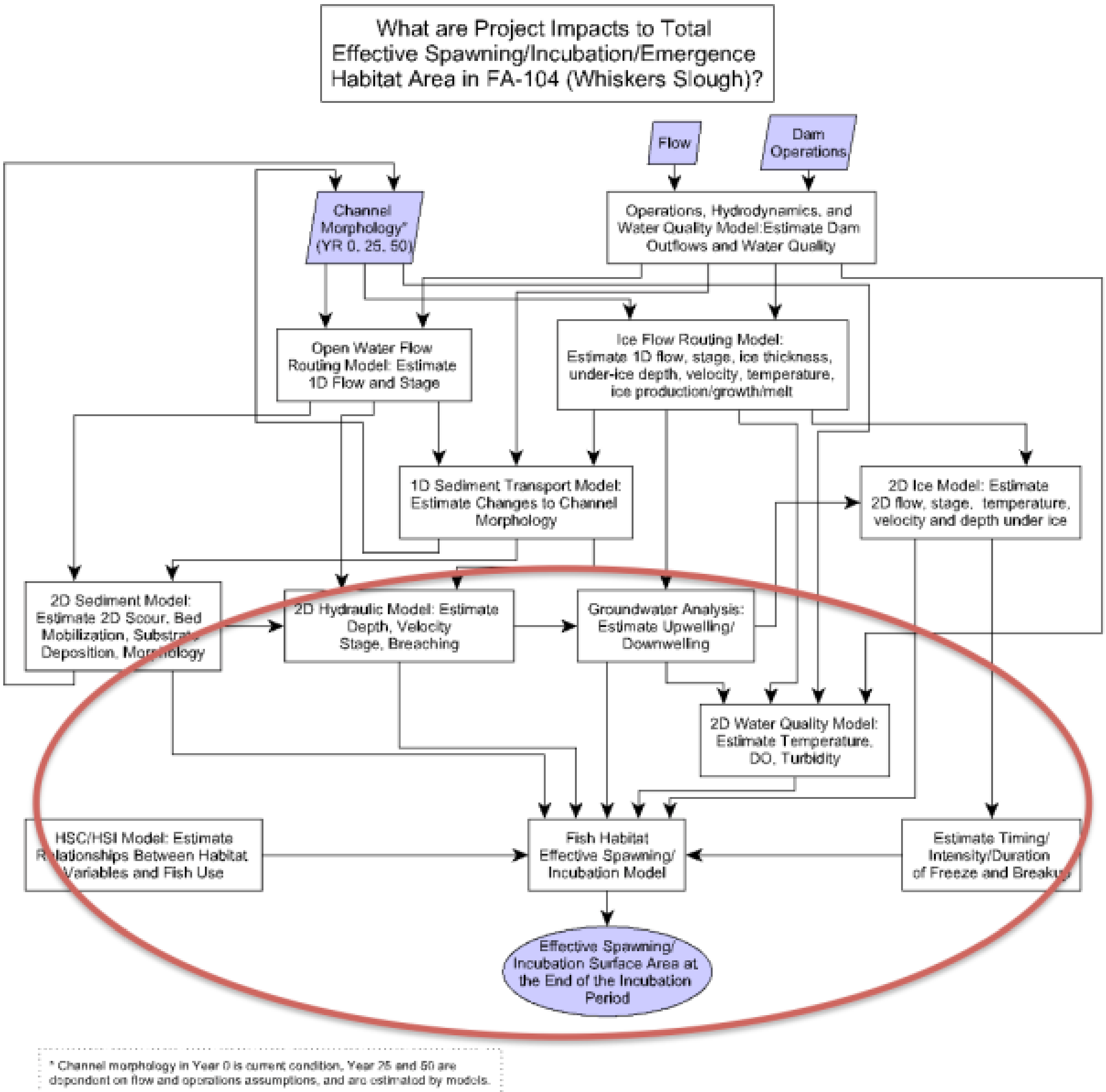


Figure 5.6-14. Example of data flow from physical process and data analysis to the Effective Spawning/Incubation Analysis.

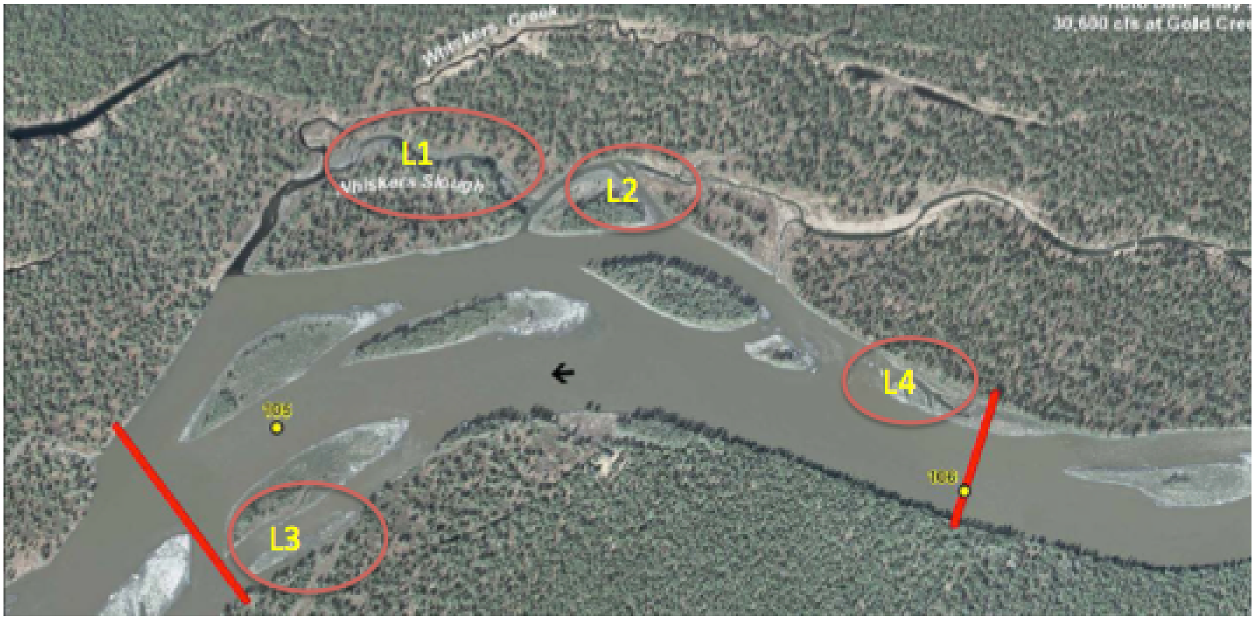


Figure 5.6-15. Example of smaller spatial area analysis for effective spawning/incubation habitat analysis (Note: the circled areas are for demonstration only and may not reflect actual use).

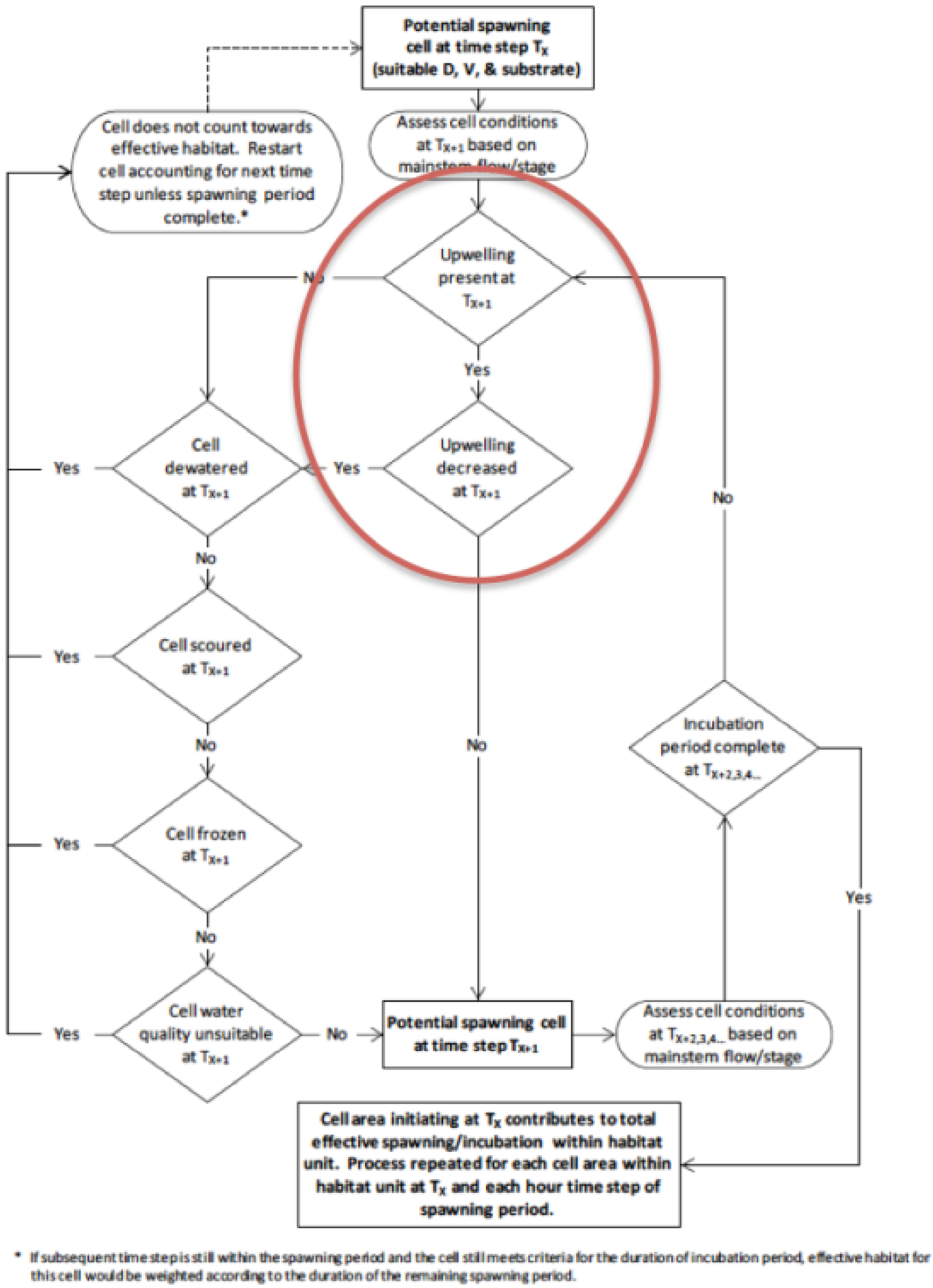


Figure 5.6-16. Flow chart showing analysis sequence for effective spawning/incubation 2-D habitat model highlighting groundwater dependency and analysis sequence.

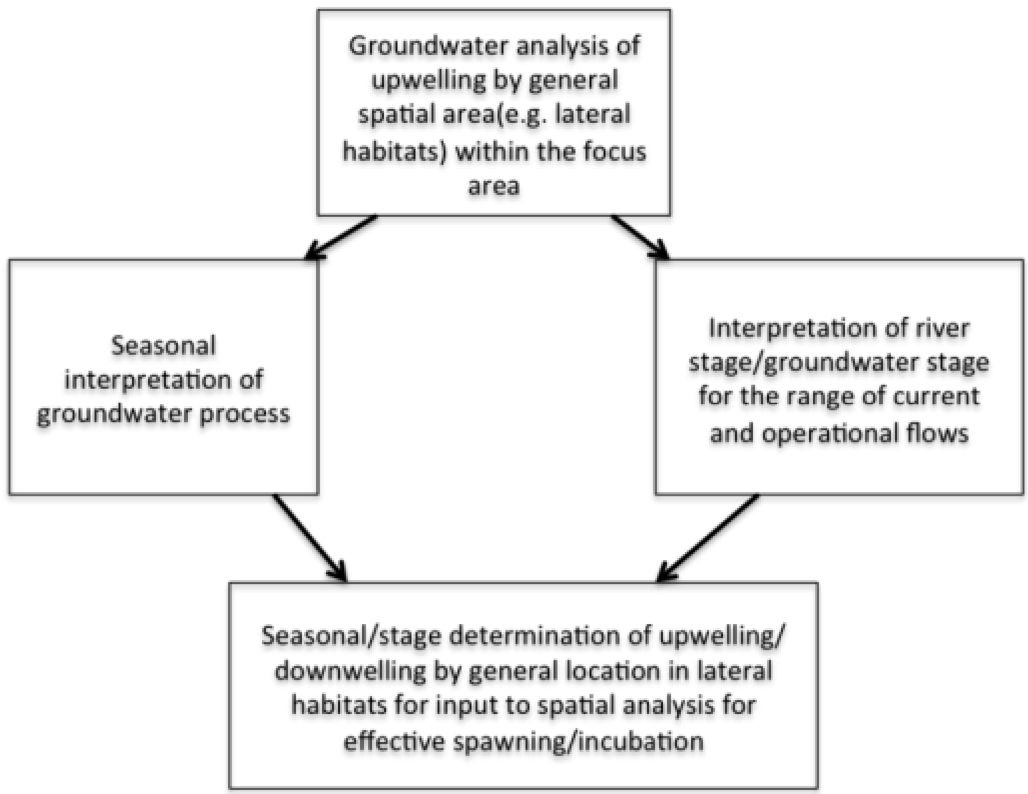
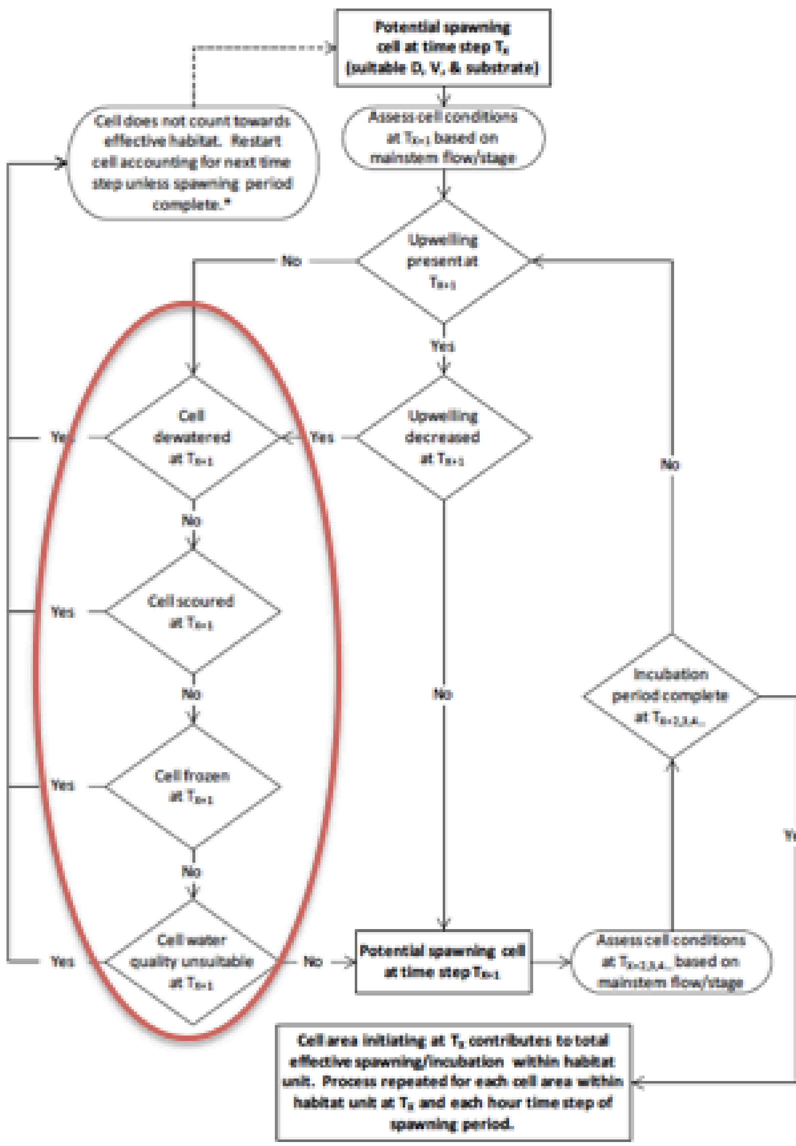


Figure 5.6-17. Example of groundwater data flow for use in Effective Spawning/Incubation Analysis.

Ground water upwelling trend by season for current conditions at FA **XX**.

Season/Month	Lateral habitat 1	Lateral habitat 2	Lateral habitat 3	Lateral habitat 4
May	Present/increasing	Present/steady	Present/increasing	Present/increasing
June	Present/increasing	Present/steady	Present/increasing	Present/increasing
July	Present/increasing	Present/decreasing	Present/increasing	Present/increasing
August	Present/increasing	Present/decreasing	Present/increasing	Present/increasing
September	Present/increasing	Present/decreasing	Present/increasing	Present/increasing
October	Present/steady	Present/decreasing	Present/steady	Present/steady
November	Present/steady	Present/decreasing	Present/steady	Present/steady
December	Present/steady	Absent	Present/steady	Present/steady
January	Present/steady	Absent	Present/steady	Present/steady
February	Present/steady	Absent	Present/steady	Present/steady
March	Present/steady	Absent	Present/steady	Present/steady
April	Present/steady	Absent	Present/steady	Present/steady

Figure 5.6-18. Example of groundwater upwelling data or trend supplied to 2-D habitat analysis.



* If subsequent time step is still within the spawning period and the cell still meets criteria for the duration of incubation period, effective habitat for this cell would be weighted according to the duration of the remaining spawning period.

Figure 8.5-32. Conceptual diagram depicting the Effective Spawning/Incubation Model.

Figure 5.6-19. Example data analysis sequence for depth, scour (velocity), and water quality for Effective Spawning/Incubation Analysis in Focus Areas.

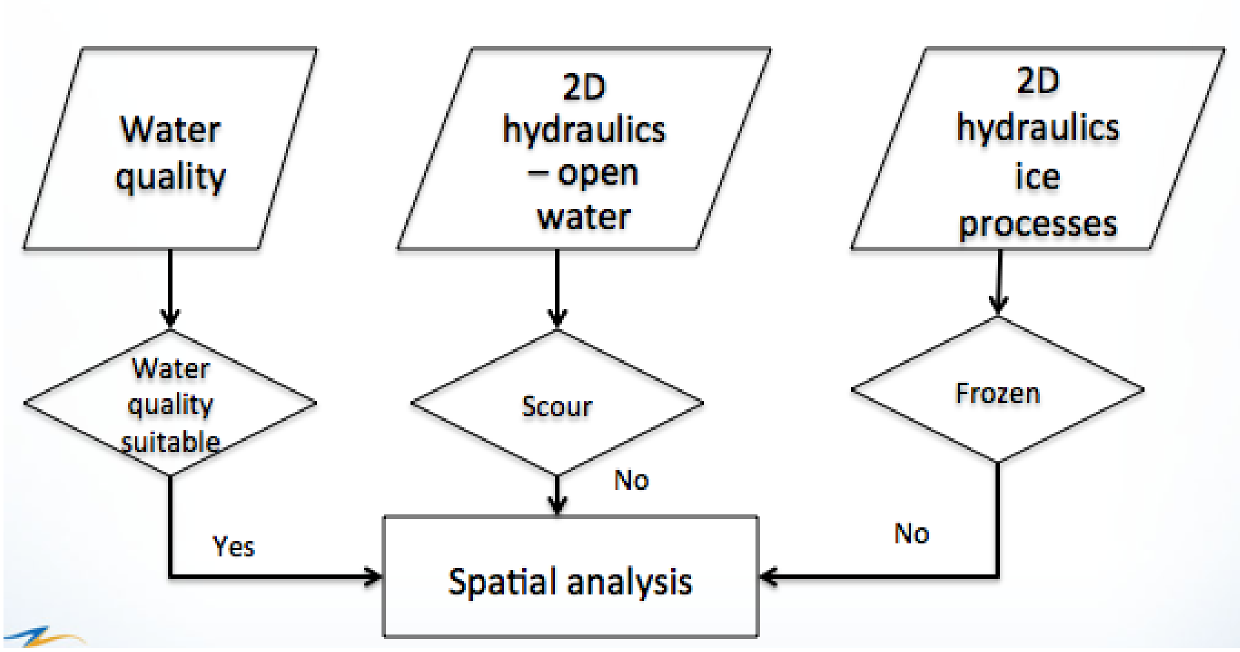


Figure 5.6-20. Example of other inputs from physical models for Effective Spawning/Incubation Analysis.

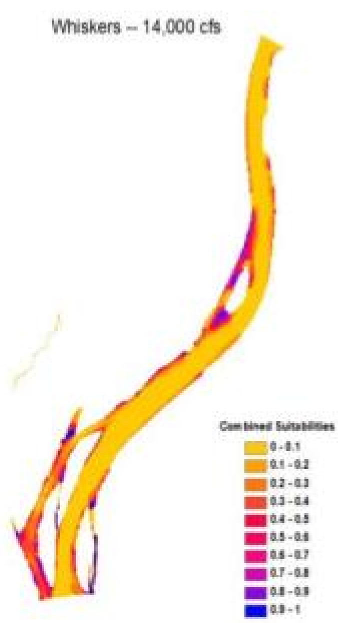


Figure 5.6-21. Example of GIS tool output showing habitat suitability for an entire Focus Area.

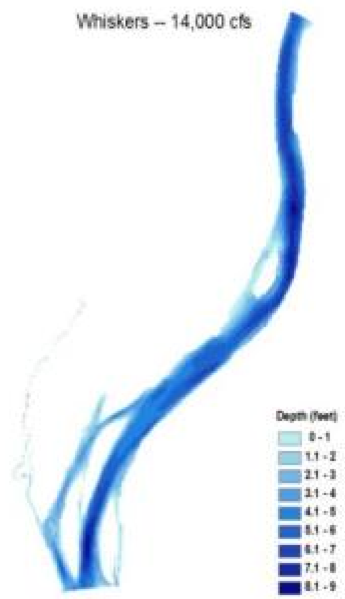


Figure 5.6-22. Example of GIS tool output showing depth for an entire Focus Area.

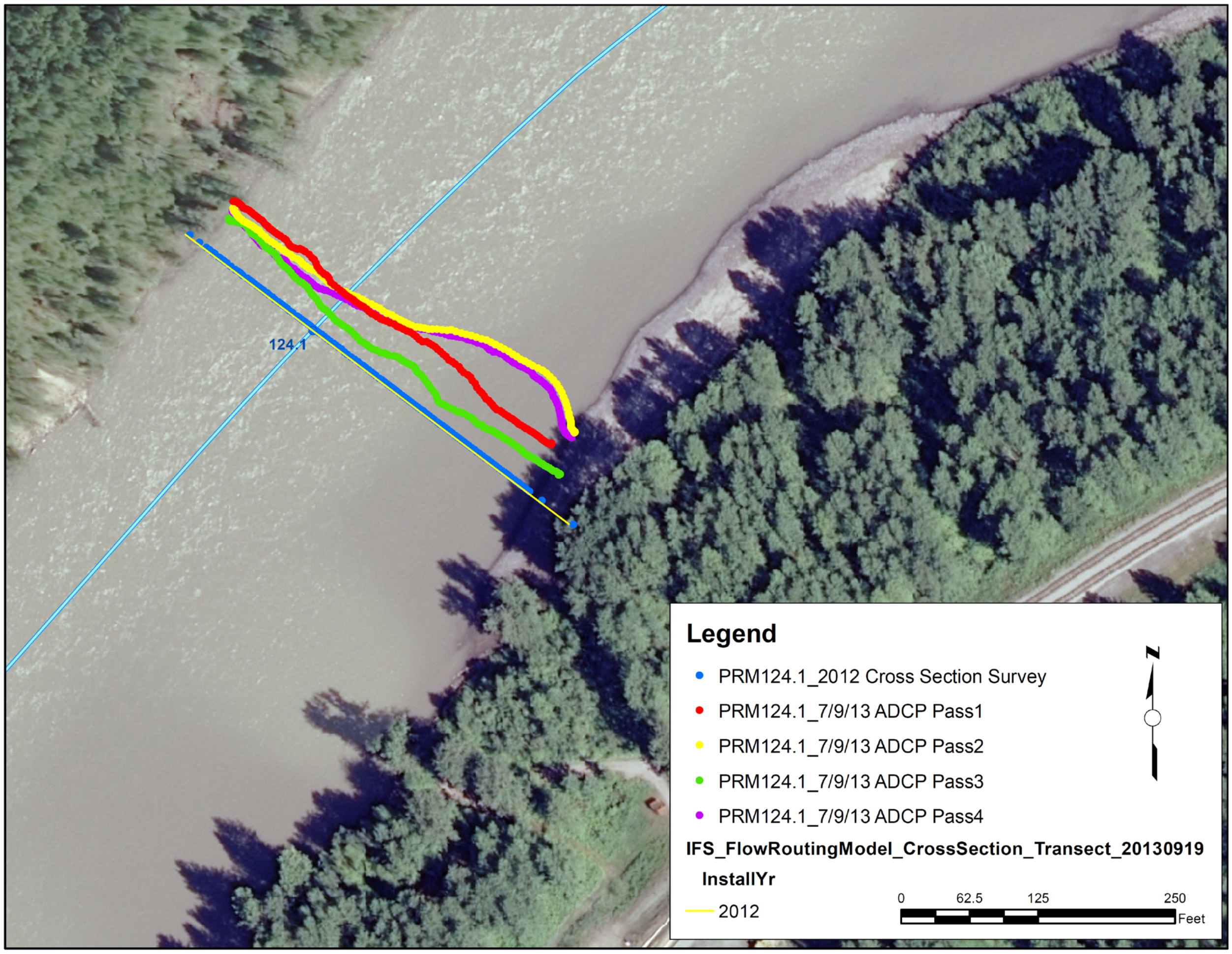


Figure 6.3-1. Aerial photo of locations of cross-sectional data collected at PRM 124.1 of the Susitna River 2012 and 2013.

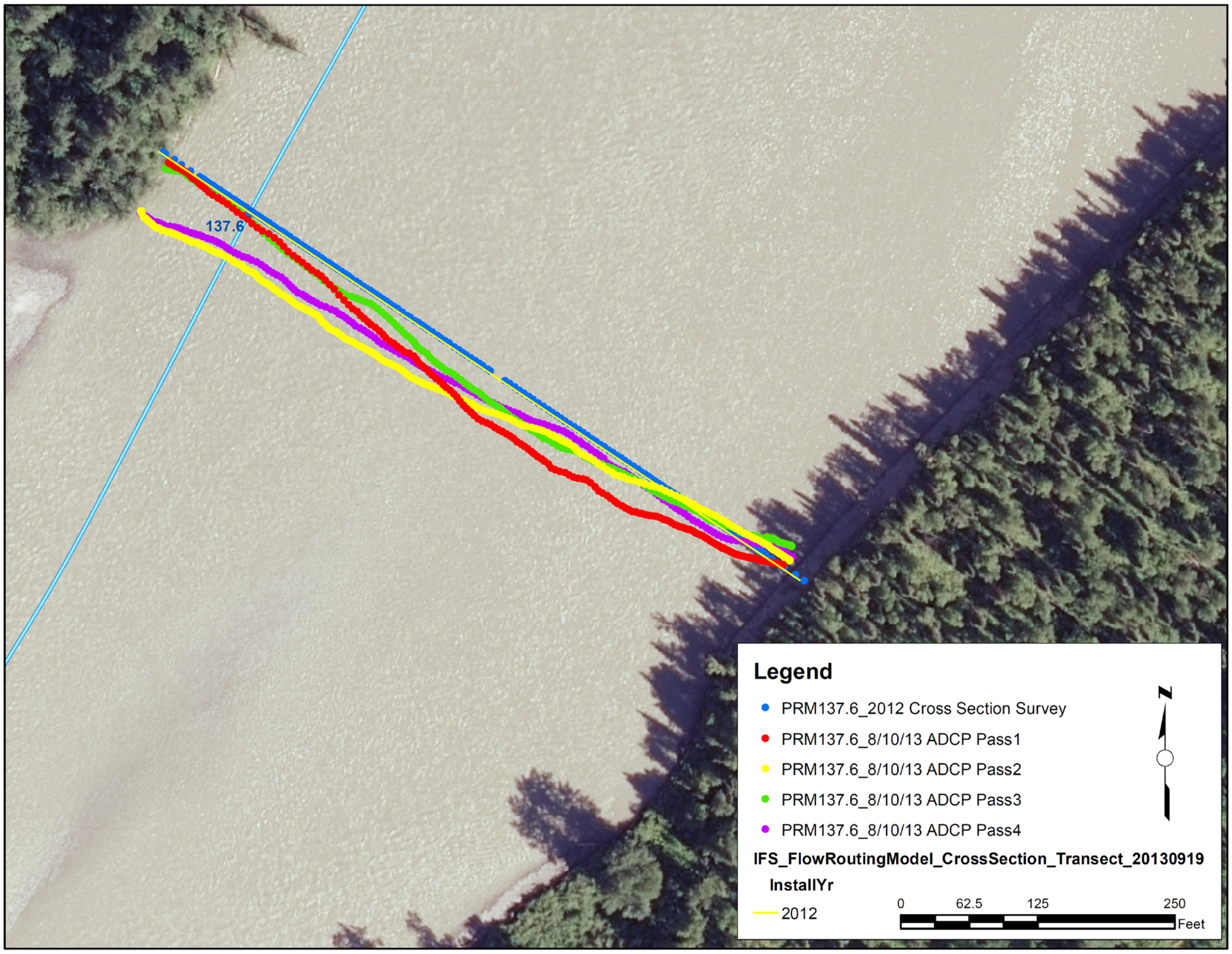


Figure 6.3-2. Aerial photo of locations of cross-sectional data collected at PRM 137.6 of the Susitna River in 2012 and 2013.