

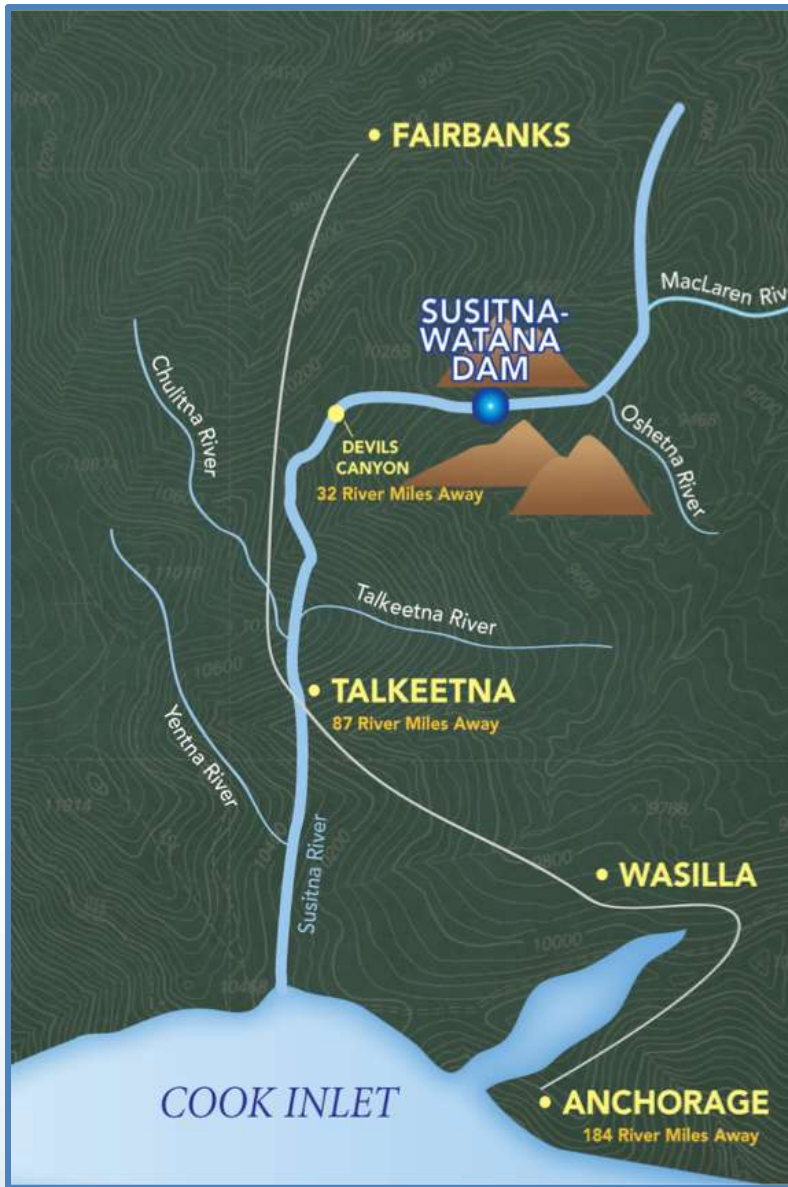
Technical WorkGroup Meeting Q3 2013 TWG

RSP 8.5

Fish and Aquatics Instream Flow Study (FA-IFS)

September 24, 2013

Prepared by **R2 Resource
Consultants**



RSP 8.5 FA-IFS: Presentation Overview²

- Review of Schedule and Q3 Activities and Planned Q4 Activities
- Focus Area Data Collection
- Hydrology and Hydraulic Flow Routing
- HSC/HSI Data Collection
- IFS Winter Studies
- Inter-disciplinary Study Integration and Modeling
- Other Topics

Review of Schedule: Fish and Aquatics Instream Flow Study

Activity	2012				2013				2014				2015	
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q
Study Area Selection (Focus and Supplemental Areas)	—————													
Compile aquatic habitat (RSP Sec 9.09) and geomorphology (Sec 6.5) characterization study results					—————								
Identify proposed Focus Areas				—————										
Refine Focus Areas and identify supplementary area if needed for any underrepresented habitats					—————								
TWG confirmation of 2013 areas					—————								
Review available data and modify or add Focus Areas and supplementary sampling areas									—————	△				
TWG review of proposed area weighting factors to extrapolate modeled to non-modeled areas													
TWG meeting on area weighting					—————								▲

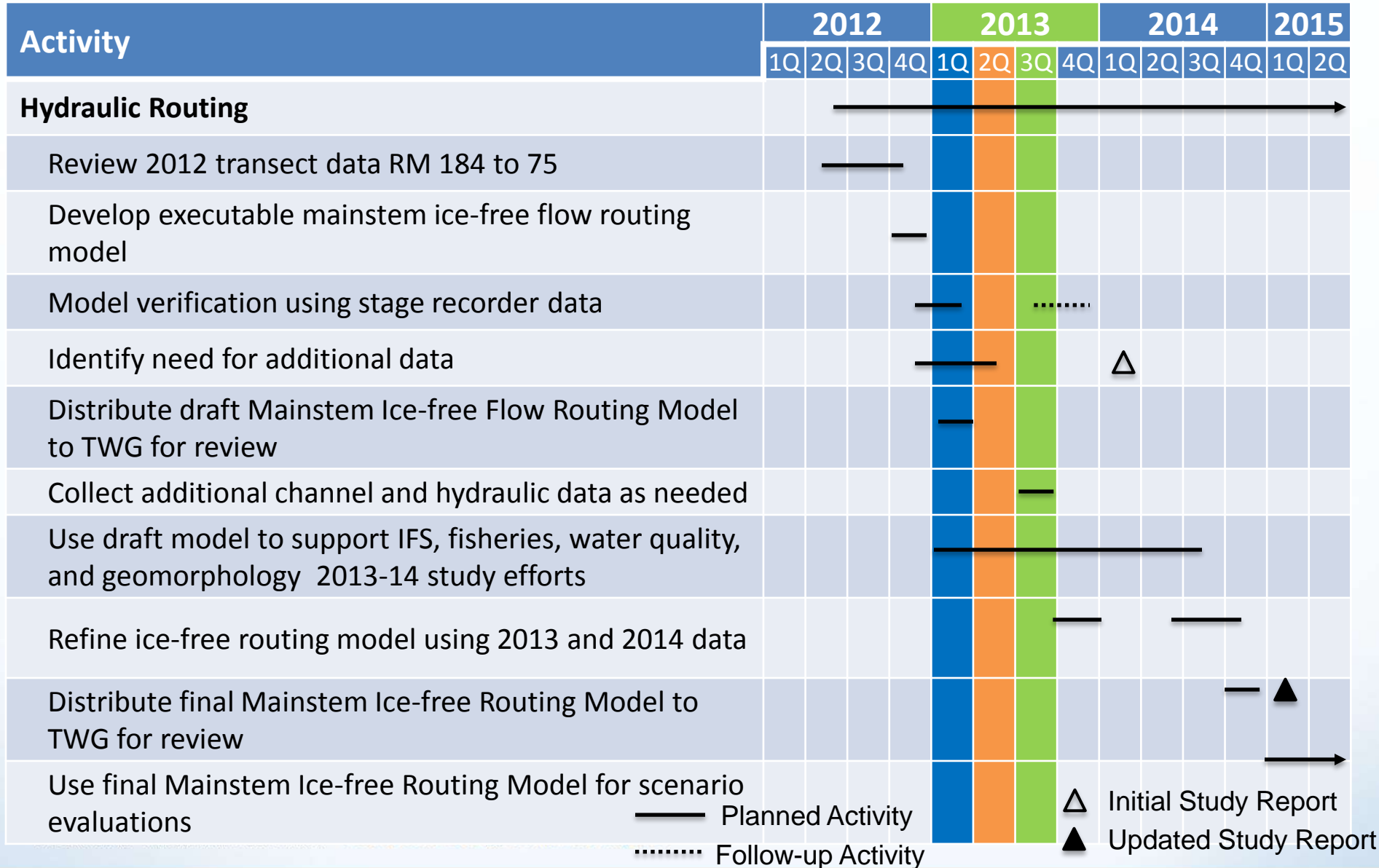
- Planned Activity
- Follow-up Activity
- △ Initial Study Report
- ▲ Updated Study Report

Fish and Aquatics Instream Flow Study Schedule (cont.)

Activity	2012				2013				2014				2015	
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q
Review of 1980s Data and Information														
Model Selection by habitat type (2-D, 1-D, etc.)														
Propose habitat models for Focus Areas and supplemental area														
TWG review and meeting on habitat model selection														

- Planned Activity
- Follow-up Activity
- △ Initial Study Report
- ▲ Updated Study Report

Fish and Aquatics Instream Flow Study Schedule (cont.)



Fish and Aquatics Instream Flow Study Schedule (cont.)

Activity	2012				2013				2014				2015	
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q
Hydrology														
Obtain existing daily flow records from USGS		—	—	—										
Obtain analysis of climate change effects on flow from USGS			—	—										
Obtain basin area calculations from GINA-UAF				—										
Calculate estimated tributary accretion flows				—										
TWG review of hydrologic record of daily flow							—							
TWG review of representative years for modeling							—			△				
Collect 15-min stage records from mainstem, tribs, Focus Areas		—	—	—	—	—	—	—	—	—	—	—		
Develop hourly flow record: Focus Areas/other mainstem loc.								—	—					
Develop hourly inflow for select tributaries								—	—					
Develop list of potential/recommended IHA-type parameters								—	—					
TWG review of selected IHA-type parameters									—					
Examine 2014 stage data and refine hydrologic record to support scenario evaluations												—		
TWG meeting to review complete hydrologic record												—	▲	
Use hydrologic record for scenario evaluations														→

Fish and Aquatics Instream Flow Study Schedule (cont.)

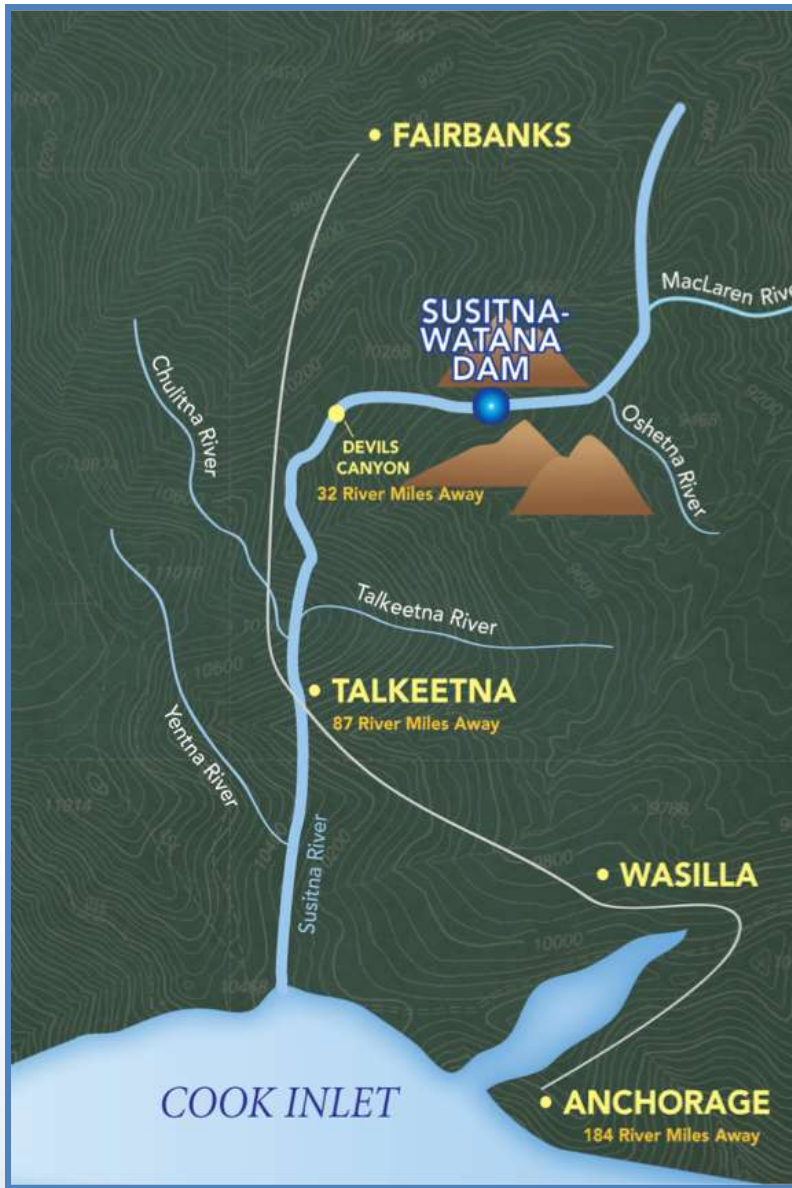
Activity	2012				2013				2014				2015	
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q
Periodicity														
Review draft species and lifestage periodicity data developed under Fish Distribution and Abundance (Sec 9.06)			—					
Identify specific HSC/HSI periodicity data needs				—					
Distribute HSC/HSI periodicity to TWG				—				△				
TWG meeting on HSC/HSI periodicity used to model scenarios													—	▲

- Planned Activity
- Follow-up Activity
- △ Initial Study Report
- ▲ Updated Study Report

Fish and Aquatics Instream Flow Study Schedule (cont.)

Activity	2012				2013				2014				2015	
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q
Collect Physical and Hydraulic Data for Habitat Modeling					■	■	■	■						
Collect data for digital terrain model					■	■	■	■					
Collect x-section and stage:discharge data at Focus Areas and supplemental areas					■	■	■	■					
Collect substrate/cover data at Focus Areas and supplemental areas					■	■	■	■					
Provide summaries of data collection efforts					■	■	■	■			△			▲

- Planned Activity
- Follow-up Activity
- △ Initial Study Report
- ▲ Updated Study Report



Focus Area Data Collection Update

Focus Area Sampling

<u>Focus Area</u>	<u>Initial Sampling Year</u>
• FA-184: Watana Dam	2013/2014 *
• FA-173: Stephan Lake	2013/2014 *
• FA-151: Portage Creek	2013/2014 *
• FA-144: Side Channel 21	2013
• FA-141: Indian River	2013
• FA-138: Gold Creek	2013
• FA-128: Skull Creek Complex	2013
• FA-115: Lane Creek	2013
• FA-113: Oxbow I	2013
• FA-104: Whiskers Slough	2013

* Contingent on Permitting and Access Authorization

Focus Area Sampling

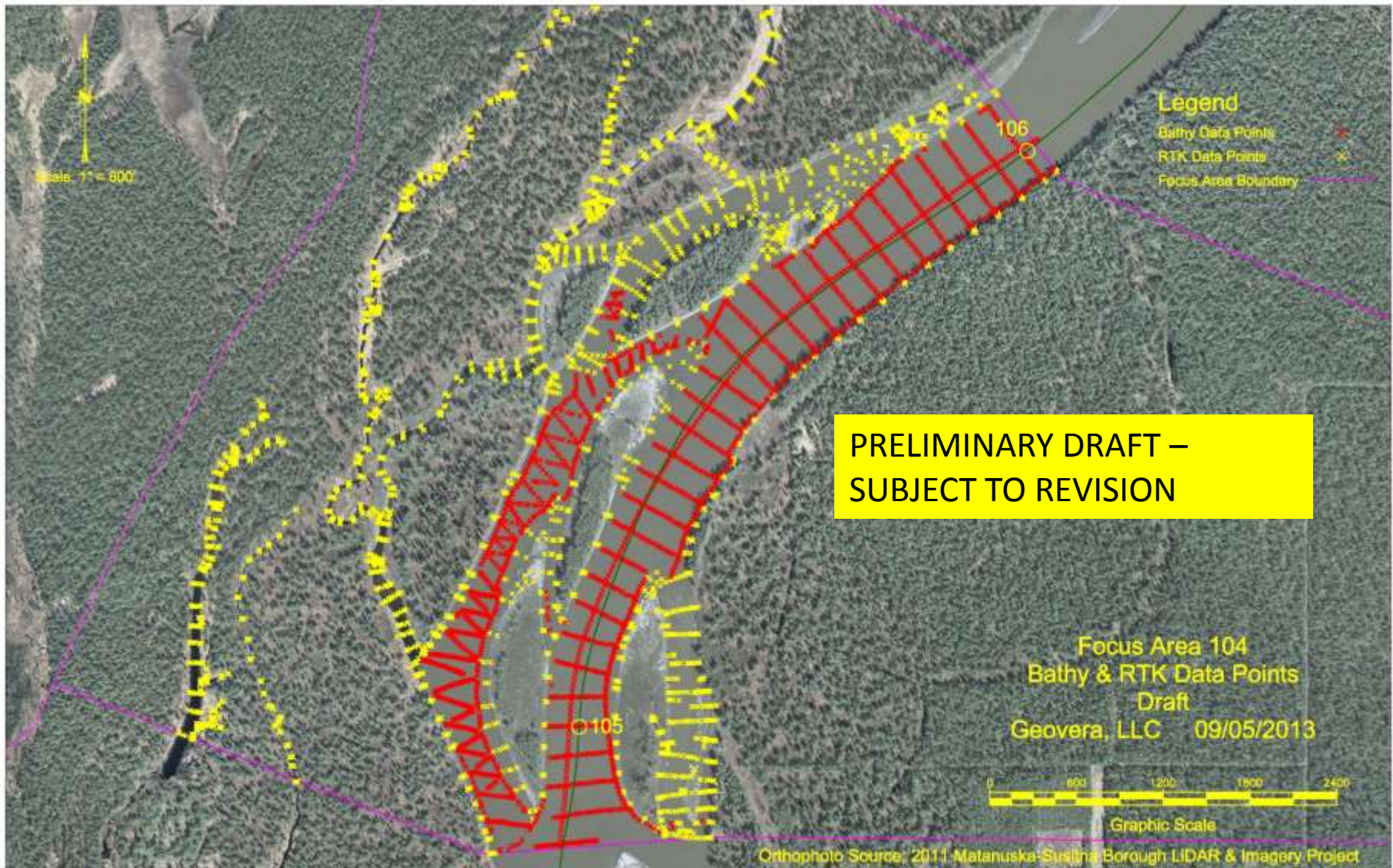
<u>Focus Area</u>	<u>Sampling Year</u>	
• FA-184: Watana Dam	2014 *	
• FA-173: Stephan Lake	2014 *	
• FA-151: Portage Creek	2014 *	
• FA-144: Side Channel 21	2013	 <p>Bathymetric Surveys Completed</p>
• FA-141: Indian River	2013	
• FA-138: Gold Creek	2013	
• FA-128: Skull Creek Complex	2013	
• FA-115: Lane Creek	2013	
• FA-113: Oxbow I	2013	
• FA-104: Whiskers Slough	2013	

* Contingent on Permitting and Access Authorization

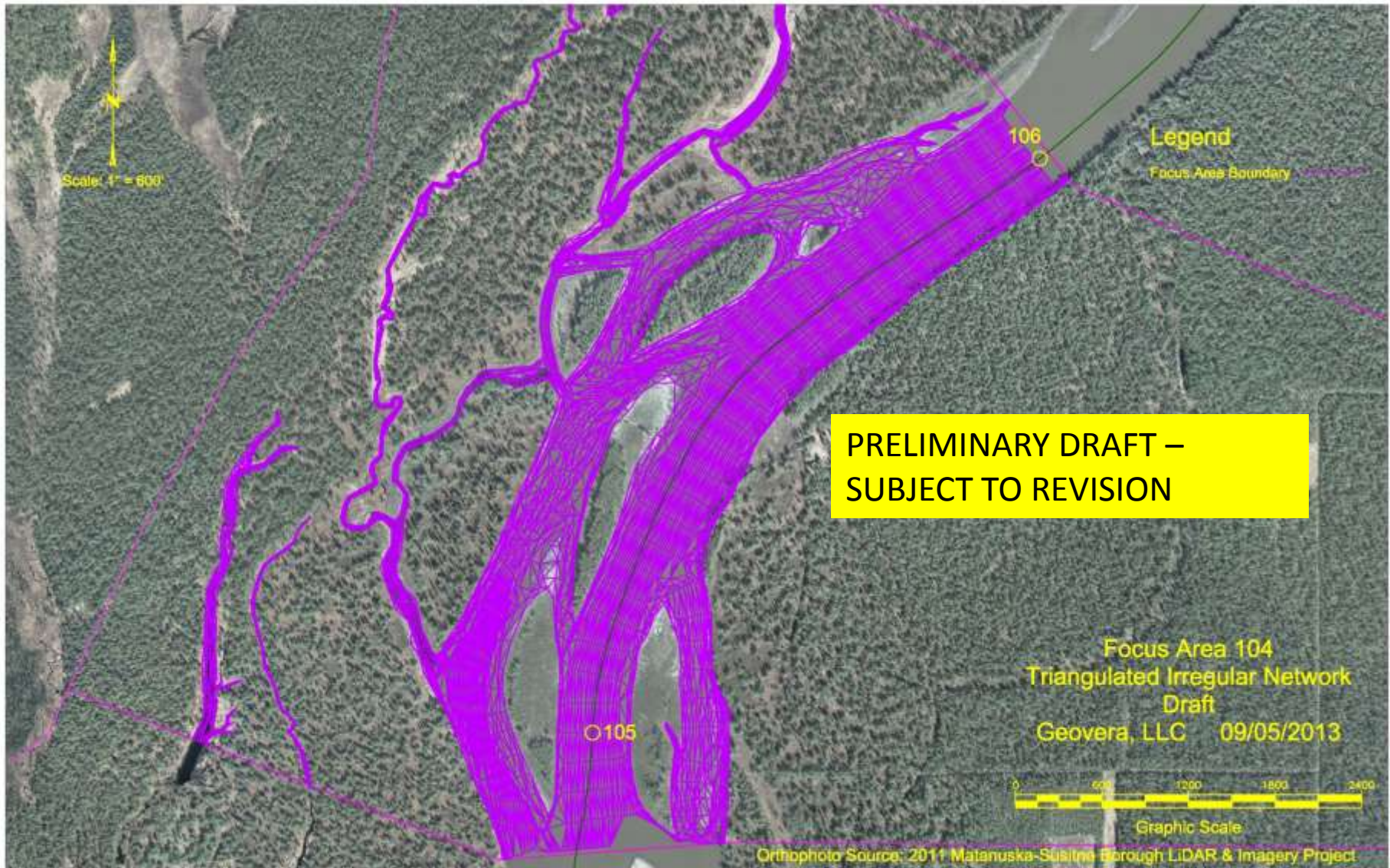
- Bathymetric Surveys completed for seven FAs
 - Work progressed from FA-144 downstream
 - Some refinements to be made during September effort (finish \approx 9/26):
reduce bathy survey intervals from 10 sec to 2 sec intervals
- ADCP Calibration measurements completed at all FAs; second set during September
- Majority of ADCP flow transects in Middle and Lower River complete
 - Cross-check with USGS measurement on one transect – nearly identical.
- Substrate characterization of seven FAs
- Data QA/QC ongoing
- Preliminary data input for modeling completed for FA-104 and FA-128: Bathymetric and RTK data point maps; Triangulated irregular network (TIN) maps; Topographic maps (see examples)



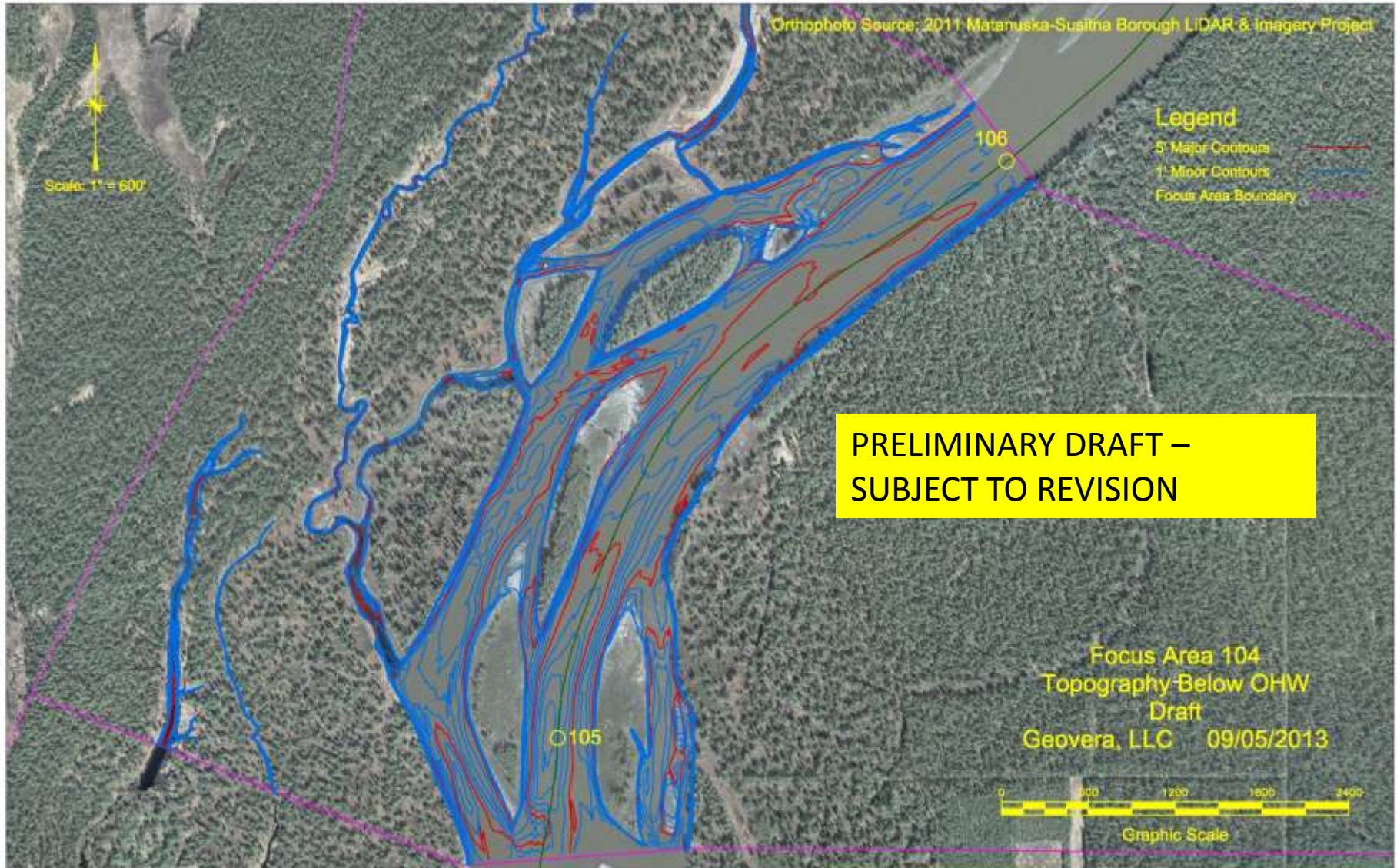
Bathy and RTK Data Points – FA-104



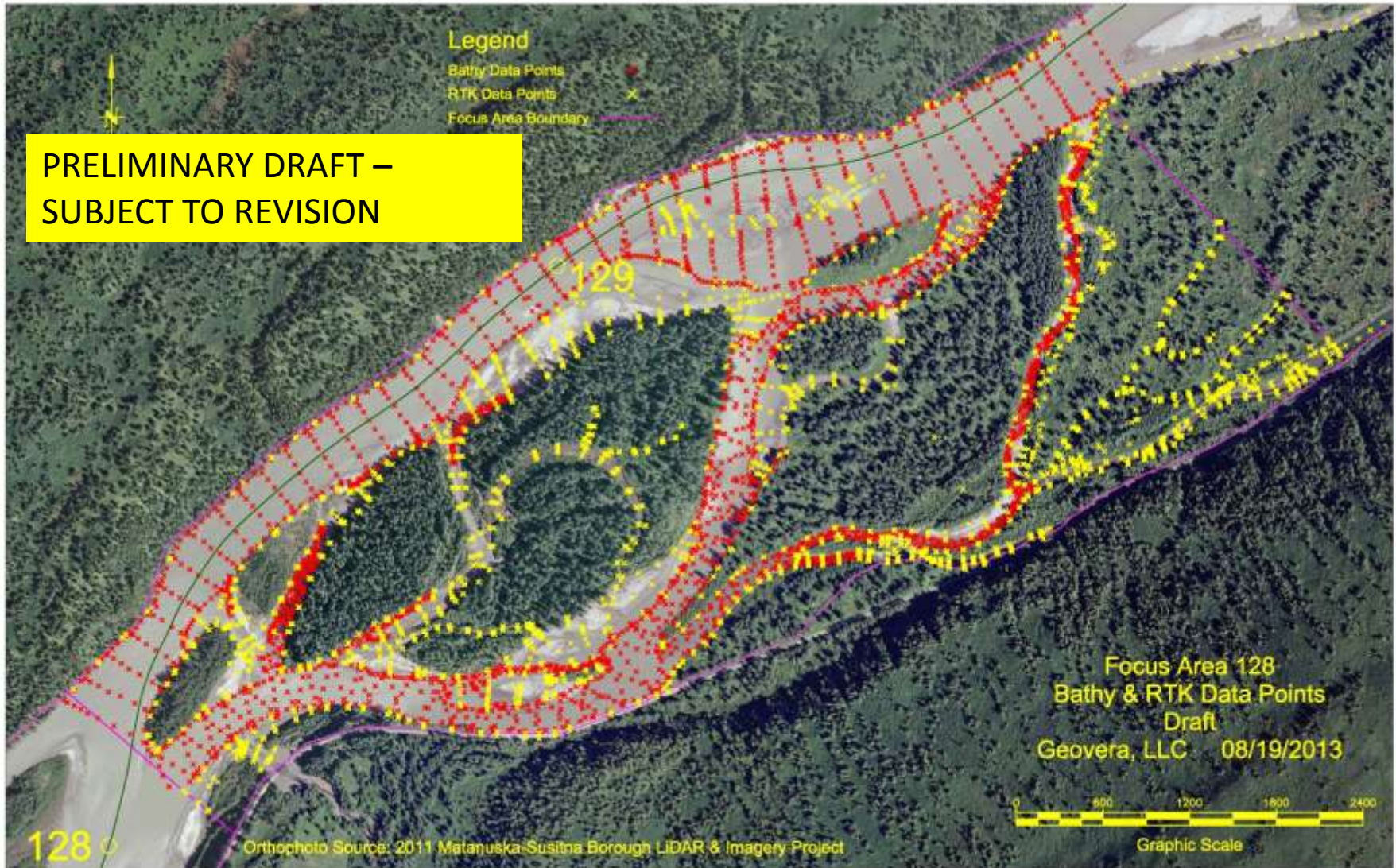
Triangulated Irregular Network – FA-104



Topography – FA-104



Bathy and RTK Data Points – FA-128



Triangulated Irregular Network – FA-128



Topography – FA-128



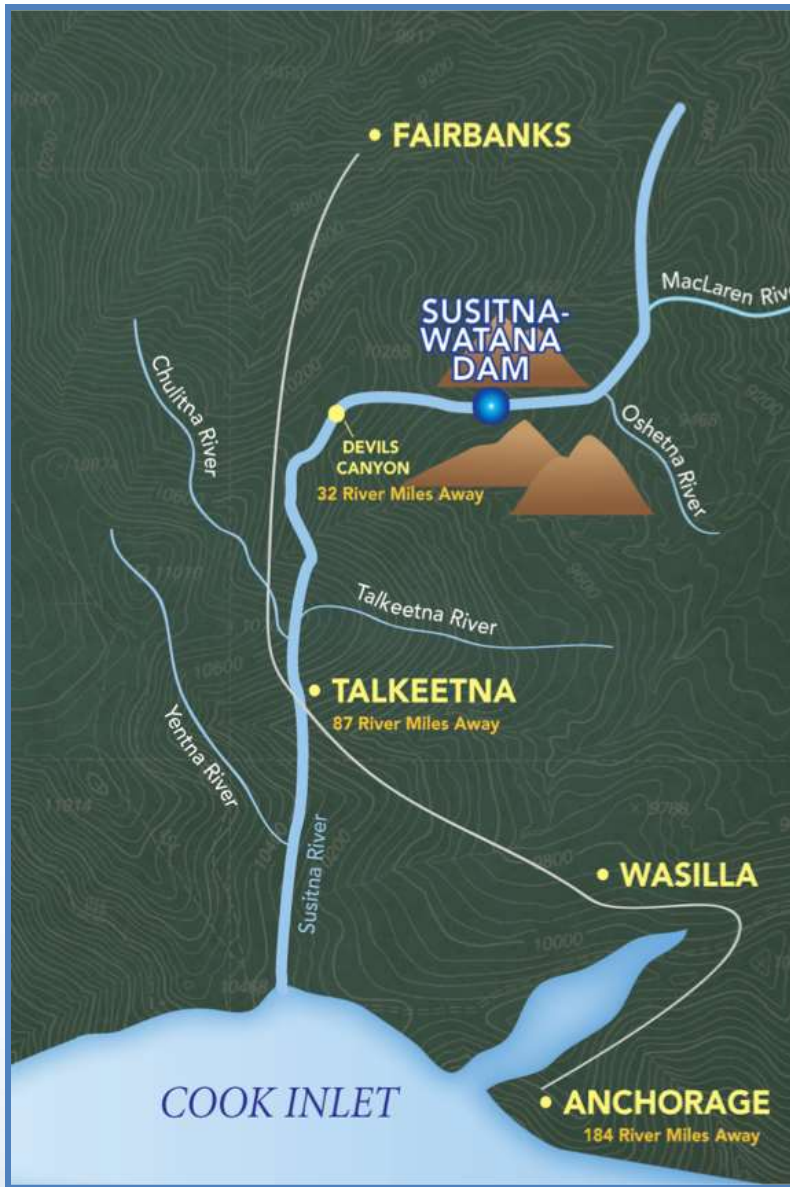
FA-IFS: Focus Area Data Collection



- Habitat Characterization and Mapping – per RSP 9.9
 - Macro-habitats (side channel, side slough, upland slough, etc.; field verification of aerial line mapping)
 - Meso-habitats (riffle, pool, etc.)
 - Training and habitat surveys initiated August 2.
 - 88% of FA habitats surveyed in August within MR 2, 5, 6, 7, 8 (FA-144 downstream)
 - 49% of accessible, randomly-selected mainstem habitat units surveyed in August, including all primary MR and UR units.
 - 8 of 38 accessible UR tributary geomorphic reaches have been surveyed.
 - Macro-habitat data analysis (ongoing)
 - Review/refine definitions
 - Compare aerial based line mapping with field surveys
 - Final review of Macro-habitat designations/definitions with IFS-TT (early October?)

RSP 8.5 FA-IFS: Variances

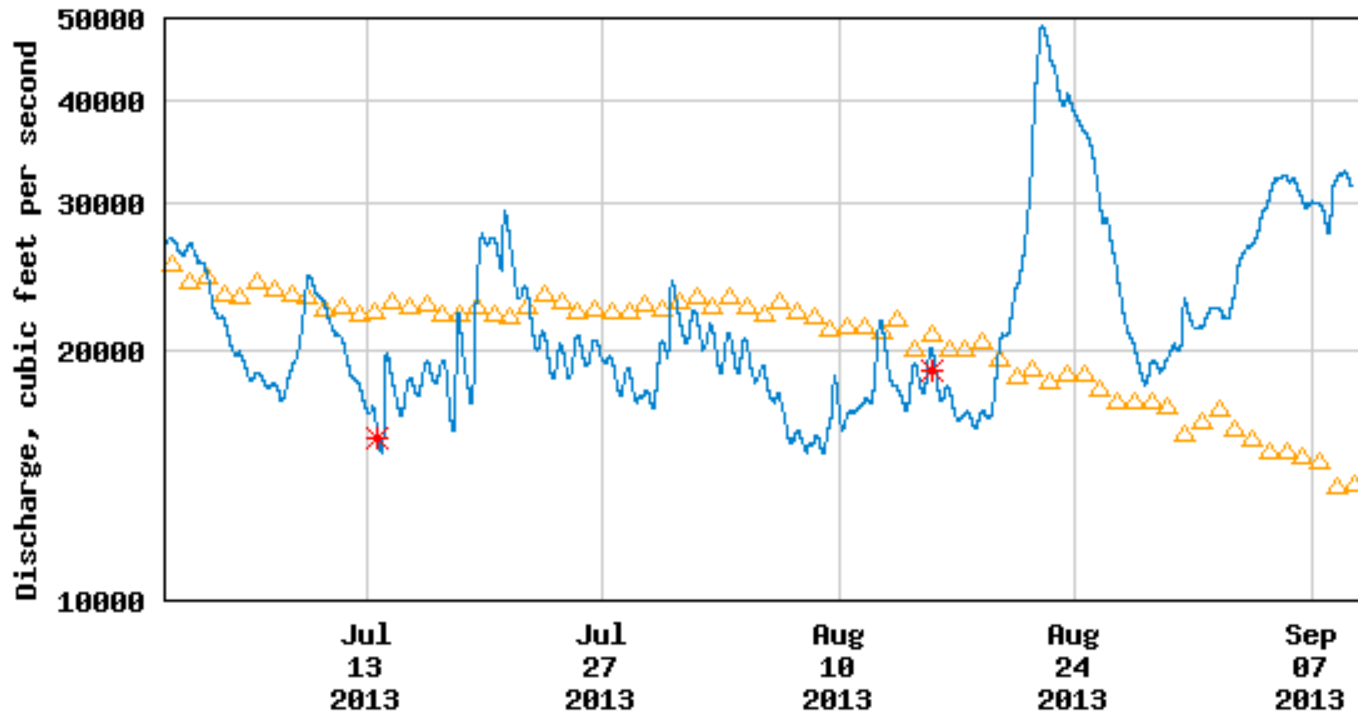
- Postponed surveys of three FAs until 2014 (access related)



8.5.4.3 Flow Routing Model and 8.5.4.4 Hydrology Update

RSP 8.5 FA-IFS: Hydrology

USGS 15292000 SUSITNA R AT GOLD CREEK AK

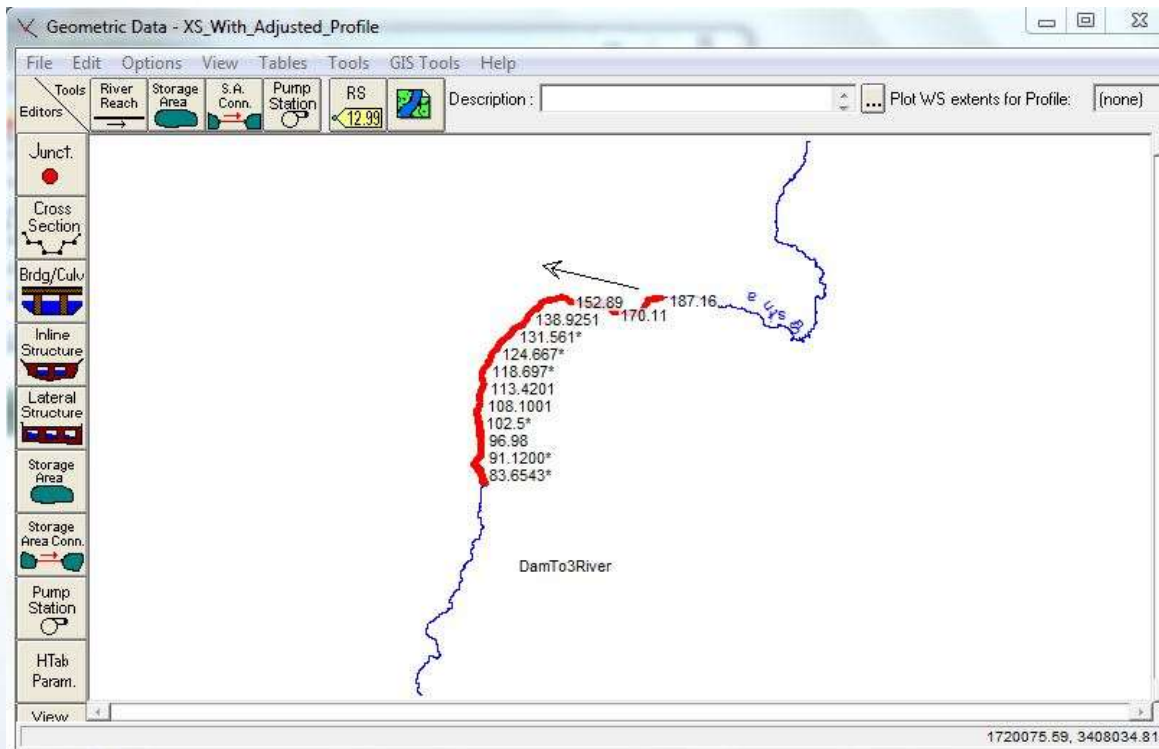


----- Provisional Data Subject to Revision -----

- △ Median daily statistic (59 years) * Measured discharge
- Discharge

8.5.4.3 FA-IFS - Open Water Flow Routing Model

U.S. Army Corps of Engineers
Hydrologic Engineering Center River Analysis System
HEC-RAS Version 4.1



Modelers

Stuart Beck, R2

Chiming Huang, R2

Matt Tiedemann, R2

- River cross-sections
 - 2012 – 88 cross-sections surveyed from PRM 80.0 to 153.7 and from PRM 168.1 to PRM 187.2 (dam site)
 - 2013 – add 99 cross-sections from PRM 29.9 to 146.1
 - 2014 – add 25 cross-sections from PRM 146.6 to 153.3 and from 166.6 to 186.7

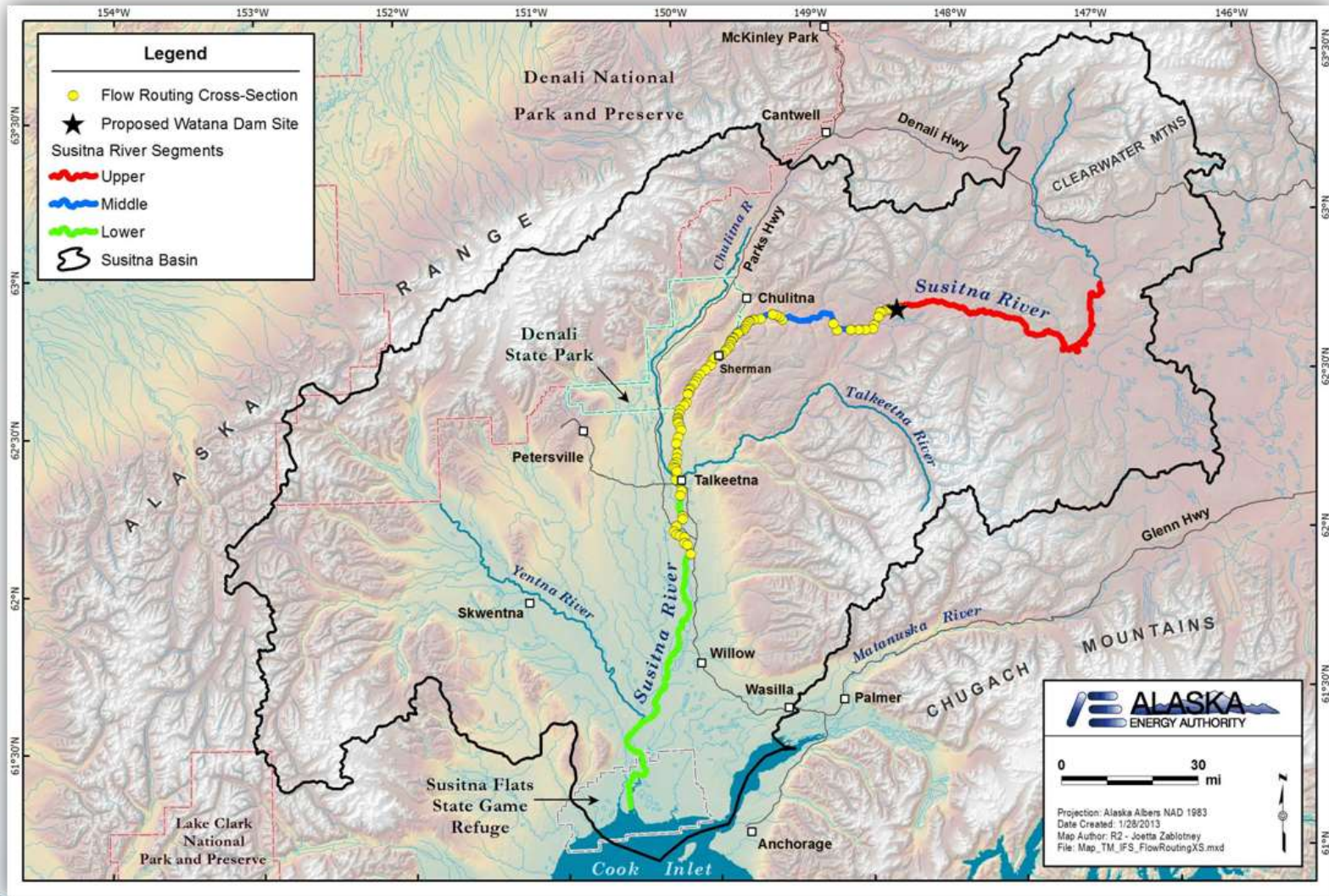
No cross-sections surveyed between PRM 153.7 and 166.6 for reasons of safety (Devils Canyon)

Final total = 212 cross-sections

Average distance between cross-sections = 0.7 miles

Cross-sections extended into the floodplain using LiDAR

Cross-Sections Surveyed in 2012



Steady State Calibration Data

- Water Surface Elevation/Flow
 - 2012 – 120 measurements
 - 2013 – 299 measurements (Ongoing)
 - 2014 – 67 measurements (Proposed)

Final total = 486 measurements

Calibration accomplished by selection of hydraulic roughness, expansion/contraction loss coefficients, and interpolated cross-sections

Unsteady State Calibration/Validation Data

River	Station	2012	2013	2014
Susitna	Above Tsusena Creek USGS 15291700	✓	✓	✓
	At Gold Creek USGS 15292000	✓	✓	✓
	At Sunshine USGS 15292780	✓	✓	✓
	At Susitna Station USGS 15294350		✓	✓
Chulitna	Near Talkeetna USGS 15292400	✓	✓	✓
Talkeetna	Near Talkeetna USGS 15292700	✓	✓	✓
Yentna	Near Susitna Station USGS 15294345		✓	✓

Flow Routing Model Development Schedule

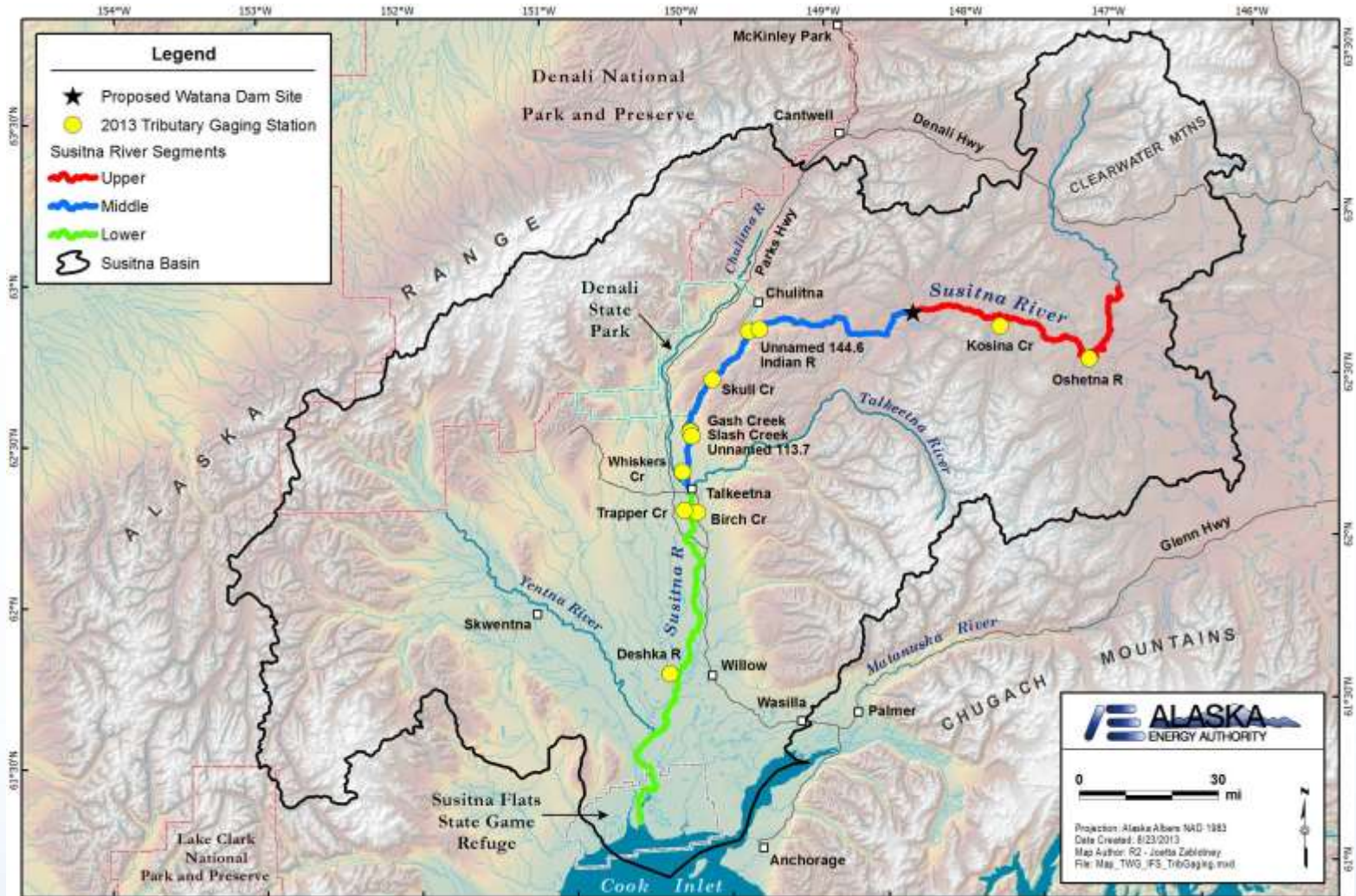
- **Version 1 – January 2013**
 - From PRM 80.0 to PRM 187.2
 - Hourly downstream accretion flows without diurnal fluctuations
 - Cross-sections do not extend into floodplain
- **Version 2 – January 2014**
 - From PRM 29.9 to PRM 187.2
 - Hourly downstream accretion flows with partial diurnal fluctuation coverage based on available historical hourly flows
 - Cross-sections do not extend into floodplain
- **Version 3 – January 2015**
 - From PRM 29.9 to PRM 187.2
 - Hourly downstream accretion flows with complete coverage of diurnal fluctuations
 - Cross-sections extended into floodplain



8.5.4.4 FA-IFS: Hydrology – 2013 Tributary Gaging

Tributary	Susitna PRM	River Segment
Oshetna River	235.1	Upper
Kosina Creek	209.1	Upper
Unnamed Creek	144.6	Middle
Indian River	142.1	Middle
Skull Creek	128.1	Middle
Gash Creek	115.0	Middle
Slash Creek	114.9	Middle
Unnamed Creek	113.7	Middle
Whiskers Creek	105.1	Middle
Trapper Creek	95.4	Lower
Birch Creek	93.3	Lower
Deshka River	44.9	Lower

RSP 8.5 FA-IFS: Tributary Gaging



RSP 8.5 FA-IFS: Tributary Gaging

32

- Installation of Continuous Pressure Transducers (& Duplicates) at 10 Sites (15 min. increments)
 - Oshetna River, Kosina Creek, Indian River, Skull Creek, Gash Creek, Unnamed Tributary @ PRM 113.7, Whiskers Creek, Trapper Creek, Birch Creek, Deshka River
- Spot Measurements at Two Sites
 - Unnamed Tributary @ PRM 144.6, Slash Creek
- Installation of barometric pressure transducers (for atmospheric adjustment) at four sites
 - Kosina Creek, Indian River, Whiskers Creek, Deshka River



- 2 Gage Installation Field Visits
 - June 15-17th, 22nd (Gash, Trapper, Unnamed Trib @ 113.7, & Whiskers)
 - July 11-15th (Birch, Doshka, Indian, Kosina, Oshetna, & Skull)
- Data download & streamflow measurement at all sites
 - Aug 6-10th



RSP 8.5 FA-IFS: Tributary Gaging

- Continuous Site Data Collection
 - Streamflow measurement
 - Staff Gage reading
 - Benchmark and Water Surface Elevation Survey
 - Datalogger download
 - Site photographs
- Spot Measurement Site Data Collection
 - Streamflow measurement
 - Site photographs



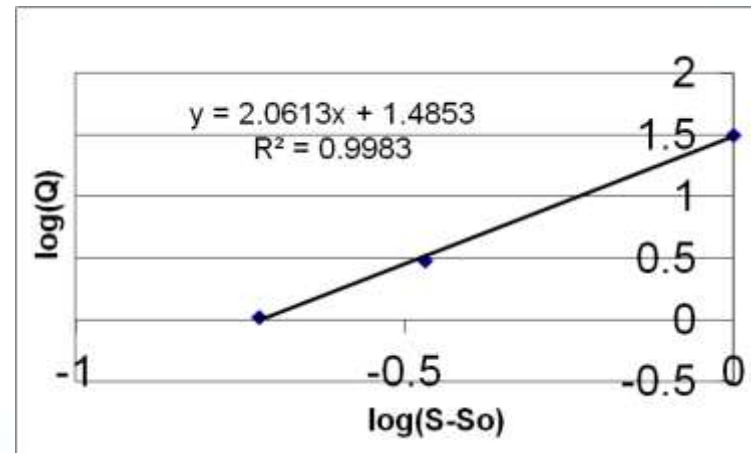
RSP 8.5 FA-IFS: Tributary Gaging

35

- Two Sites (Unnamed Tributary at PRM 144.6 and Slash Creek) were too low to install continuous monitors so only discharge spot measurements were collected during site visits.
- Four barometric pressure transducers installed.

RSP 8.5 FA-IFS: Tributary Gaging

- One more field visit in the end of September/beginning of October
- Data Analysis
 - Where possible, develop rating curves for each of the continuous sites to develop a 15-minute record of streamflow
 - Ability to develop rating curve and continuous record depends on the range of streamflows measured and the range of pressure recorded



FA-IFS – Tributary Gaging: Next Steps 2014

- Continue spot measurements and continuous monitoring at the same sites and add five additional tributary gaging sites
 - Fog Creek, Unnamed Tributary @ 173.8, Portage Creek, Sheep Creek, and Caswell Creek
- Conduct four field visits (once per month June through September)



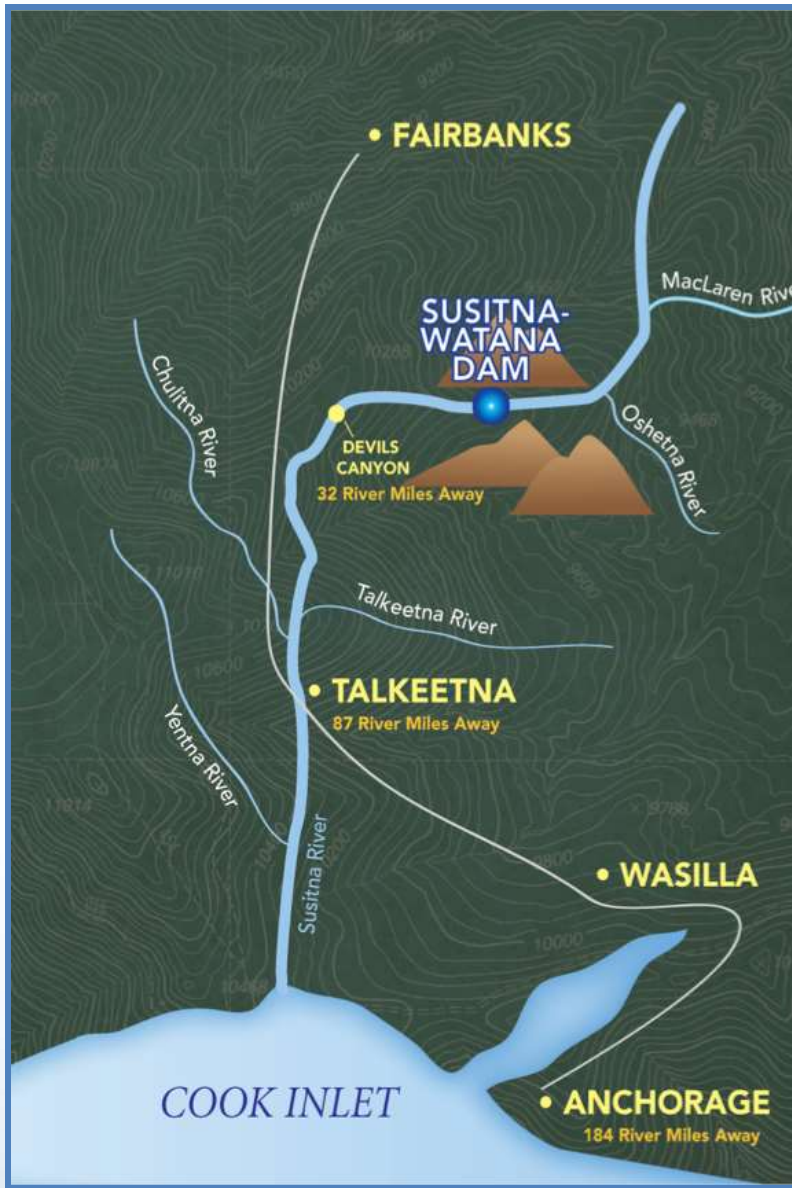
8.5.4.5.1.3 FA-IFS: Biological Cues Evaluation ³⁸

- Identify and evaluate candidate drainages with “suitable data” sets (hydrology and adult escapement/count data):
 - Deshka River – lacking hydrologic record
 - Taku River
 - Stikine River
- Identify appropriate biological metrics
 - Species
 - Life stage sensitive - periodicity
- Identify appropriate hydrologic metrics (potential correlates)
 - IHA and others
- Statistical Analysis



FA-IFS Study – Biological Cues Evaluation

Dependent Variable	Potential Driving/Correlating Factors
Brood Year Escapement or Returns per Spawner	Mean flow during Incubation Peak flow during Incubation Mean flow during spawning Low flow during spawning Mean winter air temperature during Incubation (Brood Year + 1) Mean winter air temperature during fry overwintering (Brood Year +2) Winter low flow during Incubation (Brood Year +1) Winter low flow during fry overwintering (Brood Year +2) Mean Winter flow during Incubation (Brood Year +1) Mean Winter flow during fry overwintering (Brood Year +2) Mean Summer PDO index (Brood Year +2)
Median Julian day of upstream migration	Julian Day of peak flow during July through August
Number of days between 5% and 95% cumulative upstream migration	Annual Escapement Mean Flow during upstream migration Julian Day of peak flow during July through August Variance of mean daily flow during upstream migration
Median Julian day of downstream migration	Julian day of initial ice break-up Julian Day of peak flow during mid-May to August



8.5.4.5 HSC/HSI Data Collection

FA-IFS: Habitat Suitability Criteria Development

- Q3 2013 HSC/HSI Data Collection Task Summary
- HSC/HSI Data Collection Update
 - Number of Sites, field visits, data collected
- Variances from 2013 Study Plan
- Q4 2013 Proposed Work



FA-IFS: HSC Studies

- Conduct summer 2013 HSC surveys: In Progress – crew training and initial surveys started June 18, 2013
- Conduct opportunistic stranding and trapping surveys: In Progress – crew training and initial surveys started June 18, 2013



FA-IFS: HSC Data Collection

- Q3 2013 HSC/HSI Data Collection Task Summary
 - Collect microhabitat use and availability data across a broad range of habitat conditions for development of site-specific HSC preference curves
 - Collect and evaluate relationship between other variables (water quality & chemistry, groundwater upwelling) and fish presence where possible



FA-IFS: HSI Sampling Update

- Surveyed 134 Sampling Reaches:
 - 110 - 50m (off-channel areas)
 - 24 - 100m (mainstem areas)
- HSI data collected in each of the 134 Reaches:
 - Minimum of three measurements of each parameter
 - Temperature, D.O., conductivity, and VHG
 - Turbidity 1-3 samples depending on variability
- VHG values range from +200 mm to -95 mm
 - Main and side channel generally losing reaches
 - Off-channel/sloughs generally gaining reaches

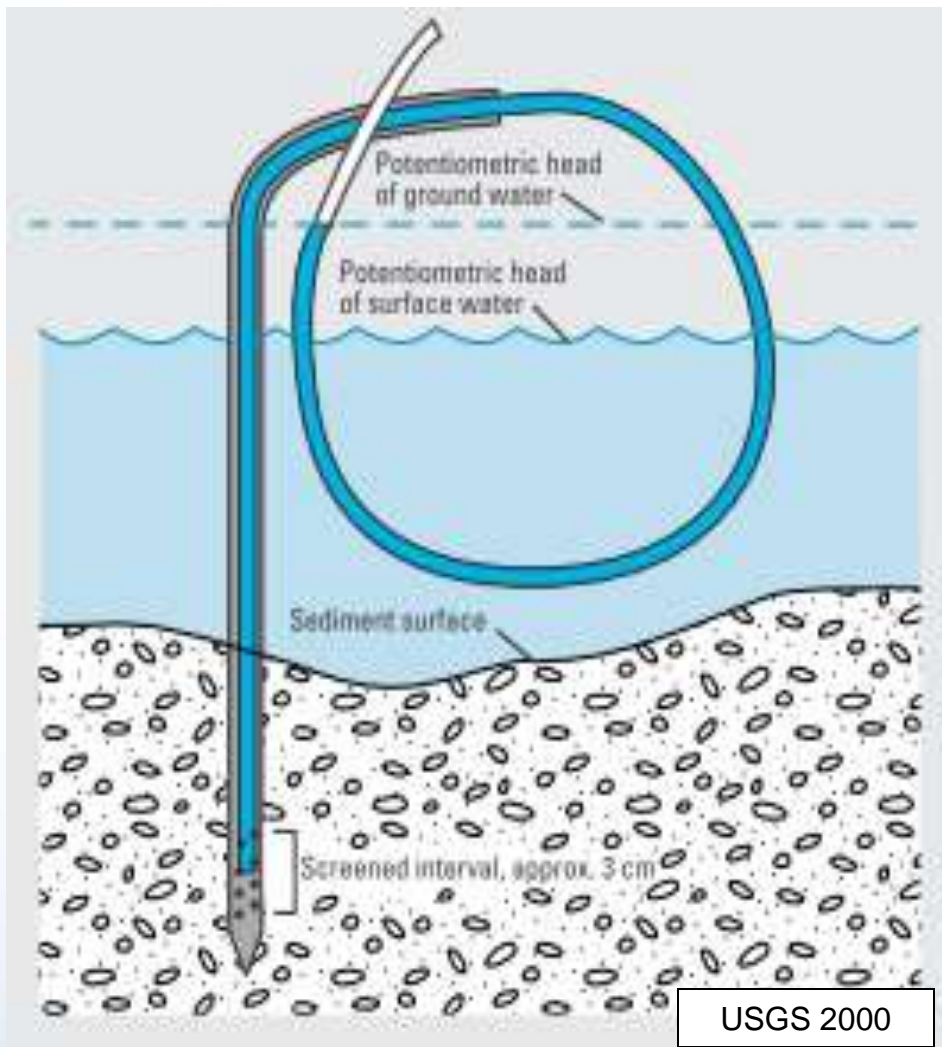


Microhabitat Data in Unoccup 45 Cells

- Collected at set intervals along 100m or 50m length
- Depth, Vel., Substrate, & cover
- Water quality (temp., D.O., conductivity, turbidity)
- Measurement of groundwater upwelling



Detecting Groundwater Upwelling 46



FA-IFS: HSC Data Collection Summary

- Collect microhabitat data for both occupied (utilization) and unoccupied (availability) areas:
 - ✓ Measurements collected at all FA sites d/s Portage Creek, expanded to areas outside FA
 - ✓ Sites selected based on stratified random sampling
 - ✓ Sampling events : July 8-17, July 22-31, August 5-14, August 19-28, September 9-18, and September 23-October 2
 - ✓ 50m and 100m sampling reaches (agency recommended)
 - ✓ Snorkel, seining, electrofishing, and pedestrian surveys
 - ✓ Collected depth, velocity, substrate, cover and water quality data (temp., D.O., conductivity, turbidity, groundwater upwelling)





SUSITNA-WATANA HYDRO *Clean, reliable energy for the next 100 years.*

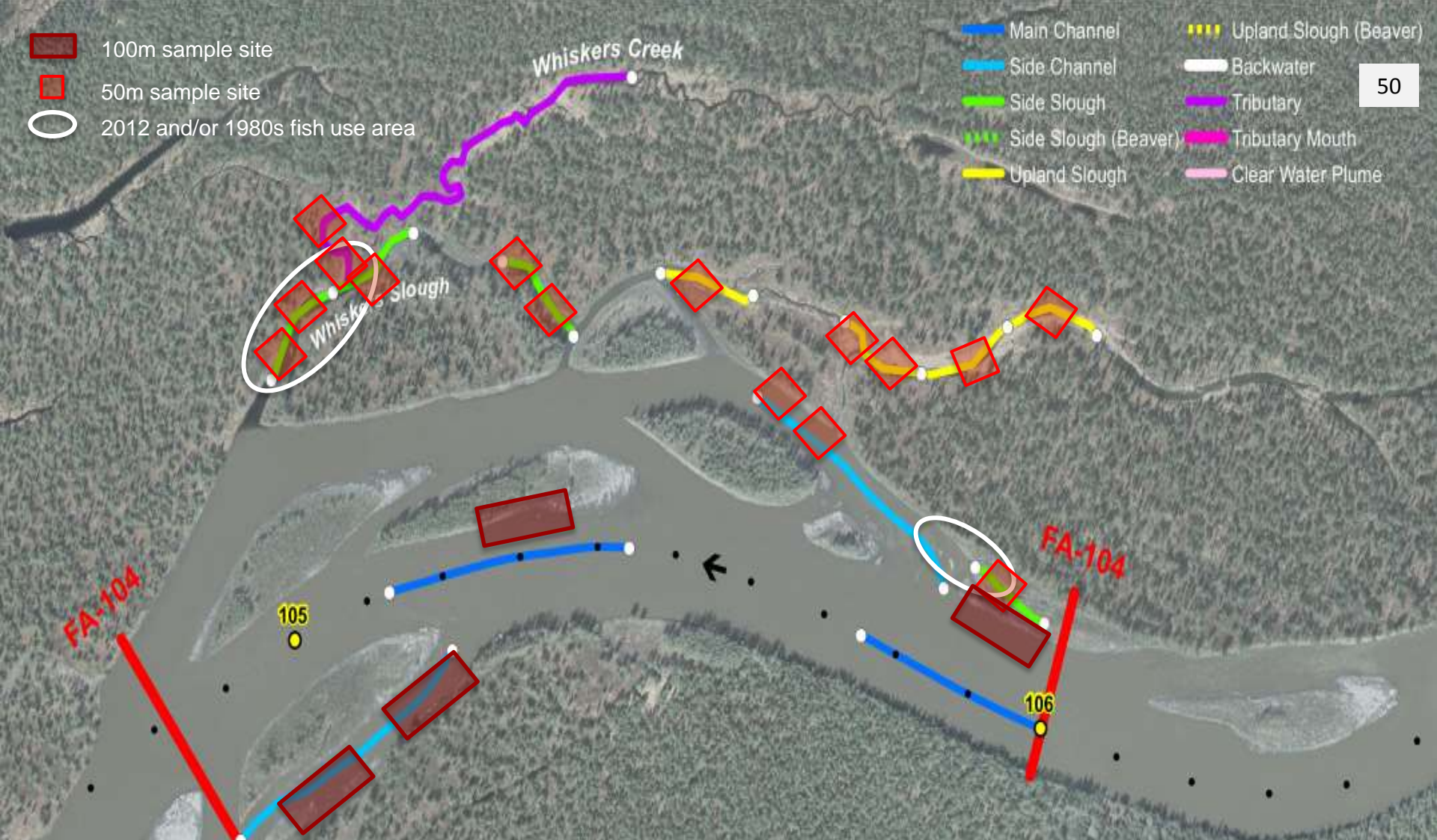
2013 HSC Sampling Update

- Emphasis on Middle River Segment (downstream of Portage Creek)
- Concentrated effort on 7 Focus Areas with known fish use and high diversity of macrohabitat types
- Surveyed 134 Sampling Reaches:
 - 110 - 50m (off-channel areas)
 - 24 - 100m (mainstem areas)
- Sample length = 7,900m (25,900 ft)
- Number of utilization measurements = 828
- Number of availability measurements = 2,370

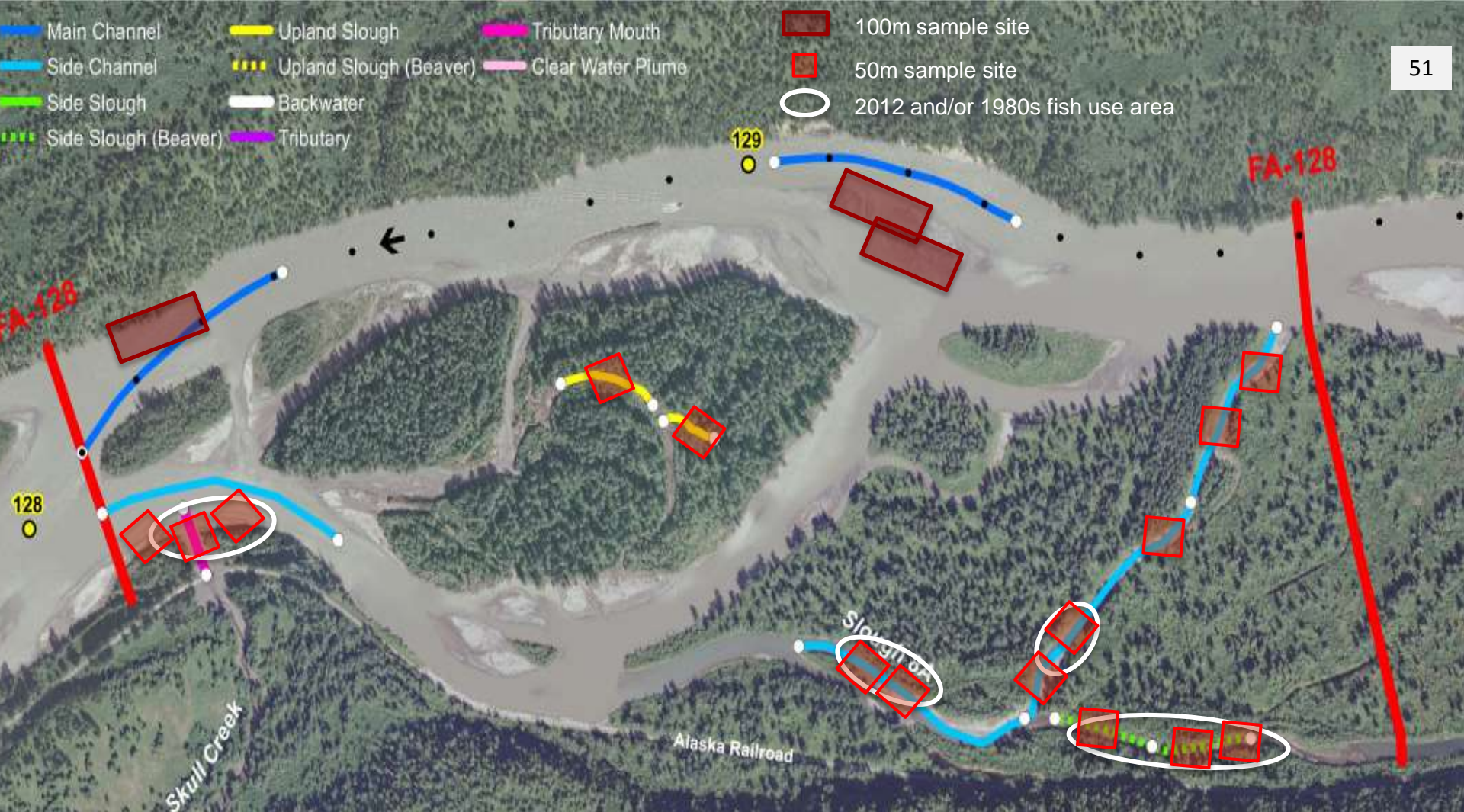


- 100m sample site
- 50m sample site
- 2012 and/or 1980s fish use area

- Main Channel
- Side Channel
- Side Slough
- Side Slough (Beaver)
- Upland Slough
- Upland Slough (Beaver)
- Backwater
- Tributary
- Tributary Mouth
- Clear Water Plume



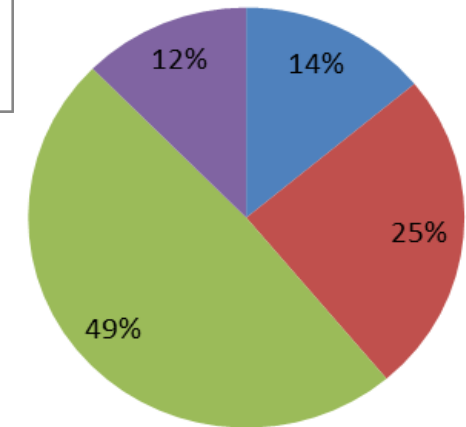
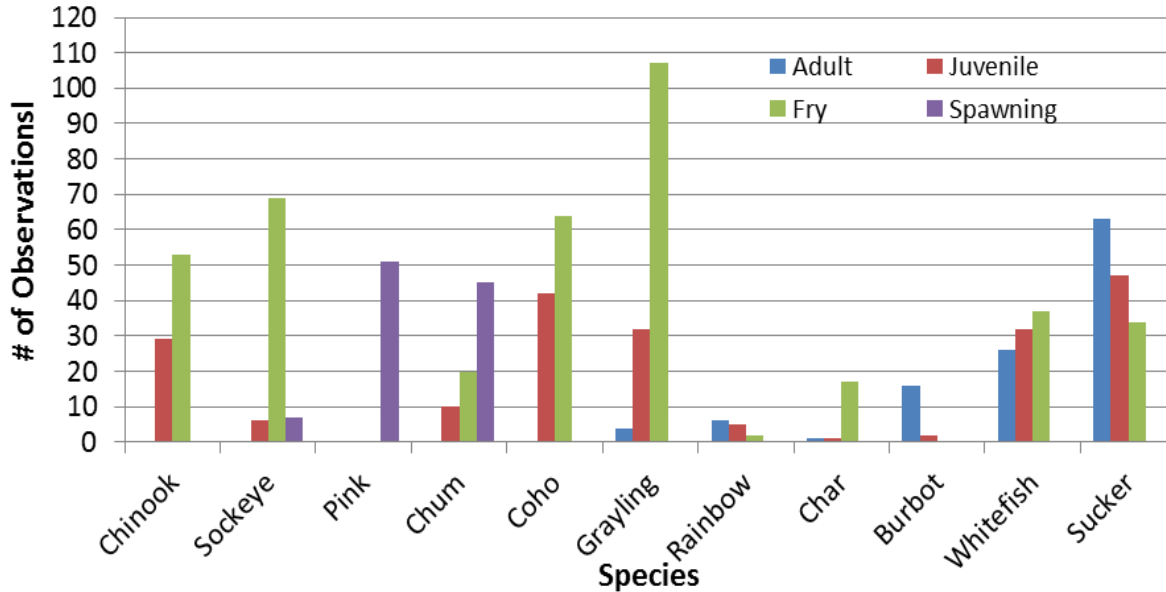
FA-104, Whiskers Slough Complex: 2013 HSC Sampling



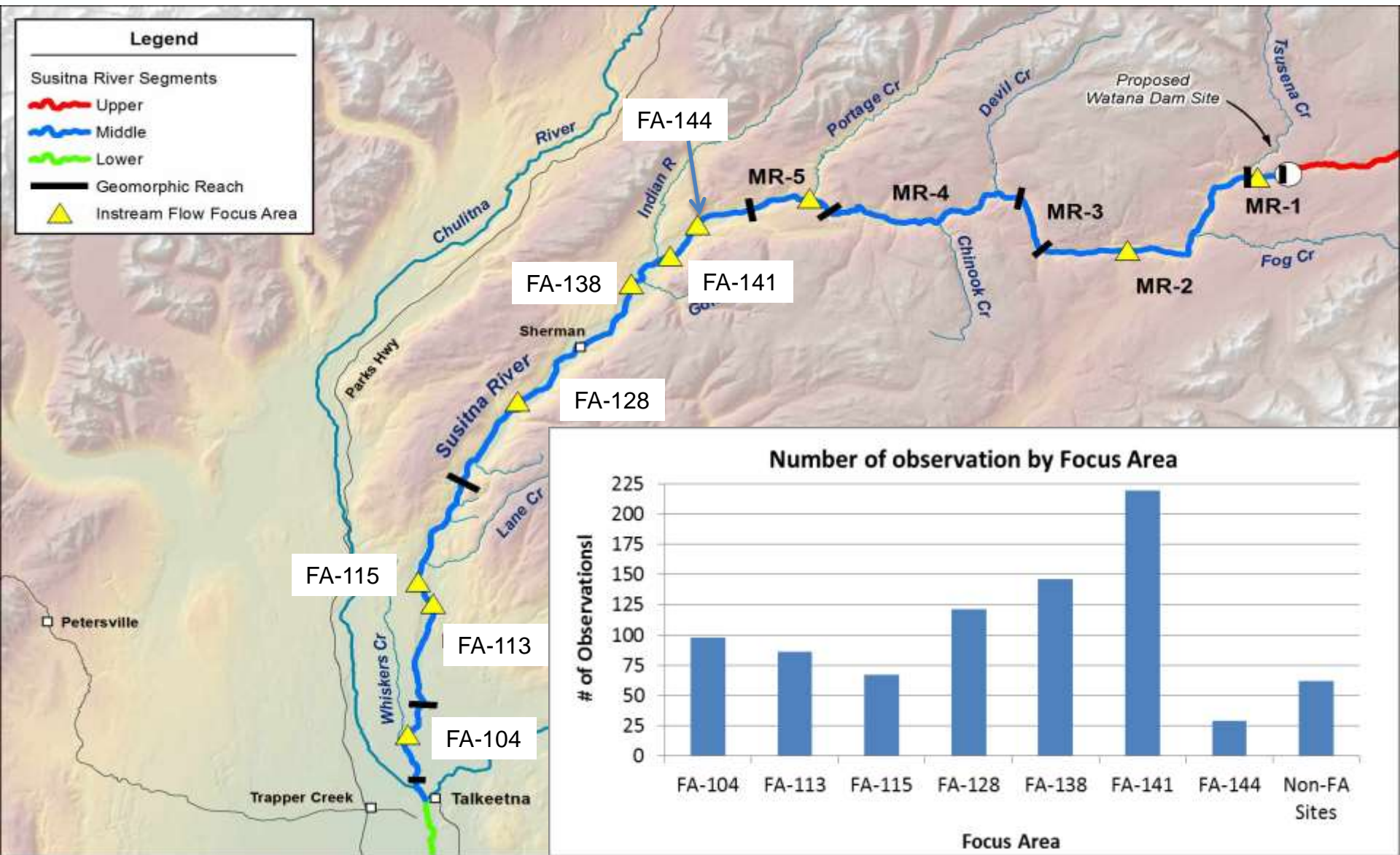
FA-128, Skull Creek Complex: 2013 HSC Sampling

FA-IFS: HSC Sampling Update

Number of observation by species and life stage



FA-IFS: HSC Sampling Update



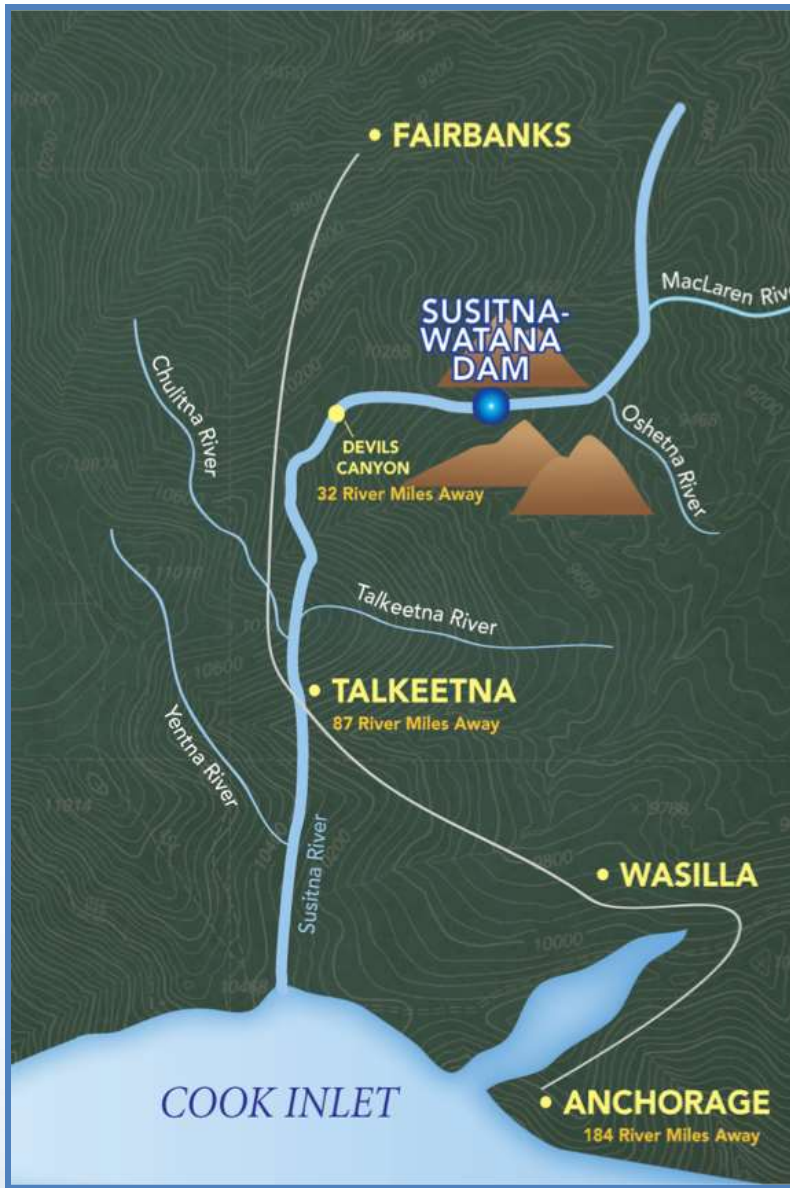
FA-IFS: HSC Study – Variances

- No HSC sampling in Lower River Segment
 - Concentrated efforts within Middle River Segment
 - Limited macrohabitat mapping for stratified, random sampling approach
 - Proposed for 2014
- No HSC sampling in three upstream most FAs (151, 173, 184)
 - Access/permitting issues
 - Proposed for 2014
- Limited Stranding and Trapping Surveys
 - Opportunistic sampling based on specific flow events
 - Lower priority for 2013 sampling
 - Lower priority for 2014 sampling



FA-IFS: HSC Study – Next Steps

- Q4 2013 Activities:
 1. Complete data entry for September data collection efforts
 2. Perform final QC checks on all 2013 data
 3. Sort and analyze data based on geomorphic reach, FA, macrohabitat type, fish species and life stage
 4. Refine process for development of Univariate and/or Multivariate HSC curve
 5. Review HSC data for patterns in microhabitat use based on water quality (temp., D.O., conductivity, turbidity) and groundwater upwelling
 6. Review field data from Early Life History and Fish Distribution and Abundance studies for refinement of species and life stage periodicity
 7. Identify data gaps for recommended 2014 activities
 8. Produce Initial Study Report
 9. Conduct IFS-TT meeting (early December) to review 2013 data and evaluation of curve development procedures



RSP 8.5 IFS

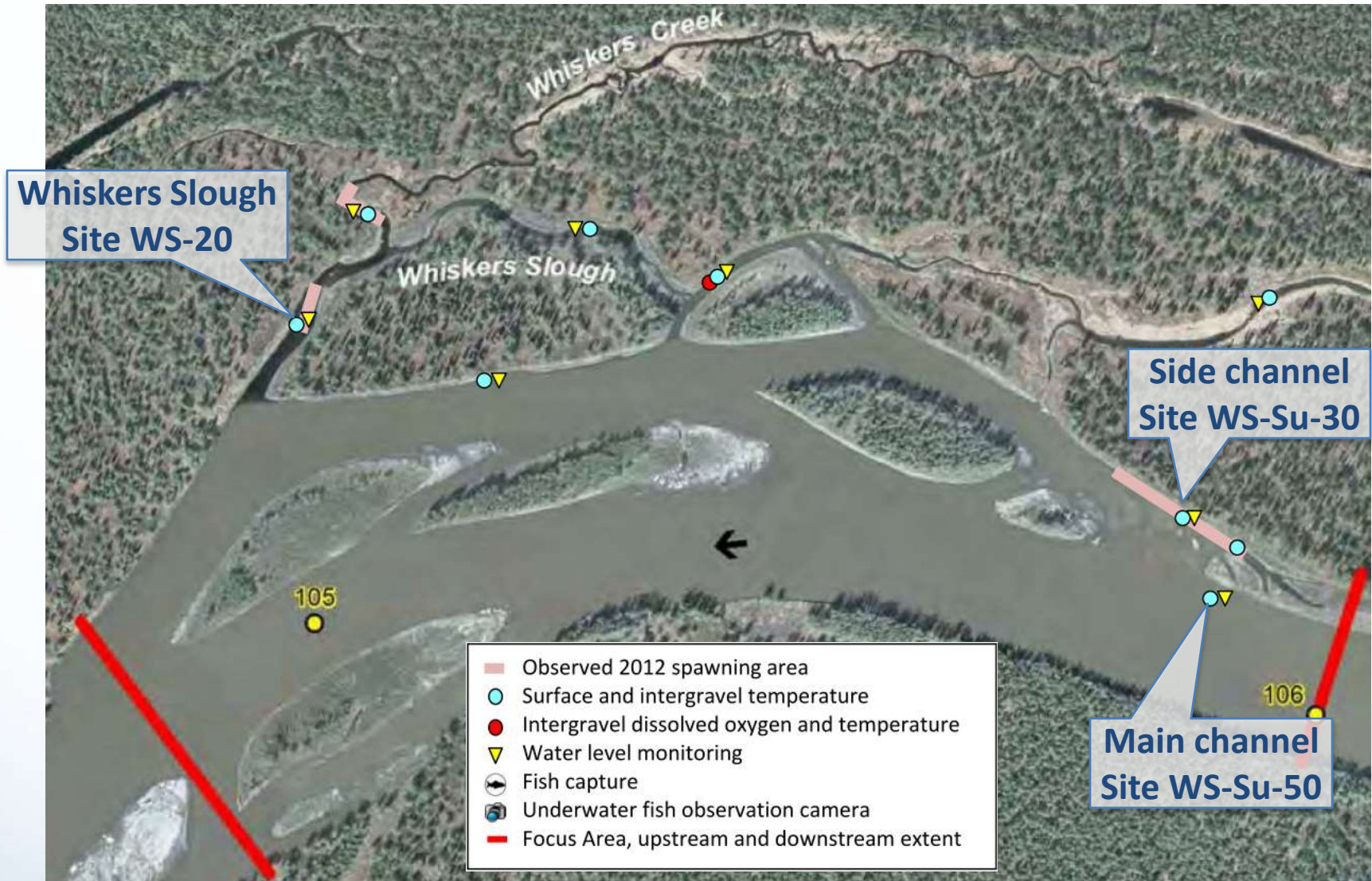
Winter Studies Update

FA-IFS: Winter Studies – Q3 2013 Update ⁵⁷

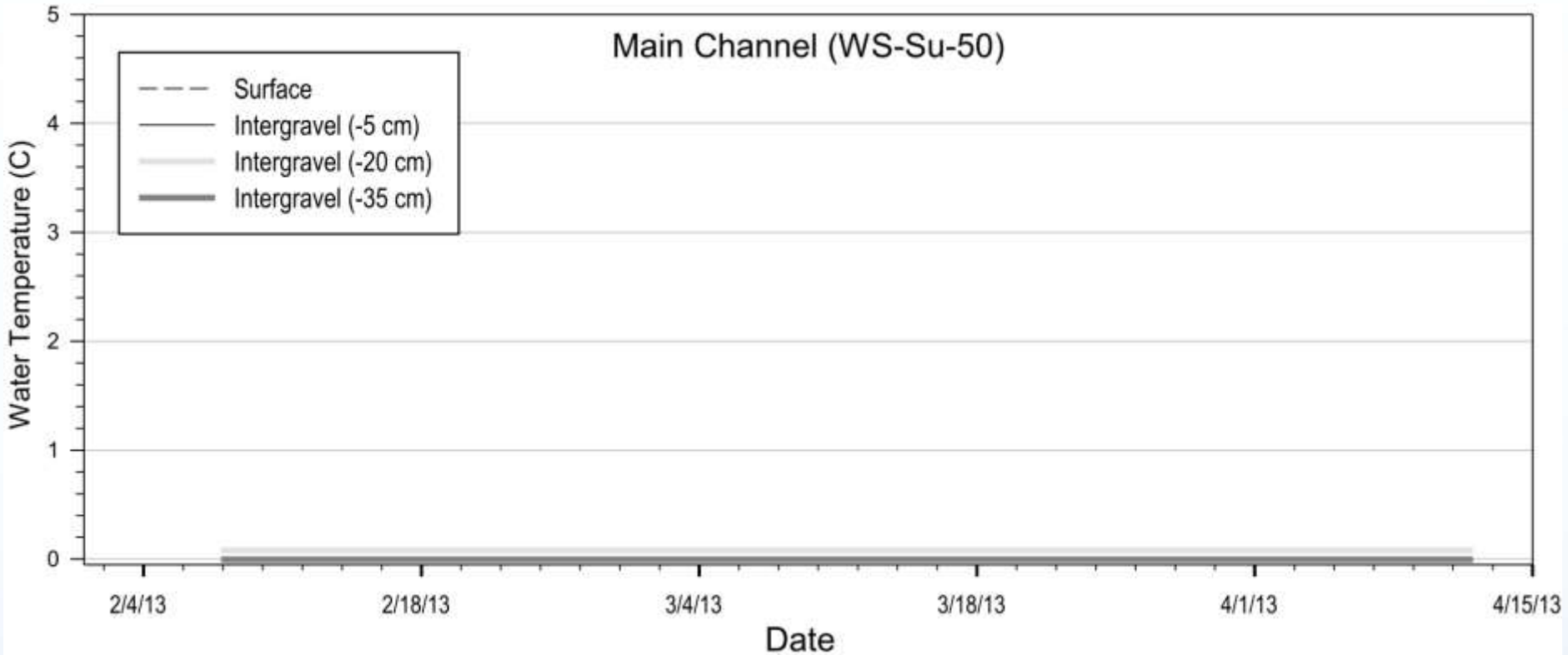
- 2012-2013 Analysis and Results: In Progress
 - Updates at March, June and Sept 2013 TWG meetings
 - To be completed during Q4 2013
- 2013-2014 Study Plan Development: In Progress
 - Collaboration: IFS, Fish, Groundwater, Ice Processes, Hydrology, Geomorphology, Water Quality
 - To be completed during Q4 2013



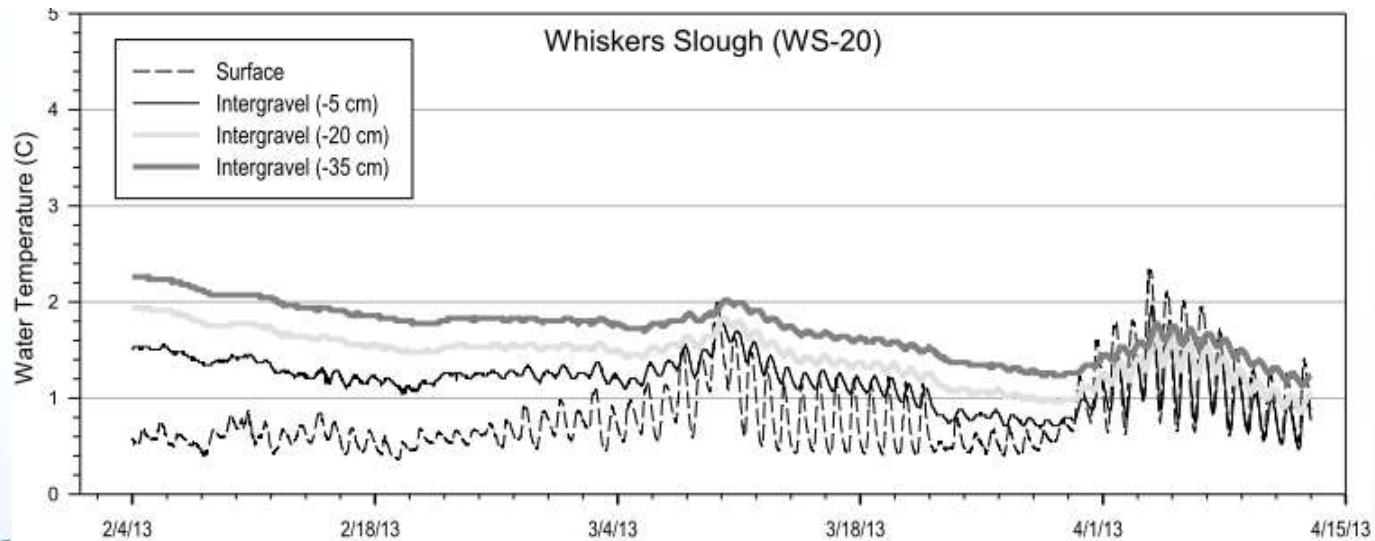
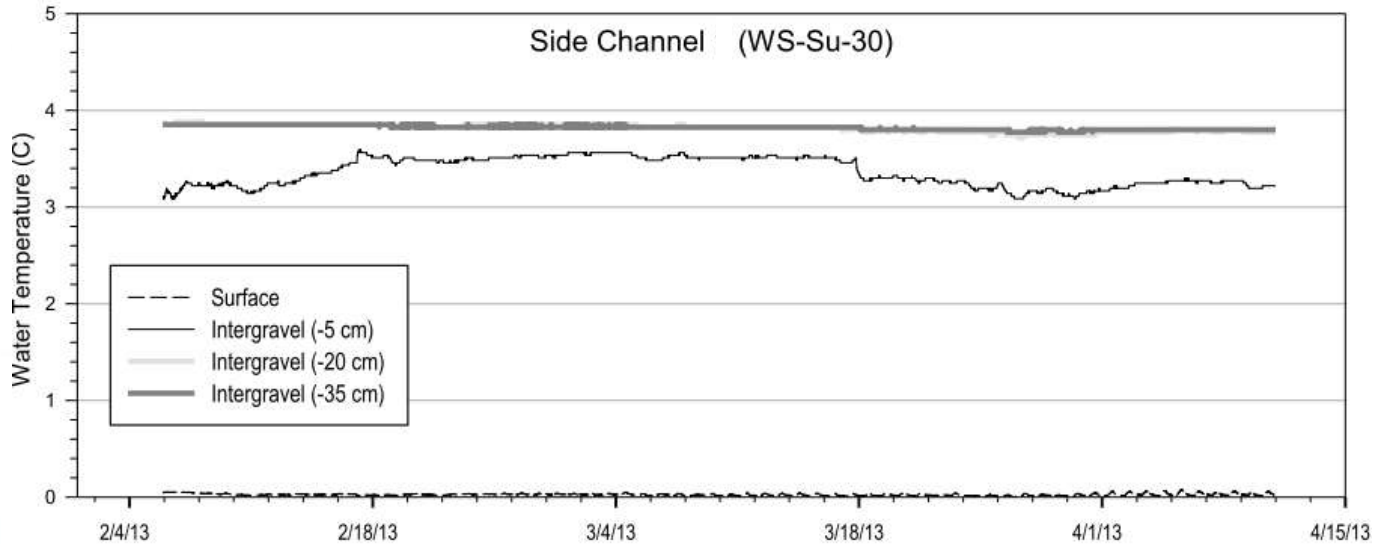
FA-IFS: Winter Studies – Results



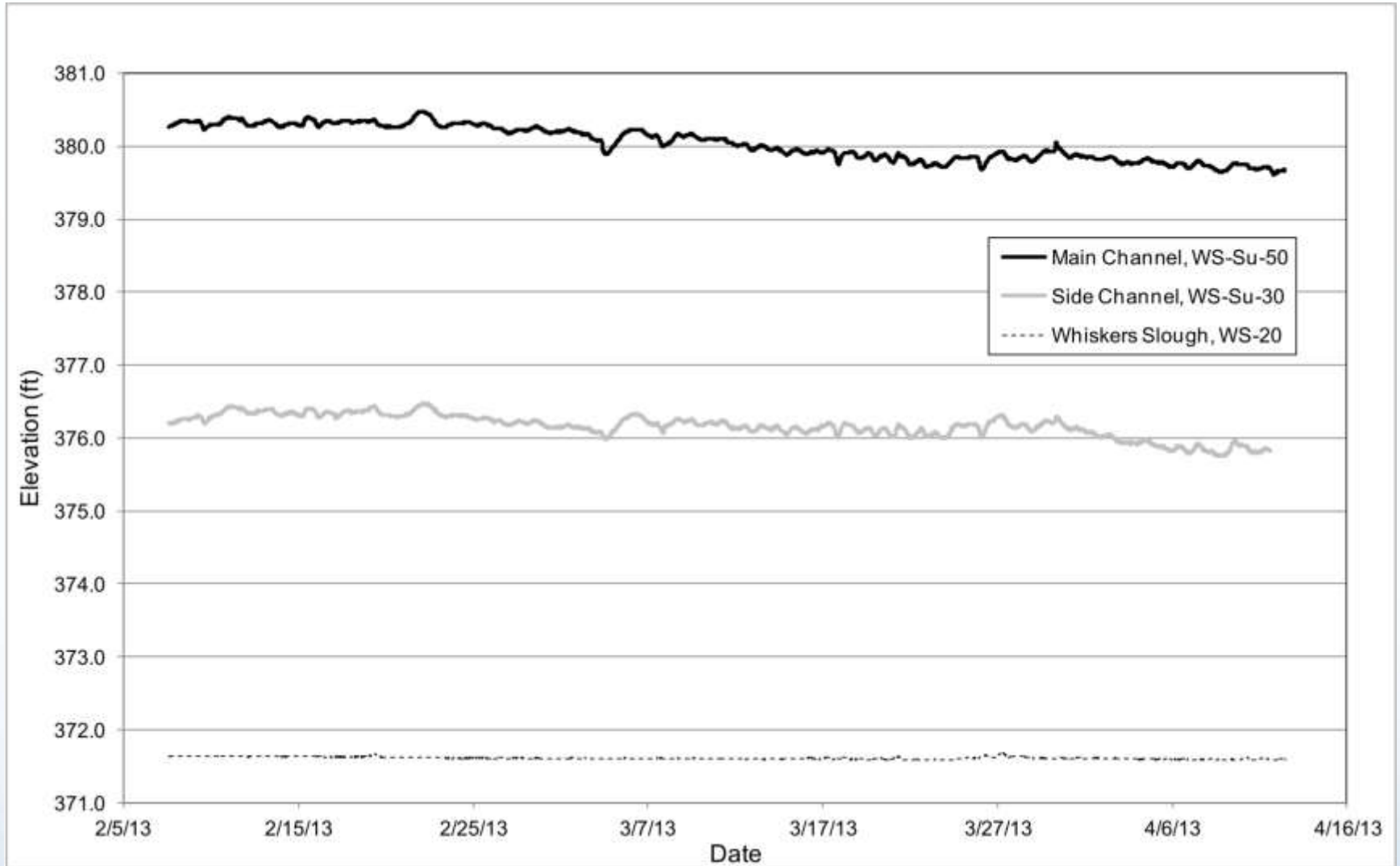
FA-IFS: Winter Studies Results – Temperature 59



FA-IFS: Winter Studies Results – Temperature



FA-IFS: Winter Studies Results – Water Level



FA-IFS: Winter Studies HSC Data-2012-2013⁶²

Focus Area	Species	Fish Life Stage	Habitat Type	Number of Observations
Whiskers Slough	Chinook	Fry	Upland Slough	1
		Juvenile	Upland Slough	12
		Juvenile	Side Channel	1
	Coho	Fry	Upland Slough	3
Skull Creek Complex	Chinook	Fry	Side Slough	2
		Juvenile	Upland Slough	9
			Side Slough	1
TOTAL				29

FA-IFS: Winter Studies – Variances⁶³

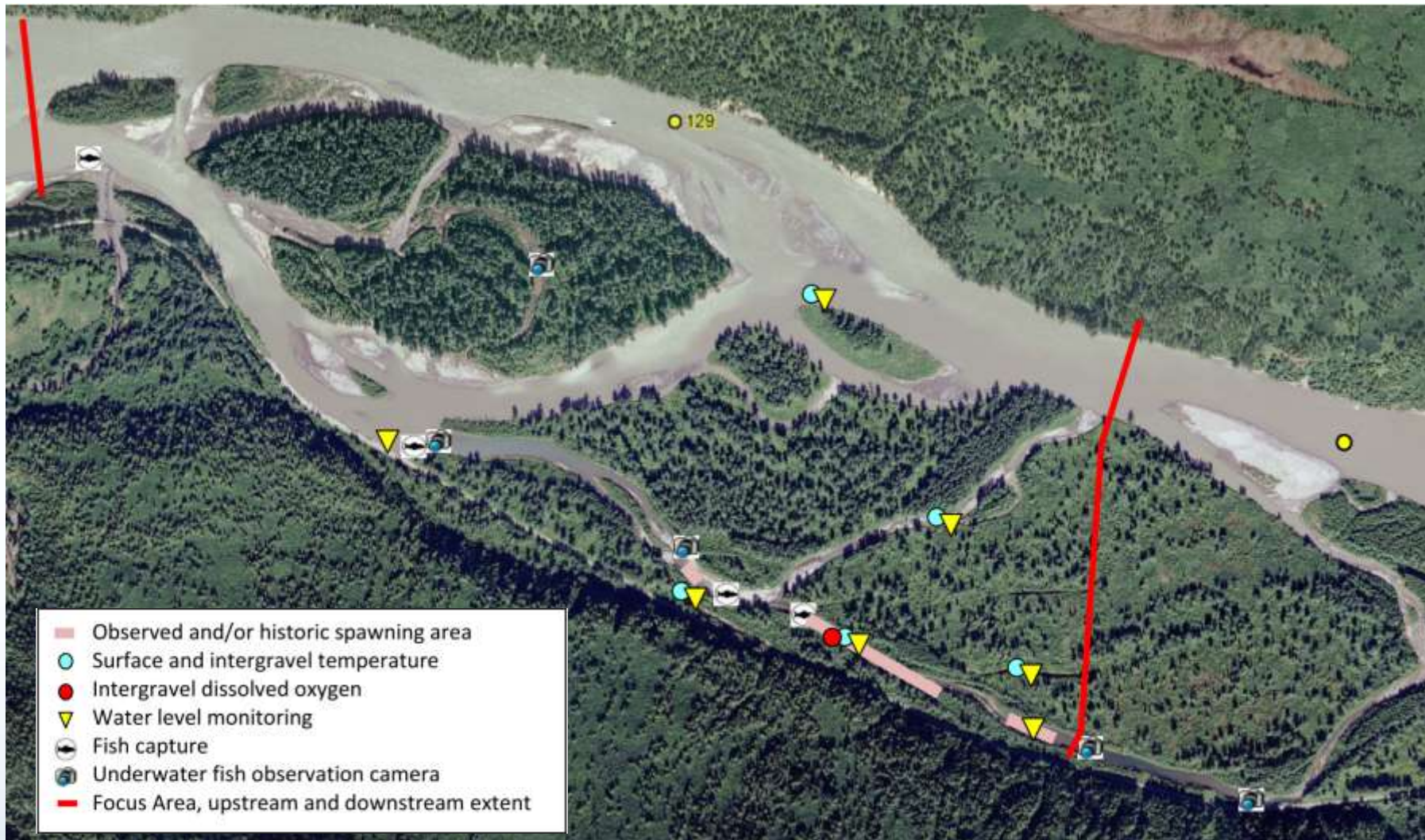
- No variances for IFS Winter Studies

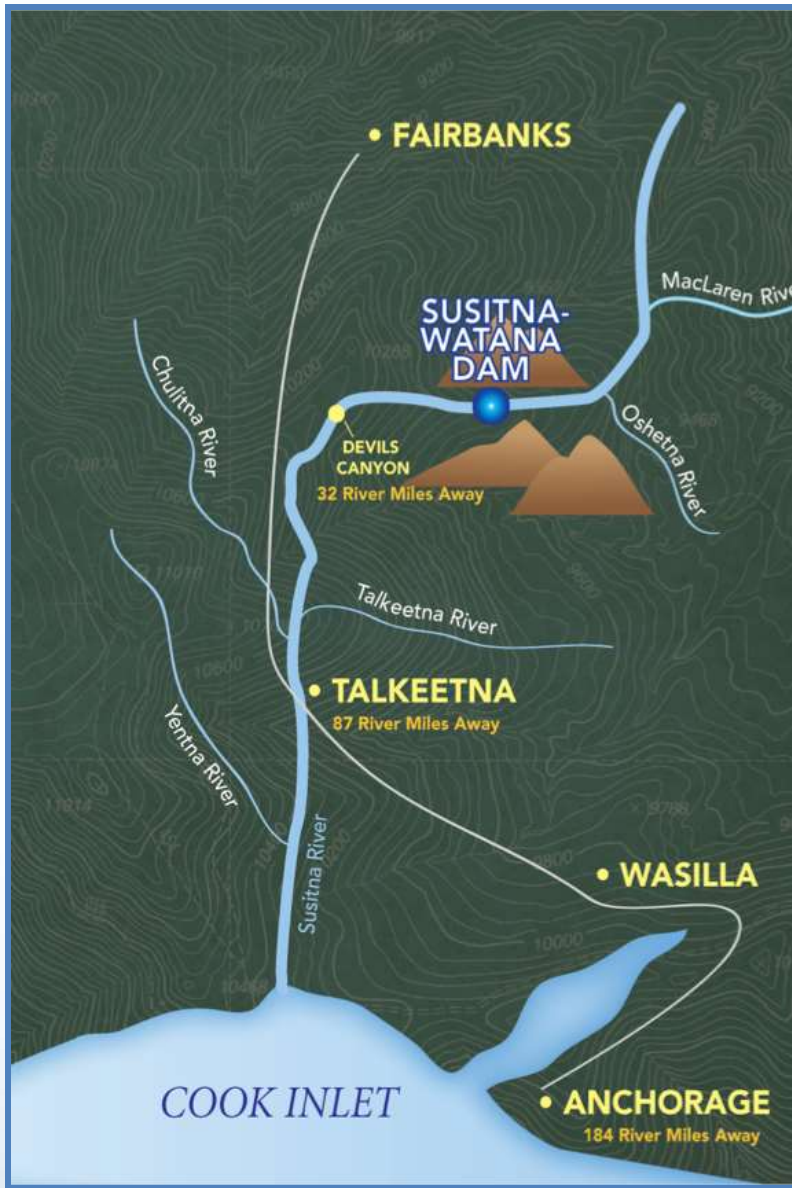
FA-IFS: Winter Studies – Next Steps⁶⁴

- 2013-2014 Study Plan
 - Three Primary FAs: FA-104, FA-128, FA-138
 - Sampling at additional sites based on fish distribution, weather, access
 - Four trips: January, February, March and April 2014
 - HSI: Water quality and water level instruments installed Sept 2013 and monitored thru Winter 2014
 - HSC: Record fish habitat use and behavior via capture and underwater observation methods



Study Plan – 2013-2014 Sites



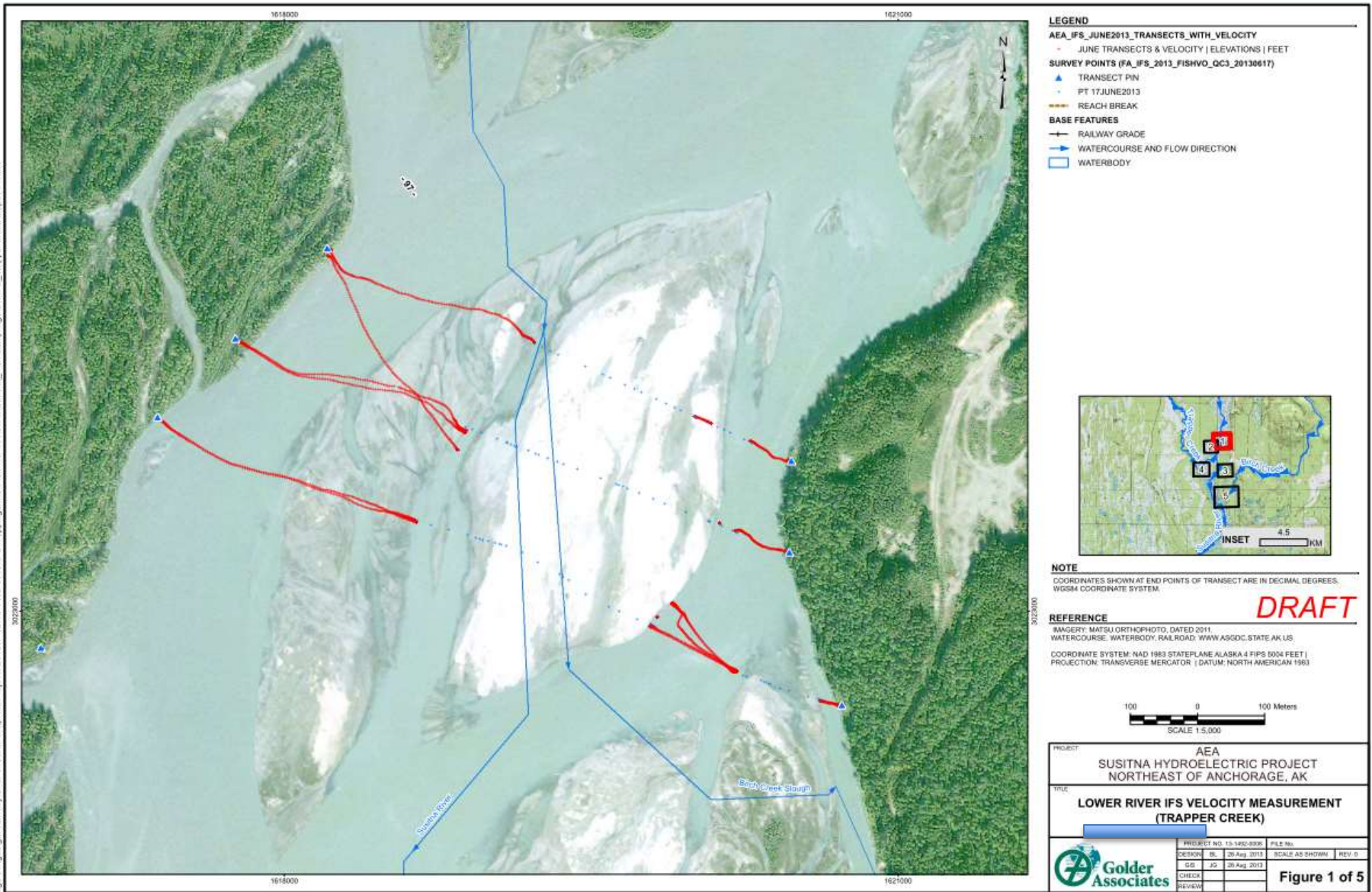


RSP 8.5 FA-IFS: Lower River Studies Update

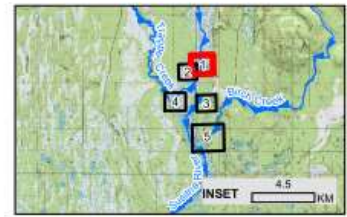
FA- IFS: Lower River Fish Habitat Study – Q3 2013 Update

67

- Field Tasks
 - Moderate flow (~ 45,000 cfs at Sunshine) water surface elevations at fish habitat transects sites – COMPLETED August 18-20
 - Collect low flow WSE at PRM 93 to PRM 97 fish habitat transects – (Scheduled Sep 23-25)
 - Complete substrate and cover mapping at PRM 93 to PRM 97 fish habitat transects – (Scheduled Sep 23-25)
 - Collect transect profile and water surface elevation data at Deshka River confluence in coordination with geomorphology (Scheduled mid-September)
- Data and Modeling Tasks
 - Received QC2 field data from Geovera and Brailey for June survey
 - Initiated data processing and QC3 process



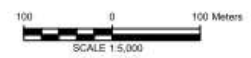
- LEGEND**
- AEA_IFS_JUNE2013_TRANSECTS_WITH_VELOCITY**
 - JUNE TRANSECTS & VELOCITY | ELEVATIONS | FEET
 - SURVEY POINTS (FA_IFS_2013_FISHVO_QC3_20130617)**
 - ▲ TRANSECT PIN
 - PT 17JUNE2013
 - REACH BREAK
 - BASE FEATURES**
 - RAILWAY GRADE
 - WATERCOURSE AND FLOW DIRECTION
 - WATERBODY



NOTE
 COORDINATES SHOWN AT END POINTS OF TRANSECT ARE IN DECIMAL DEGREES.
 WGS84 COORDINATE SYSTEM.

DRAFT

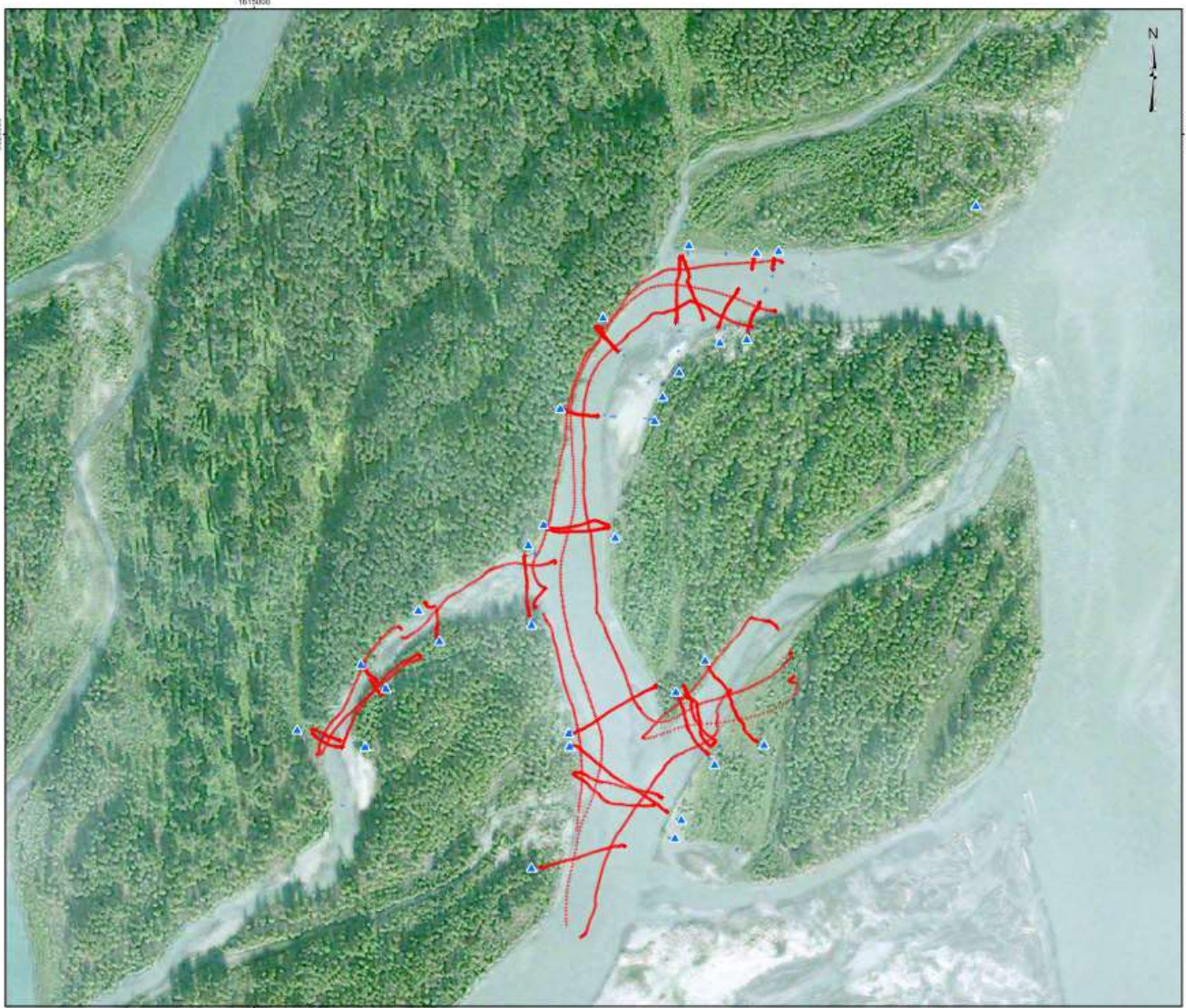
REFERENCE
 IMAGERY: MATSU ORTHOPHOTO, DATED 2011.
 WATERCOURSE, WATERBODY, RAILROAD: WWW.ASGDC.STATE.AK.US
 COORDINATE SYSTEM: NAD 1983 STATEPLANE ALASKA 4 FIPS 5004 FEET |
 PROJECTION: TRANSVERSE MERCATOR | DATUM: NORTH AMERICAN 1983



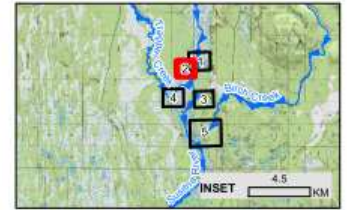
PROJECT			
AEA SUSITNA HYDROELECTRIC PROJECT NORTHEAST OF ANCHORAGE, AK			
TITLE			
LOWER RIVER IFS VELOCITY MEASUREMENT (TRAPPER CREEK)			
PROJECT NO. 13-142-039		FILE NO.	
DESIGN	IS	29 Aug 2013	SCALE AS SHOWN
GS	JG	29 Aug 2013	REV 0
CHECK			
REVIEW			

Figure 1 of 5

\\gsfdr\gdr\gdr\turnumby\CAD_GIS\Bur_Graphics\Projects\011314\0113-1402-0008\GIS\Mapping\MXD\Fish\Transsects\Fish_Sampling_ABR_IFS_Trapper_creek_mapbook.mxd



- LEGEND**
- AEA_IFS_JUNE2013_TRANSECTS_WITH_VELOCITY
 - JUNE TRANSECTS & VELOCITY | ELEVATIONS | FEET
 - SURVEY POINTS (FA_IFS_2013_FISHVO_GC3_20130617)
 - ▲ TRANSECT PIN
 - PT 17JUNE2013
 - REACH BREAK
- BASE FEATURES**
- RAILWAY GRADE
 - WATERCOURSE AND FLOW DIRECTION
 - WATERBODY



NOTE
COORDINATES SHOWN AT END POINTS OF TRANSECT ARE IN DECIMAL DEGREES, WGS84 COORDINATE SYSTEM

DRAFT

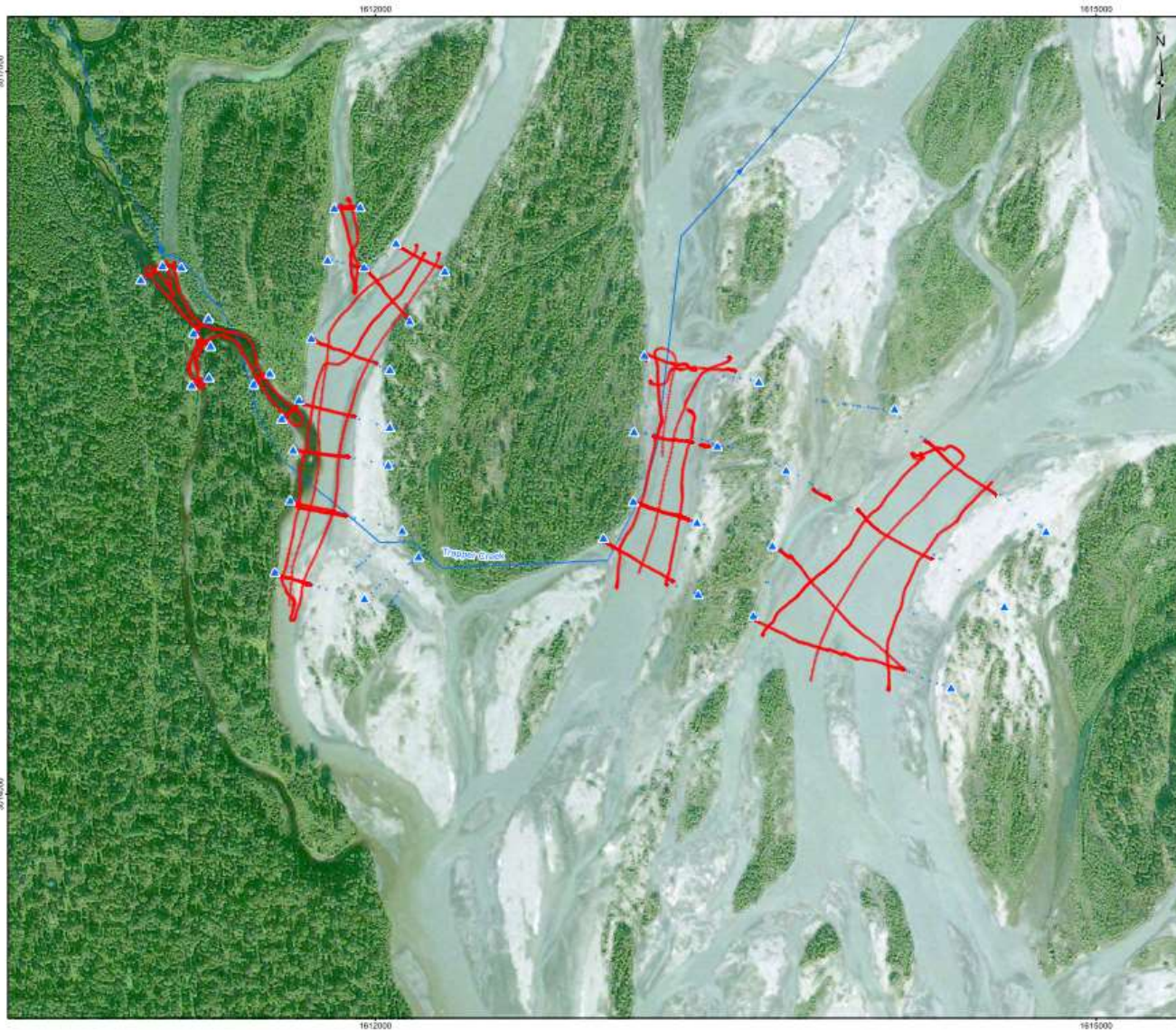
REFERENCE
IMAGERY: MATSU ORTHOPHOTO, DATED 2011
WATERCOURSE: WATERBODY, RAILROAD: WWW.ASGOC.STATE.AL.US
COORDINATE SYSTEM: NAD 1983 STATEPLANE ALASKA 4 FIPS 5004 FEET |
PROJECTION: TRANSVERSE MERCATOR | DATUM: NORTH AMERICAN 1983



PROJECT			
AEA SUSITNA HYDROELECTRIC PROJECT NORTHEAST OF ANCHORAGE, AK			
TITLE			
LOWER RIVER IFS VELOCITY MEASUREMENT (TRAPPER CREEK)			
	PROJECT NO.	13-1402-0008	FILE NO.
	DESIGNER	BL	20 Aug 2013
	CHECKER	JG	20 Aug 2013
	REVIEWER		
			SCALE AS SHOWN
			REV 0

Figure 2 of 5

I:\goldier\gis\gaitburnaby\CAD_GIS\Bur_Graphics\Projects\2013\14521\GIS_Mapping\KOD\Fish\Transects\IFS_Susitna_Fish_Stumping_ABR_IFS_Trapper_creek_mapbook.mxd
 3014500
 3014500



- LEGEND**
- AEA_IFS_JUNE2013_TRANSECTS_WITH_VELOCITY
 - JUNE TRANSECTS & VELOCITY | ELEVATIONS | FEET
 - SURVEY POINTS (FA_IFS_2013_FISHVO_GC3_20130617)**
 - ▲ TRANSECT PIN
 - PT 17JUNE2013
 - REACH BREAK
 - BASE FEATURES**
 - RAILWAY GRADE
 - WATERCOURSE AND FLOW DIRECTION
 - WATERBODY



NOTE
 COORDINATES SHOWN AT END POINTS OF TRANSECT ARE IN DECIMAL DEGREES, WGS84 COORDINATE SYSTEM.

DRAFT

REFERENCE
 WANGERY MATSU ORTHOPHOTO, DATED 2011.
 WATERCOURSE, WATERBODY, RAILROAD WWW.ASGDC.STATE.AK.US
 COORDINATE SYSTEM: NAD 1983 STATEPLANE ALASKA 4 FIPS 5004 FEET |
 PROJECTION: TRANSVERSE MERCATOR | DATUM: NORTH AMERICAN 1983



PROJECT		AEA SUSITNA HYDROELECTRIC PROJECT NORTHEAST OF ANCHORAGE, AK	
TITLE		LOWER RIVER IFS VELOCITY MEASUREMENT (TRAPPER CREEK)	
PROJECT NO. 15-1450-0008		FILE NO.	
DESIGN	RL	25 Aug. 2013	SCALE AS SHOWN
GIS	JG	28 Aug. 2013	REV. 0
CHECK			
REVIEW			



Figure 4 of 5

\\goldr\gib\giburnaby\CAD\GIS\Sur_Graphics\Projects\2013\1492\13_1492_0010\GIS\Mapping\MXD\Fish\Transsects\IFS\Susitna_Fish_Sampling\ABR_IFS_Trapper_creek_mapbook.mxd



- LEGEND**
- AEA_IFS_JUNE2013_TRANSECTS_WITH_VELOCITY
 - JUNE TRANSECTS & VELOCITY | ELEVATIONS | FEET
 - SURVEY POINTS (FA_IFS_2013_FISHVO_Gc3_20130617)
 - ▲ TRANSECT PIN
 - PT 17JUNE2013
 - REACH BREAK
 - BASE FEATURES
 - RAILWAY GRADE
 - WATERCOURSE AND FLOW DIRECTION
 - WATERBODY

3008000

3005000



NOTE
 COORDINATES SHOWN AT END POINTS OF TRANSECT ARE IN DECIMAL DEGREES, WGS84 COORDINATE SYSTEM.

DRAFT

REFERENCE
 BANGERY MATSU ORTHOPHOTO, DATED 2011
 WATERCOURSE, WATERBODY, RAILROAD, WAW/ASGC STATE AK US
 COORDINATE SYSTEM: NAD 1983 STATEPLANE ALASKA 4 FIPS 5004 FEET |
 PROJECTION: TRANSVERSE MERCATOR | DATUM: NORTH AMERICAN 1983



PROJECT AEA SUSITNA HYDROELECTRIC PROJECT NORTHEAST OF ANCHORAGE, AK			
TITLE LOWER RIVER IFS VELOCITY MEASUREMENT (TRAPPER CREEK)			
<small>PROJECT NO.</small>	<small>13-1492-0306</small>	<small>FILE NO.</small>	
<small>DESIGN</small>	<small>BL</small>	<small>20 Aug 2013</small>	<small>SCALE AS SHOWN</small>
<small>GIS</small>	<small>JS</small>	<small>20 Aug 2013</small>	<small>REV 0</small>
<small>CHECK</small>			
<small>REVIEW</small>			



Figure 5 of 5

RSP 8.5 FA-IFS: Lower River Fish Habitat Study ⁷²

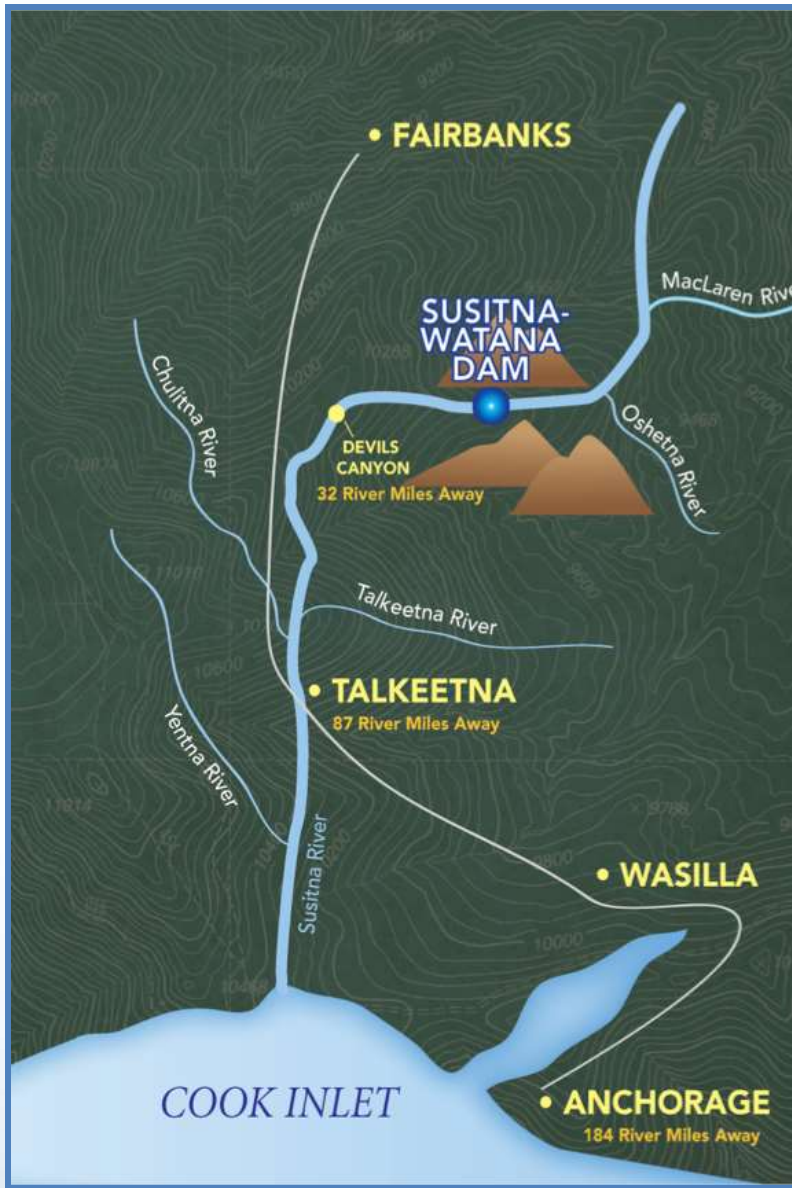
Variances

- No variances to the study plan during Q3.

Lower River Fish Habitat IFS Study – Next Steps

- No field tasks are scheduled for Q4 2013
- Data and Modeling Tasks for Q4 2013
 - Complete QC3 of all field data
 - Model setup and calibration
 - HEC-RAS (water level) and PHABSIM (velocity and habitat) modeling proposed
 - Version 1 model runs to support ISR
 - Some data needed for final model runs will not be available until Q1 2014
- ISR Tasks
 - Include details on model calibration and draft results for wetted area and WUA versus flow relationships at PRM 93 to PRM 97 sites

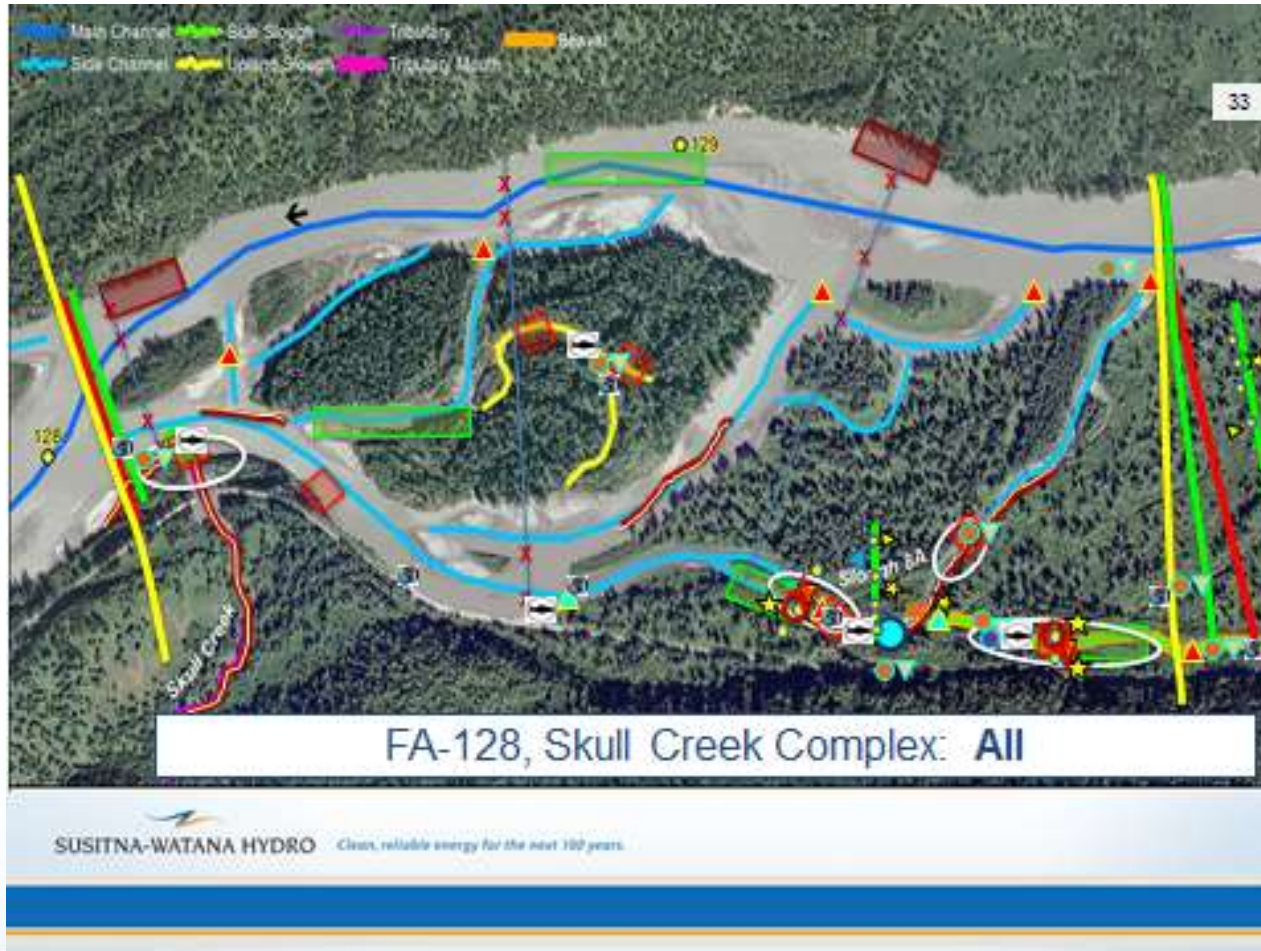




8.5.4.8 FA-IFS Study Integration and Modeling Update

FA-IFS: Study Integration and Modeling 75

- Focus Area Study Integration



FA-IFS: Riverine Modeling and Study Integration

- Internal Model Integration – Ongoing
 - Modeling Meeting – August 30 (completed)
 - Modeling Meeting – October 10
- IFS-TT Riverine Model and Study Integration Meeting – November 14-15th
 - Confirm Agenda

