

Technical Work Group Meeting

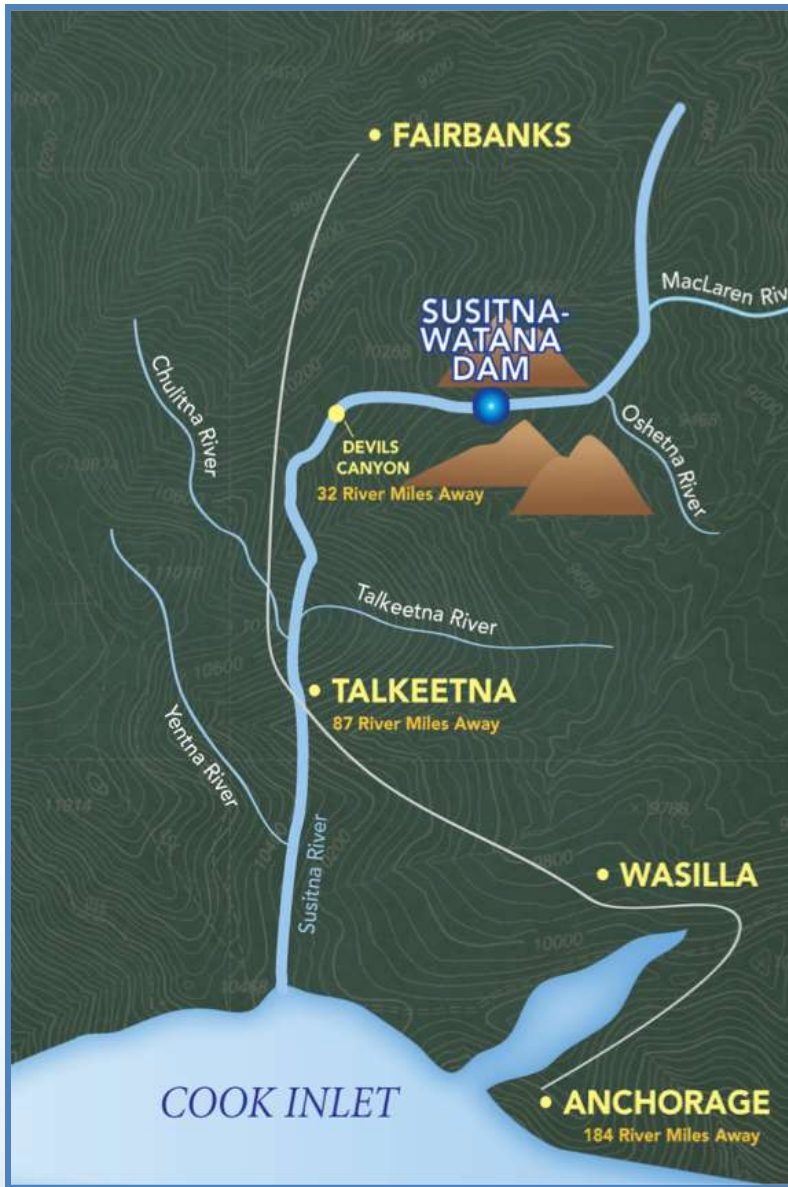
Fish and Aquatics

Instream Flow

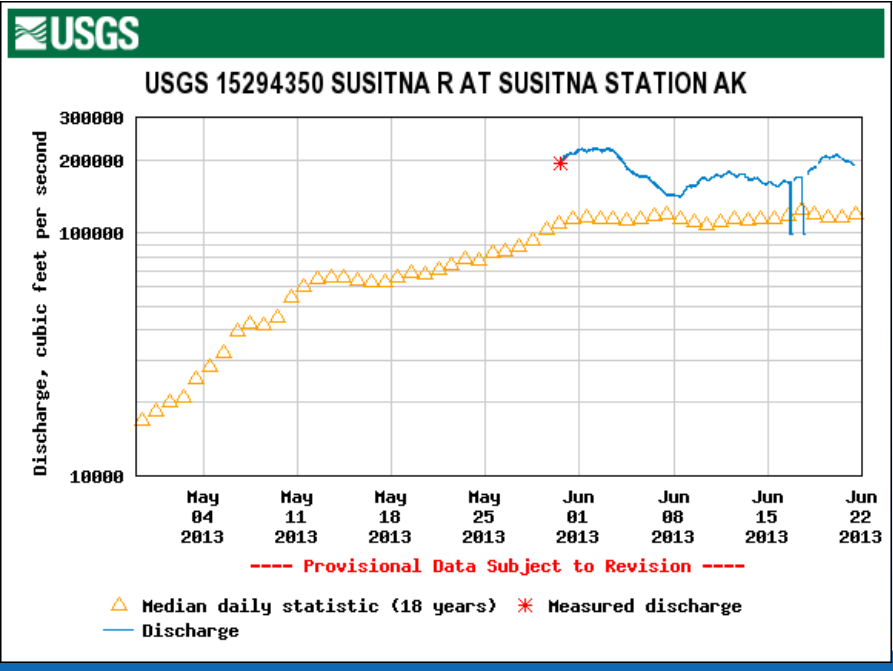
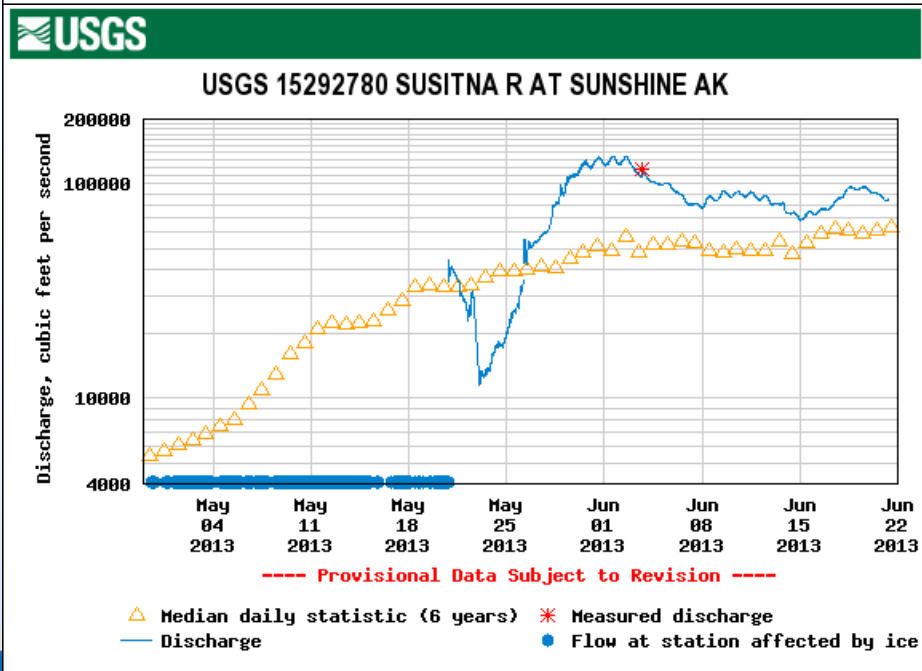
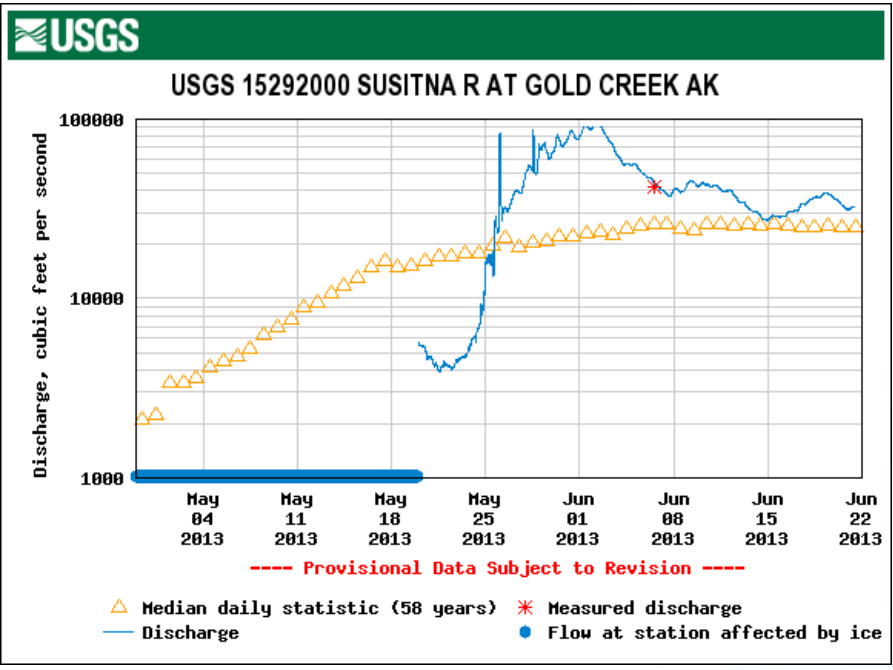
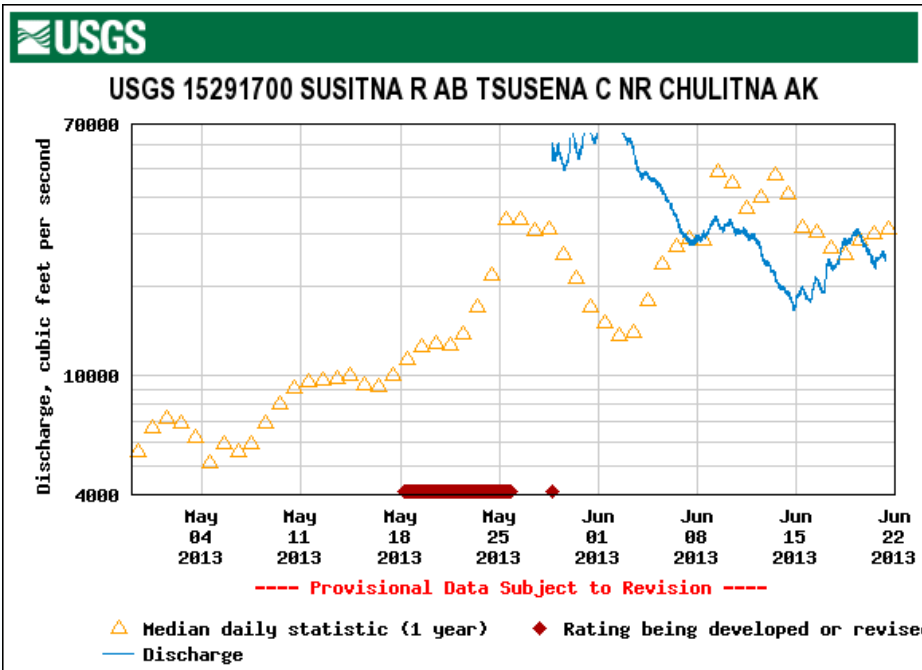
2nd Quarter 2013

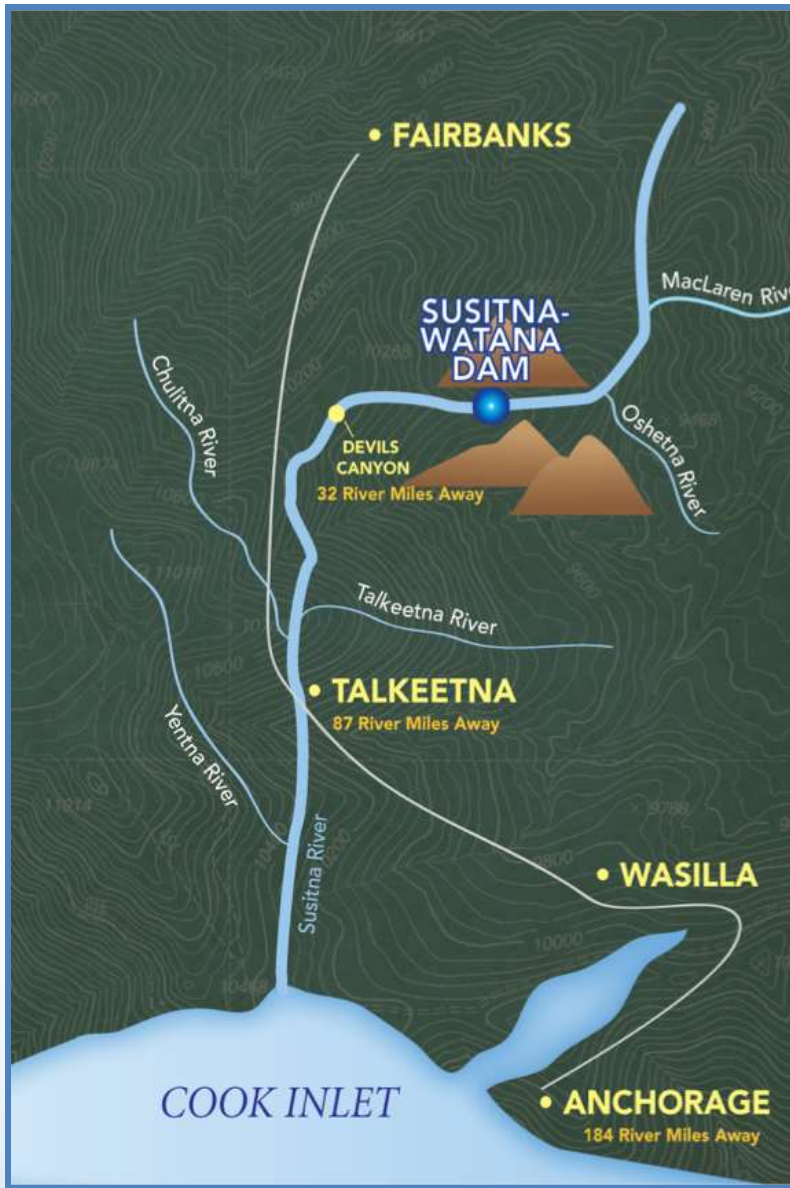
25 June 2013

Prepared by R2 Resource
Consultants



- Review of Schedule and Q2 Activities and Planned Q3 Activities
- Final Selection of Focus Areas
- HSC Data Collection – Update
- Winter Studies - Update
- Inter-disciplinary Study Integration within Focus Areas
- Other Topics





Update on Q2 Activities and Planned Q3 Activities

Fish and Aquatics Instream Flow Study Schedule

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					—————							▲	

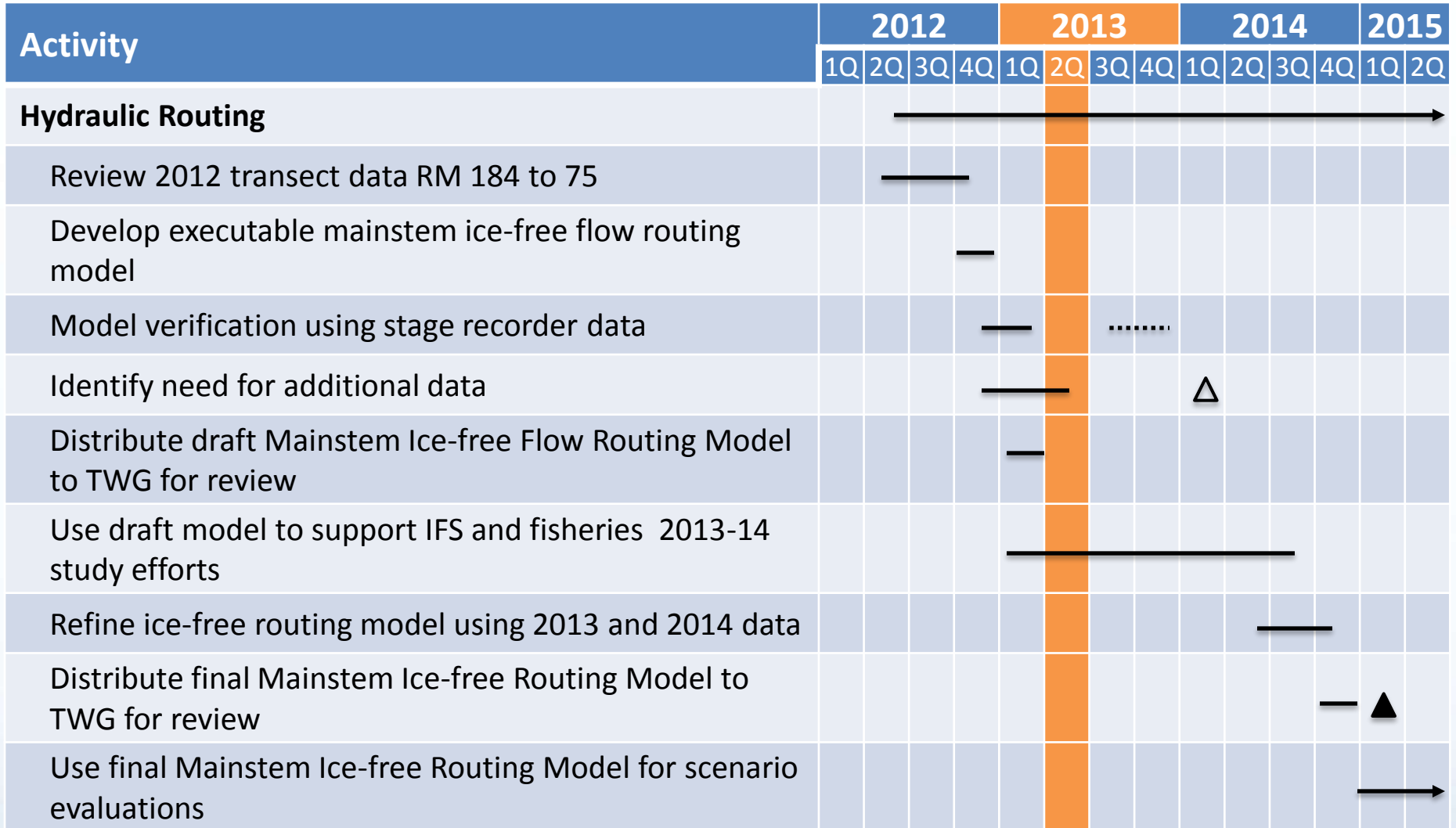
- Planned Activity
- Follow-up Activity
- △ Initial Study Report
- ▲ Updated Study Report

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

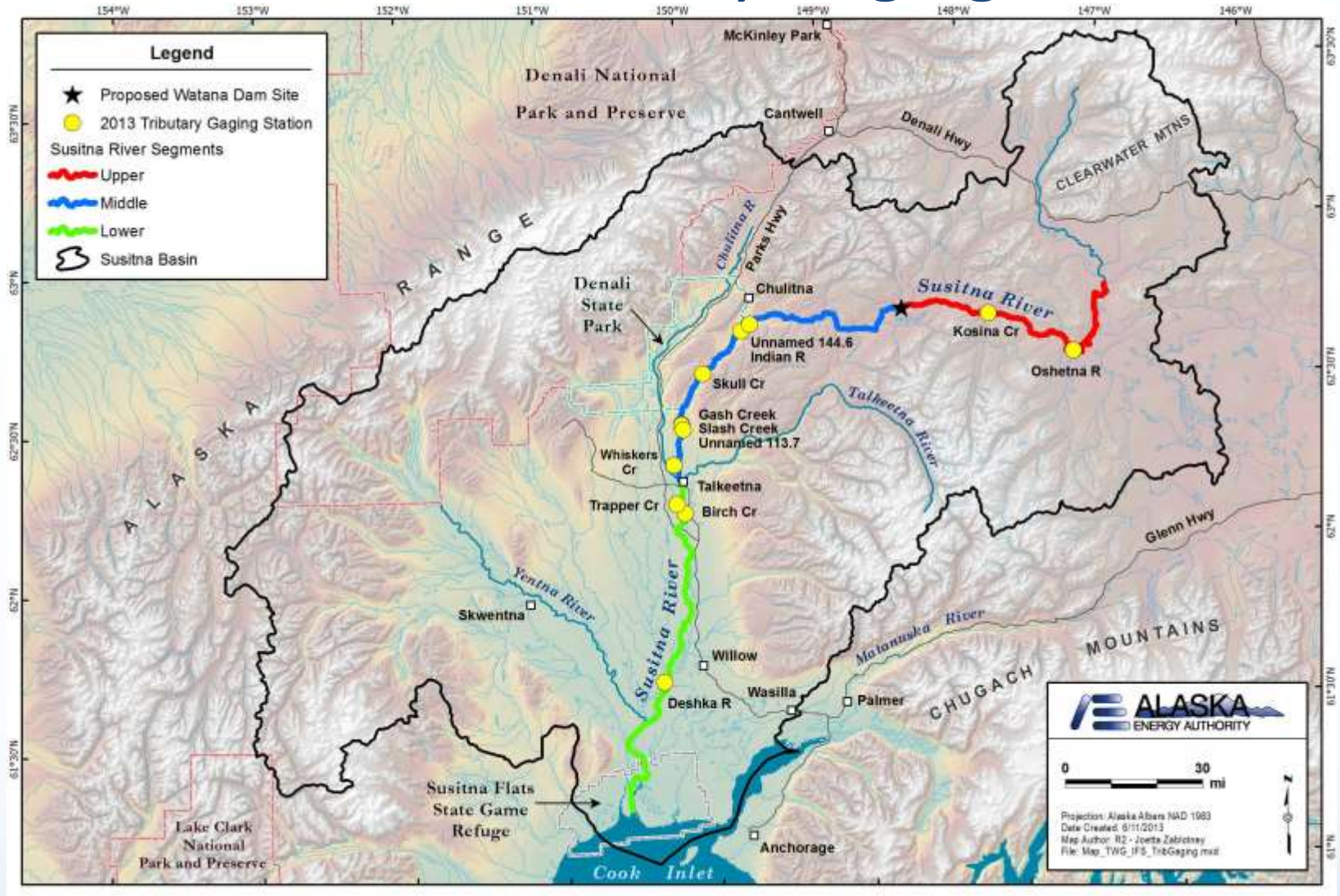
Fish and Aquatics Instream Flow Study Schedule (cont.)



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

2013 Tributary Gaging



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
HSC/HSI Fish: Field Data Collection (summer, fall, winter)		—————												
Use 1980s Susitna data and other existing HSC curves to develop draft species / lifestage HSC curves for the lower and middle Susitna River			—————											
Propose target HSC species, lifestages, substrate and cover				———										
TWG meeting on HSC/HSI targets and data collection study details					———								
Conduct HSC/HSI summer surveys (snorkel, seining, electrofishing)		———					———				———			
Conduct fish HSC/HSI winter surveys (underwater camera, electrofishing)					———				———				
Conduct aquatic biota stranding and trapping surveys							———						
Coordinate and review adult/spawning HSC data collected by Fish and Aquatic biotelemetry (Sec 9.06)			———						
Distribute preliminary findings of wintertime surveys to TWG							———				———			———
Distribute preliminary results of HSC/HSI surveys and changes to draft HSC/HSI					———				△				
TWG meeting on species and life stage HSC/HSI					———						▲

Fish and Aquatics Instream Flow Study Schedule (cont.)

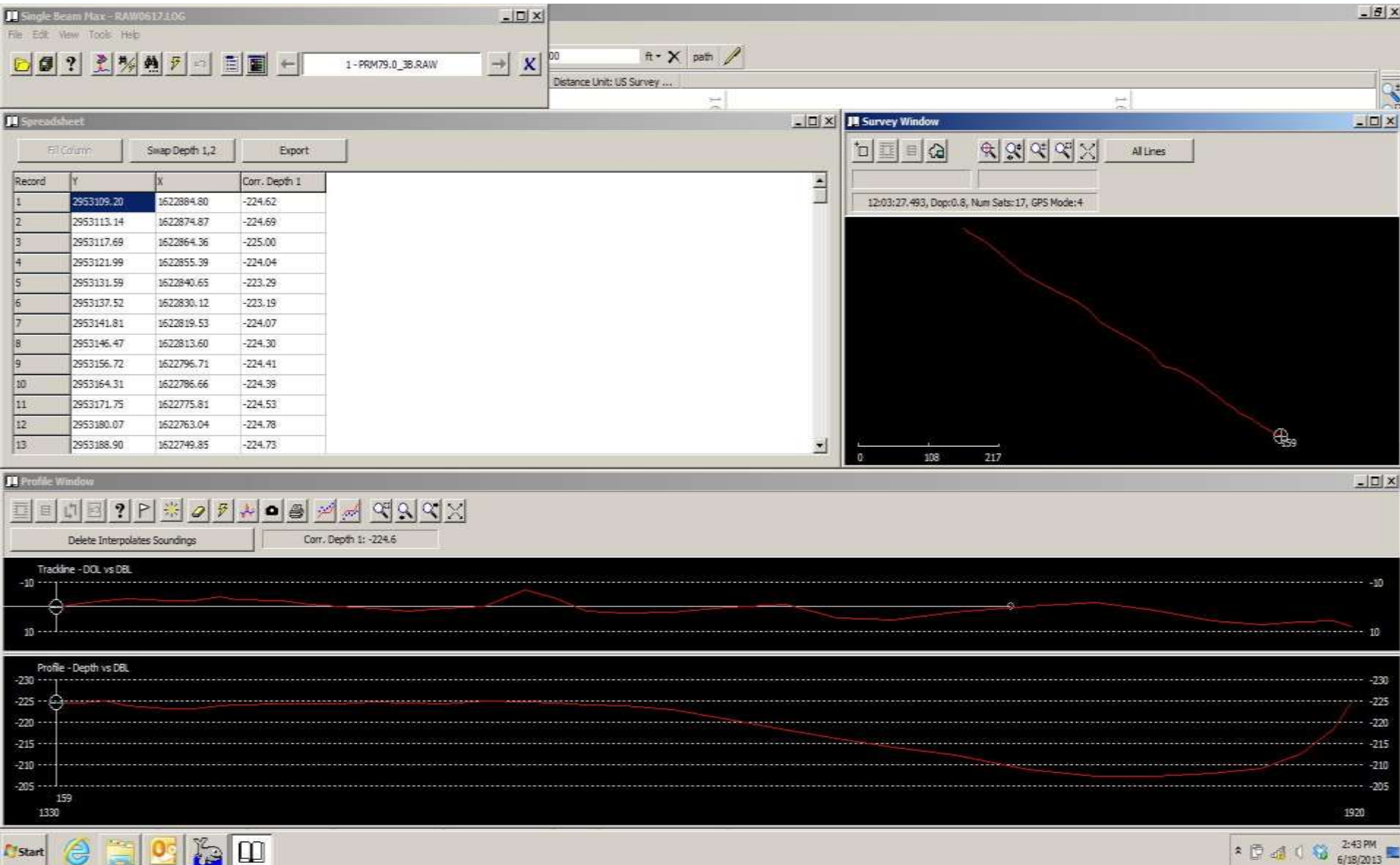
Activity	2012				2013				2014				2015	
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q
Collect Physical and Hydraulic Data for Habitat Modeling						—————	—————	—————	—————	—————	—————	—————		
Collect data for digital terrain model						—————							
Collect x-section and stage:discharge data at Focus Areas 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

Bathymetric Surveys near Trapper and Birch creeks – 6/13/13



Screen shot – bathy survey PRM 79.0



Bathy survey line PRM 80.7



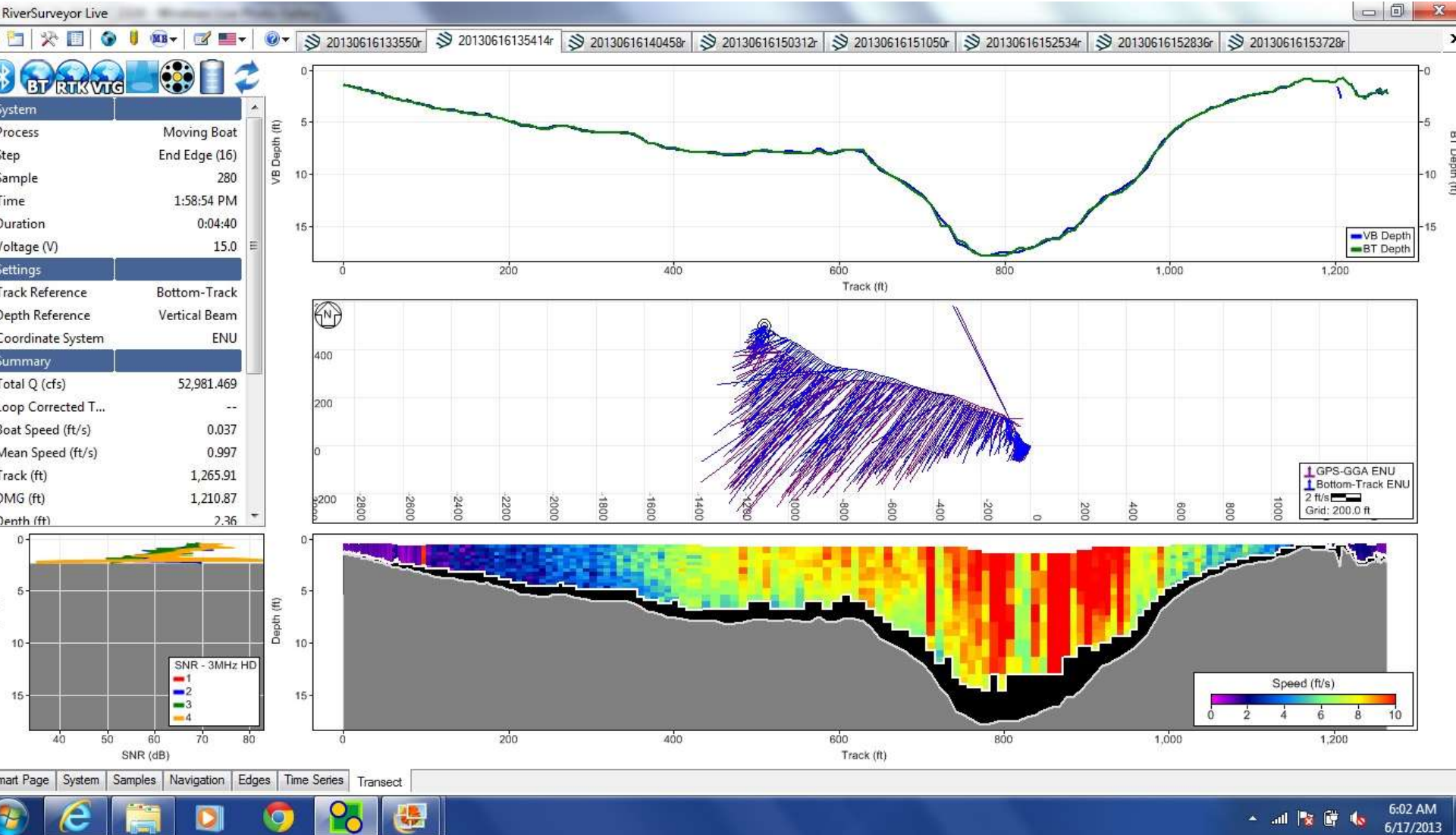
ADCP Data Collection near Trapper Creek June 13, 2013



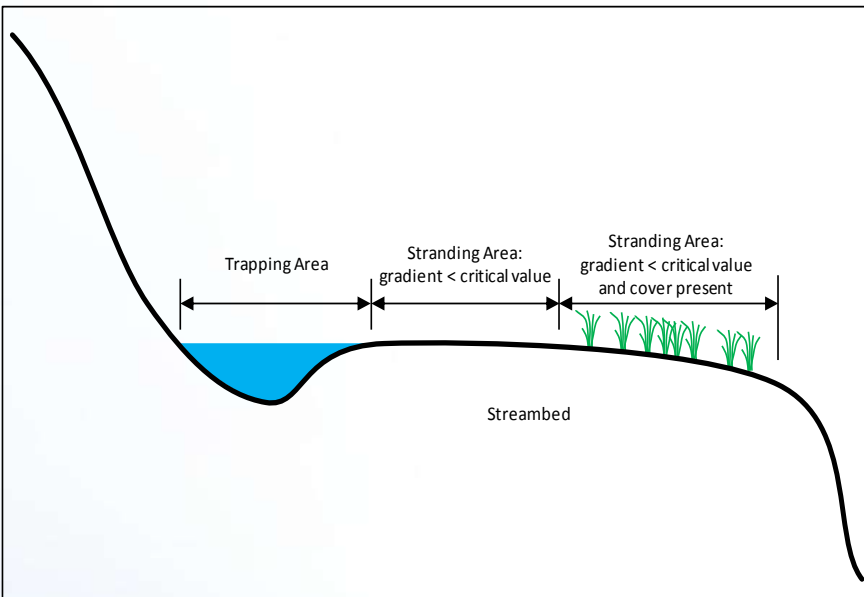
ADCP measurements – main channel and lateral

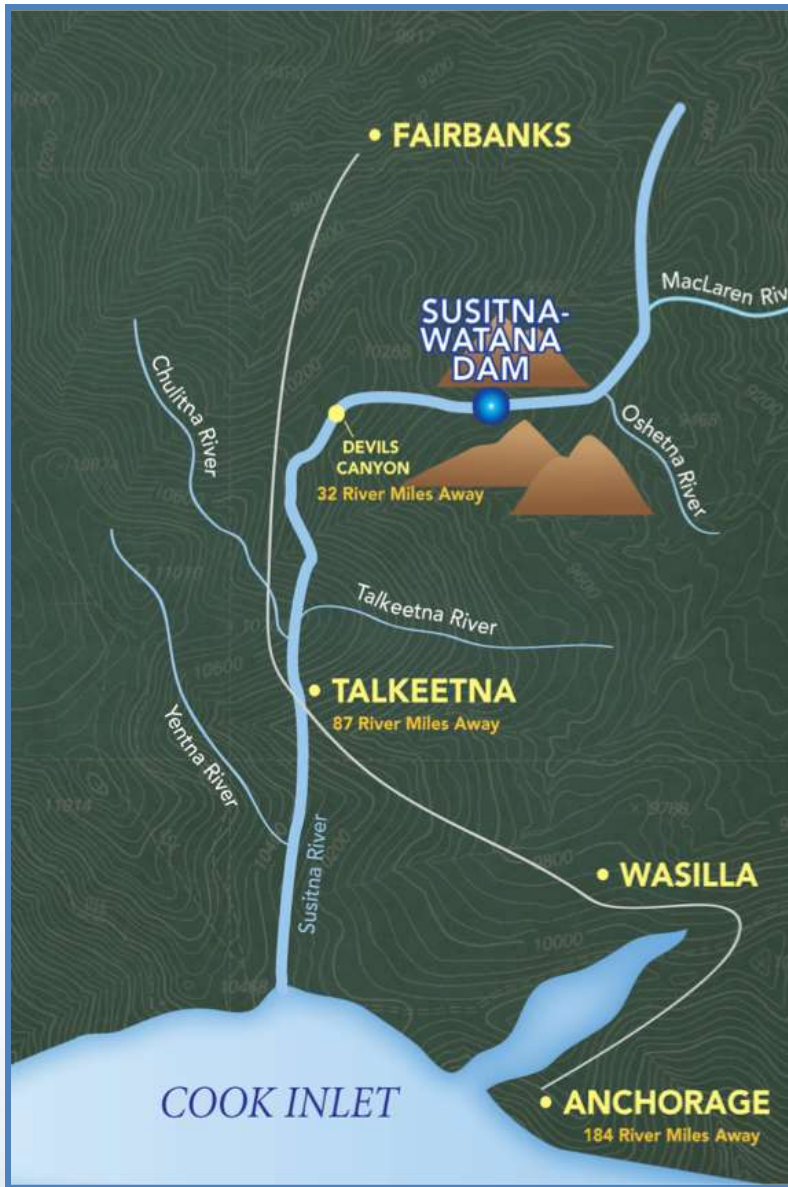


Screen capture – ADCP near Trapper Creek



Stranding and Trapping





Final Selection of Focus Areas

Final Focus Area Selection

- Prepared Draft TM for stakeholder review
- Conducted IFSTT meeting (4-26-13) to discuss options
 - Elimination of FA in MR-1
 - FA-171 Eliminated
 - Addition of FA in MR-7: Candidates -
 - Area “near Lower McKenzie Creek” per agency comments (FERC 2013, p B-89);
 - Area “below Curry on Old Oxbow II” per agency comments (FERC 2013, p B-89);
 - Area that includes Lane Creek confluence: new FA or expand FA-115;
 - Other areas such: Chase Creek confluence (PRM 110.5), Old Oxbow I (PRM 113.7), or others areas identified in consultation with the TWG.



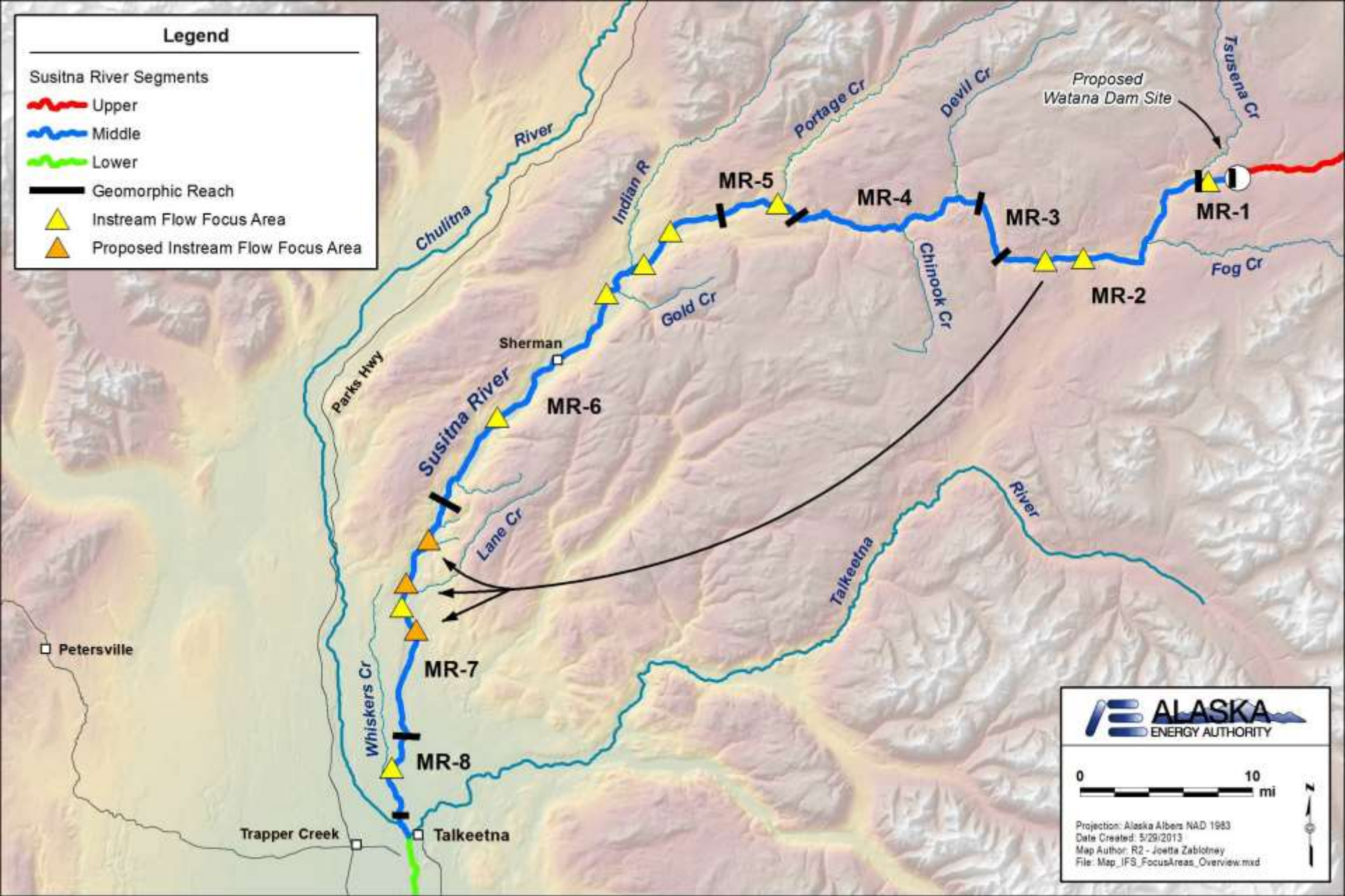
Legend

Susitna River Segments

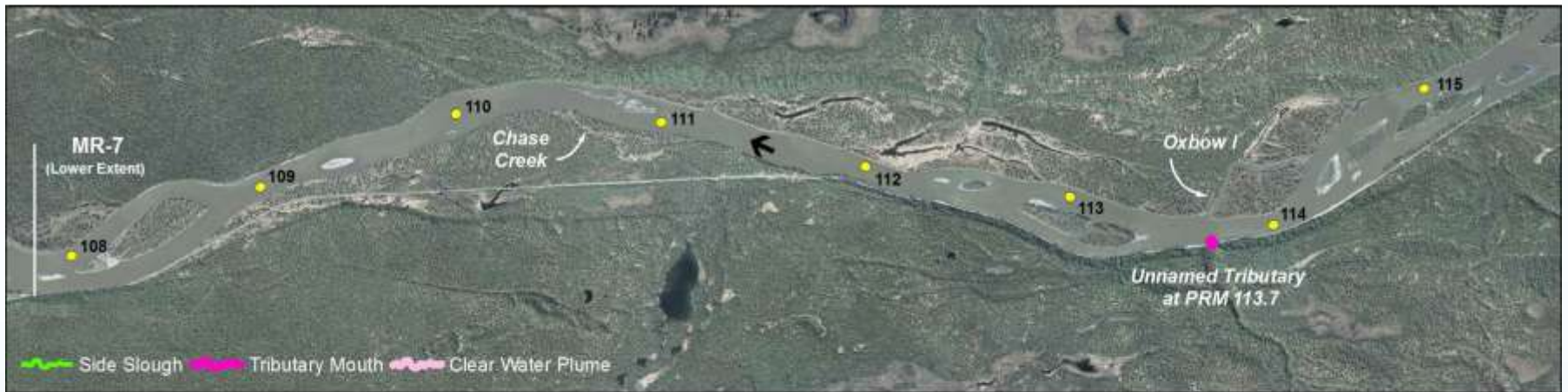
- Upper
- Middle
- Lower

Geomorphic Reach




- Instream Flow Focus Area
- Proposed Instream Flow Focus Area



Projection: Alaska Albers NAD 1983
Date Created: 5/29/2013
Map Author: R2 - Joetta Zablodney
File: Map_IFS_FocusAreas_Overview.mxd



Legend

-  Instream Flow Focus Area (Upper and Lower Extent)
-  Flow Arrow
-  Project River Mile

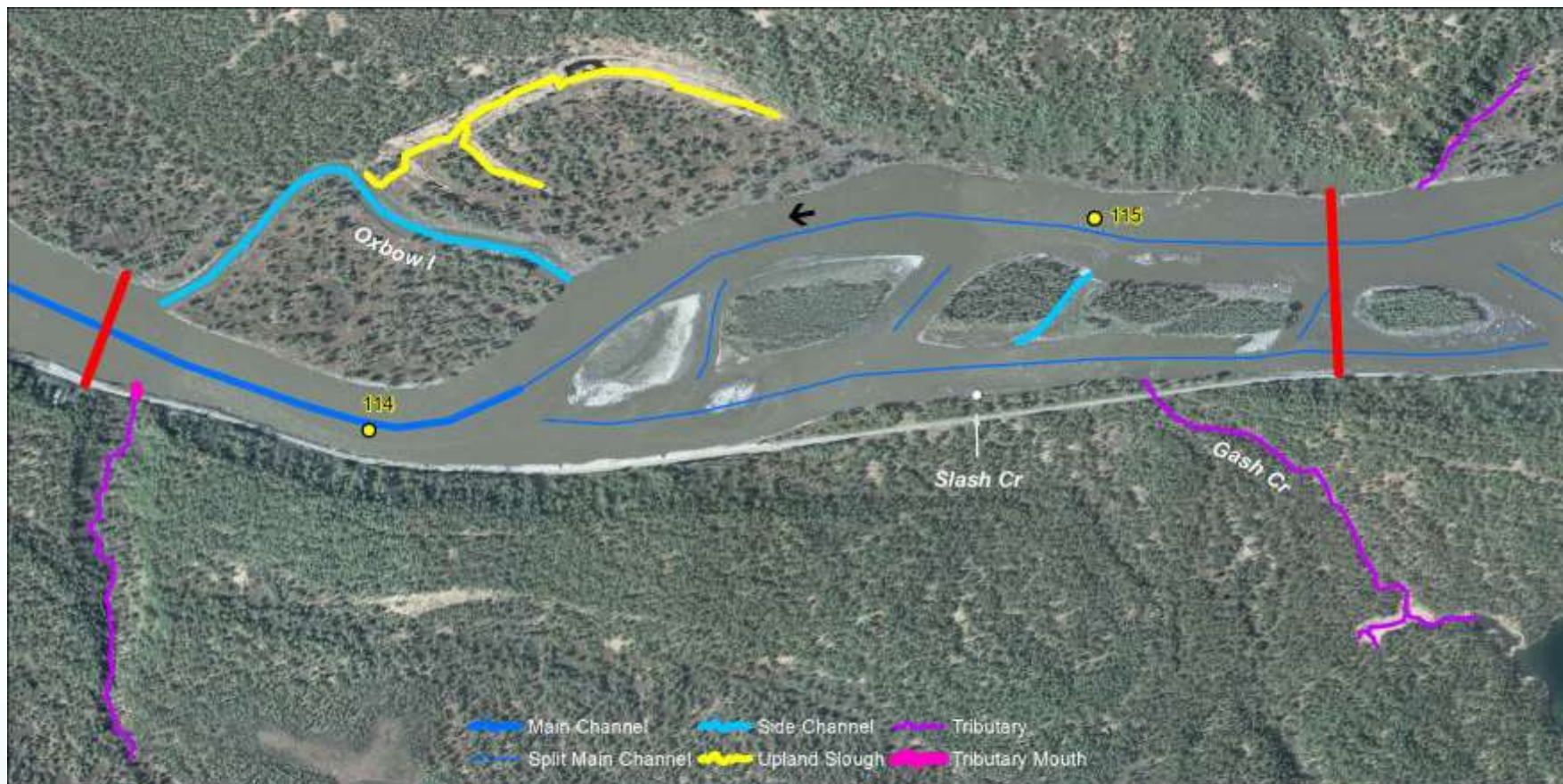


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 Date Created: 4/21/2013
 Map Author: R2 - Joetta Zablontney
 File: Map_IPS_FocusAreas_MR7.mxd



Orthophoto Source: 2011 Matanuska-Susitna Borough LiDAR & Imagery Project

Focus Area 113: Final TM submitted to FERC May 31, 2013



Legend

- Instream Flow Focus Area (Upper and Lower Extent)
- Flow Arrow
- Project River Mile



Projection: Alaska Albers NAD 1983
 Date Created: 4/29/2013
 Map Author: R2 - Joetta Zablodney
 File: Map_IFS_FocusAreas_HDRHab.mxd



Orthophoto Source: 2011 Matanuska-Susitna Borough LIDAR & Imagery Project

Focus Area Data Collection and Analysis

Middle River Focus Area	Initial Channel and Hydraulic Surveys	Tributary Inflow	HSC/HSI	Habitat Modeling
FA-184: Watana Dam	2013/2014 ⁽¹⁾	2013/2014 ⁽¹⁾	2014	2014-Fall
FA-173: Stephan Lake	2013/2014 ⁽¹⁾	2013/2014 ⁽¹⁾	2014	2014-Fall
FA-151: Portage Creek	2013/2014 ⁽¹⁾	2013/2014 ⁽¹⁾	2014	2014-Fall
FA-144: Side Channel 21	2013	2013	2013/2014 ⁽²⁾	2014-Spring
FA-141: Indian River	2013	2013	2013 partial /2014 ⁽²⁾	2014-Spring
FA-138: Gold Creek	2013	2013	2013/2014 ⁽²⁾	2014-Spring
FA-128: Skull Creek Complex	2013	2013	2013/2014 ⁽²⁾	2013
FA-115: Slough 6A	2013	2013	2013 possible /2014 ⁽²⁾	2014-Spring
FA-113: Oxbow I	2013	2013	2013 possible /2014 ⁽²⁾	2014-Spring
FA-104: Whiskers Slough	2013	2013	2013/2014 ⁽²⁾	2013

(1) Contingent upon obtaining access authorization (2) Level of 2014 effort dependent on 2013 results

Focus Area 141 – Indian River – channel and hydraulic surveys



Instream Flow Focus Area (Upper and Lower Extent)

Legend

-  2-D Fine Mesh
-  2-D Coarse Mesh
-  2-D Coarse Mesh (Upland)
-  Flow Arrow
-  Project River Mile

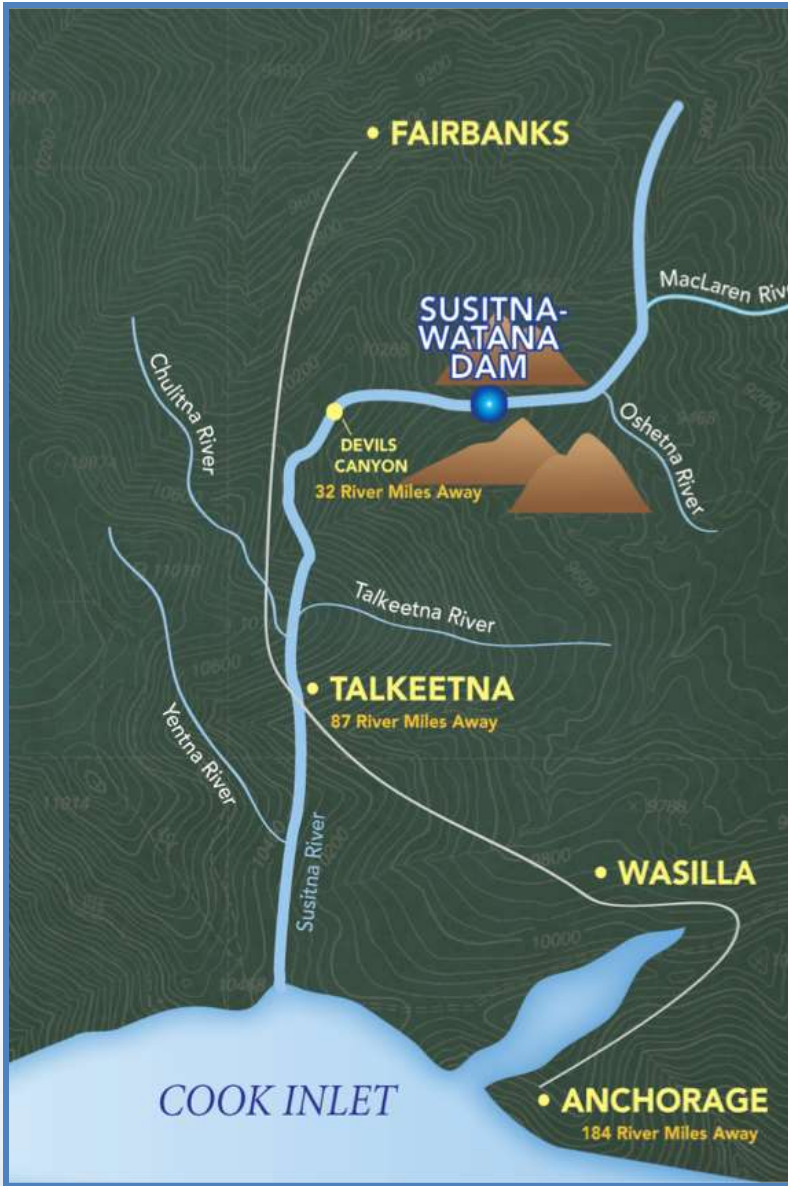


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 Date Created: 6/19/2013
 Map Author: R2 - Joella Zablotney
 File: Map_IFS_FocusAreas_Mesh.mxd



Orthophoto Source: 2011 Matanuska-Susitna Borough LIDAR & Imagery Project

Map Key



Update on HSC Curve Development



8.5.4.5 Habitat Suitability Criteria Development

- **Develop draft HSC curves using 1980's and literature data sources:** Completed – presented in March 19, 2013 Compendium
- **Proposed target species and life stages:** Completed – presented in March 19, 2013 Compendium, March 27 TWG Meeting, May 17 TT Meeting
- **Conduct winter 2012/2013 HSC surveys:** Completed – three separate surveys, two FAs, 29 observations
- **Present 2013 HSC and stranding and trapping survey methods:** Completed – March 27 TWG Meeting, May 17 TT Meeting



Common Name	Susitna River Segment		
	Lower	Middle	Upper
Arctic grayling	X	X	X
Dolly Varden	X	X	X
Humpback whitefish	X	X	X
Round whitefish	X	X	X
Burbot	X	X	X
Longnose sucker	X	X	X
Sculpin	X	X	X
Eulachon	X		
Bering cisco	X		
Threespine stickleback	X	X	
Ninespine stickleback	X		
Arctic lamprey	X	X	
Chinook salmon	X	X	X
Coho salmon	X	X	
Chum salmon	X	X	
Pink salmon	X	X	
Sockeye salmon	X	X	
Rainbow trout	X	X	
Northern pike	X		
Lake trout	X		

Fish Species Distribution

3
0

(Jennings 1985, Delaney et al. 1981)



2013 Target Species and Life Stage

Common Name	Low	Moderate	High
Arctic grayling			x
Dolly Varden		x	
Humpback whitefish		x	
Round whitefish	x		
Burbot		x	
Longnose sucker		x	
Sculpin	x		
Eulachon		x	
Bering cisco	x		
Threespine stickleback	x		
Arctic lamprey	x		
Chinook salmon			x
Coho salmon			x
Chum salmon			x
Pink salmon			x
Sockeye salmon			x
Rainbow trout			x
Northern pike	x		
Lake trout	x		

- Target high priority species and life stage?
- By river segment?
- By season winter/summer.
- Goal >100 measurements per species and life stage
- If goal reached, will consider focusing on next highest priority.

8.5.5.5 Habitat Suitability Criteria Development - continue

- **Conduct summer 2013 HSC surveys:** In Progress – crew training and initial surveys started June 18, 2013
- **Conduct stranding and trapping surveys:** In Progress – crew training and initial surveys started June 18, 2013 (*note that surveys are opportunistic and secondary to HSC data collection*)
- **Distribute Preliminary findings of winter surveys:** In Progress – Q3 TWG meeting



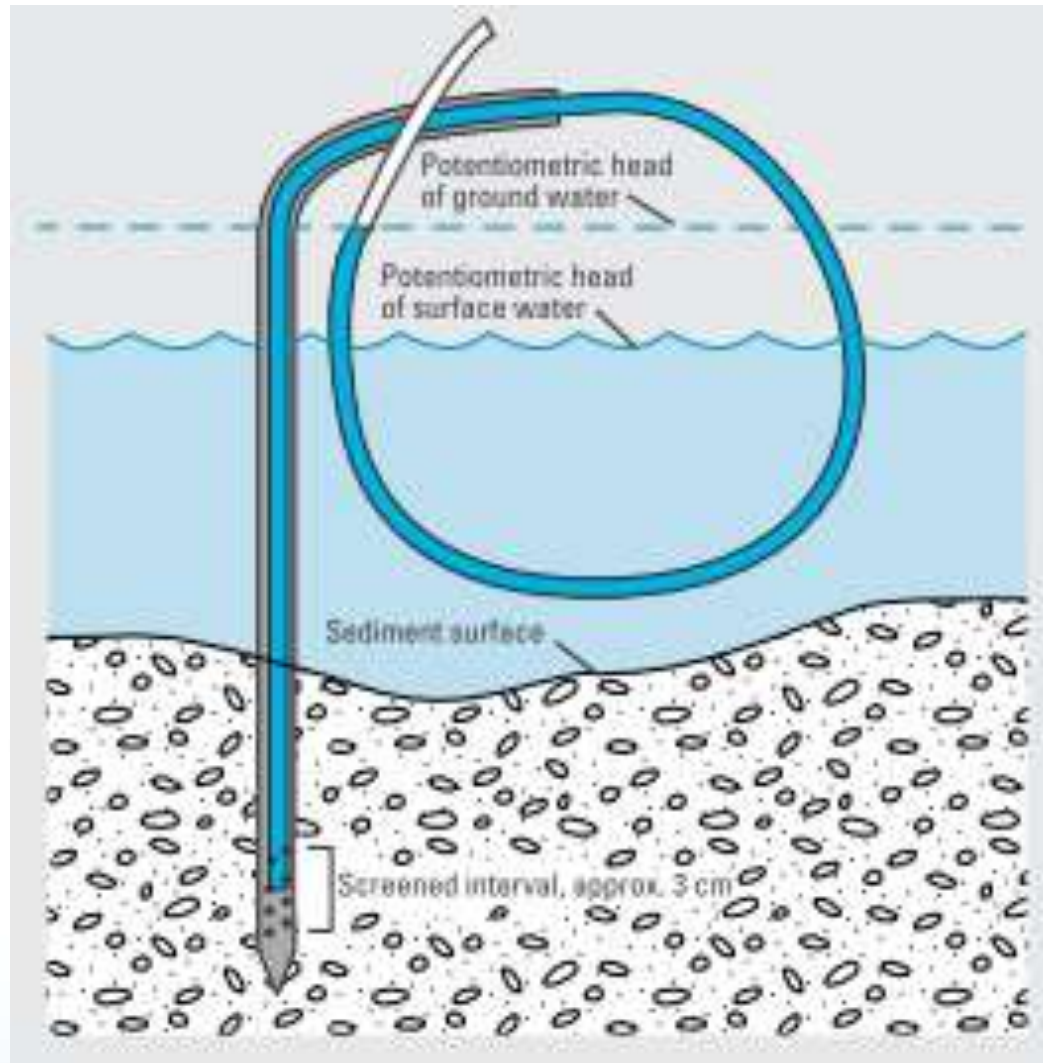
Proposed HSC Data Collection –

Site specific data collection:

- Geomorphic reach
- Macro and mesohabitat type
- Presence and/or mapping of groundwater upwelling (visual, temperature, vertical hydraulic gradient) locations
- Water quality (temp, conductivity, pH, turbidity)
- Survey area length and width
- Presence and location of cover (woody debris, aq. veg., boulder, undercut banks)
- Potential stranding and strapping areas
- Start & end location coordinates (GPS)
- Representative photographs



Detecting Groundwater Upwelling



Clear Water Plumes

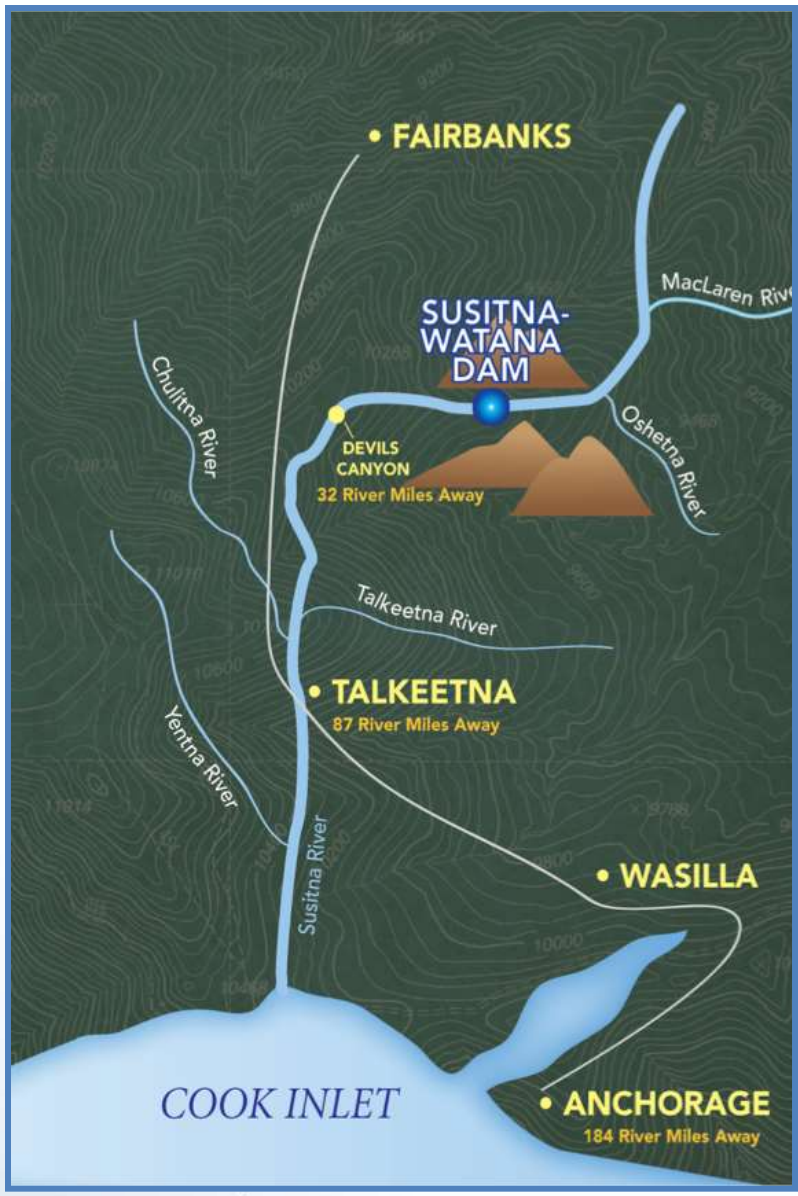


Indian River



Trapper Creek

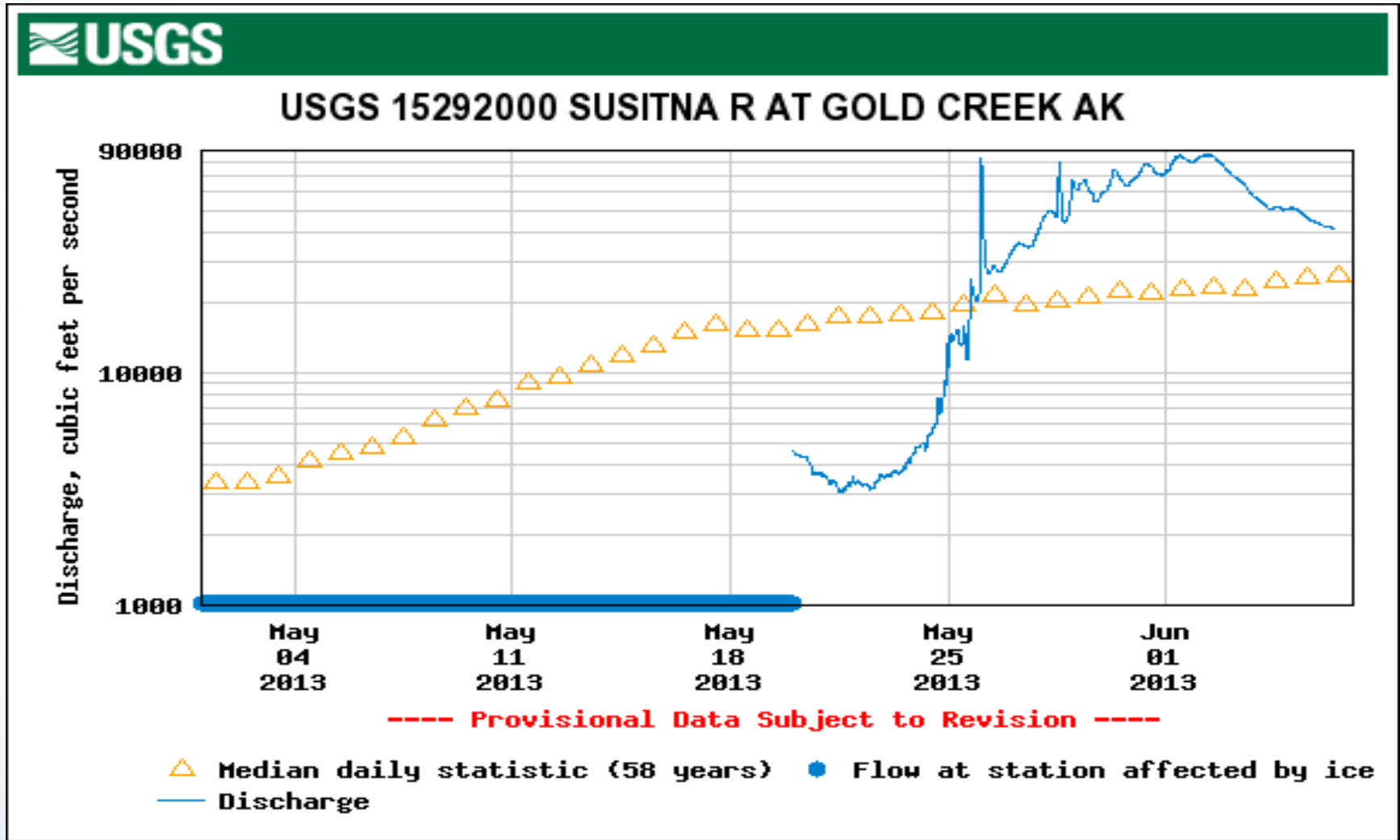




Winter Studies Update



Elevated Flow: USGS Gage at Gold Creek



Elevated Flow: Susitna River above Whiskers 38

**May 20, 2013:
Ice cover**

2013/05/20 06:00:08SUSITNA RVR ABV WHISKER CRK RM 103.0, BSS40



**May 30, 2013:
Flood Advisory**

2013/05/30 07:00:07SUSITNA RVR ABV WHISKER CRK RM 103.0, BSS40



Ice Breakup - Susitna River at Whiskers Slough ³⁹

**May 25, 2013:
Susitna R. at Whiskers Slough**



**May 25, 2013:
Whiskers Slough**



Winter Studies Update: June 2013

40

Data Collection (Feb – April 2013): Completed

- Whiskers Slough (FA-104) and Skull Creek Complex (FA-128)
- Water quality (Intergravel & surface): Temperature, Conductivity, DO
- Hydrology: Monitor stage, map groundwater upwelling
- Fish capture and observation (HSC): Electrofish, underwater video

Preliminary Summary of Results: In Progress

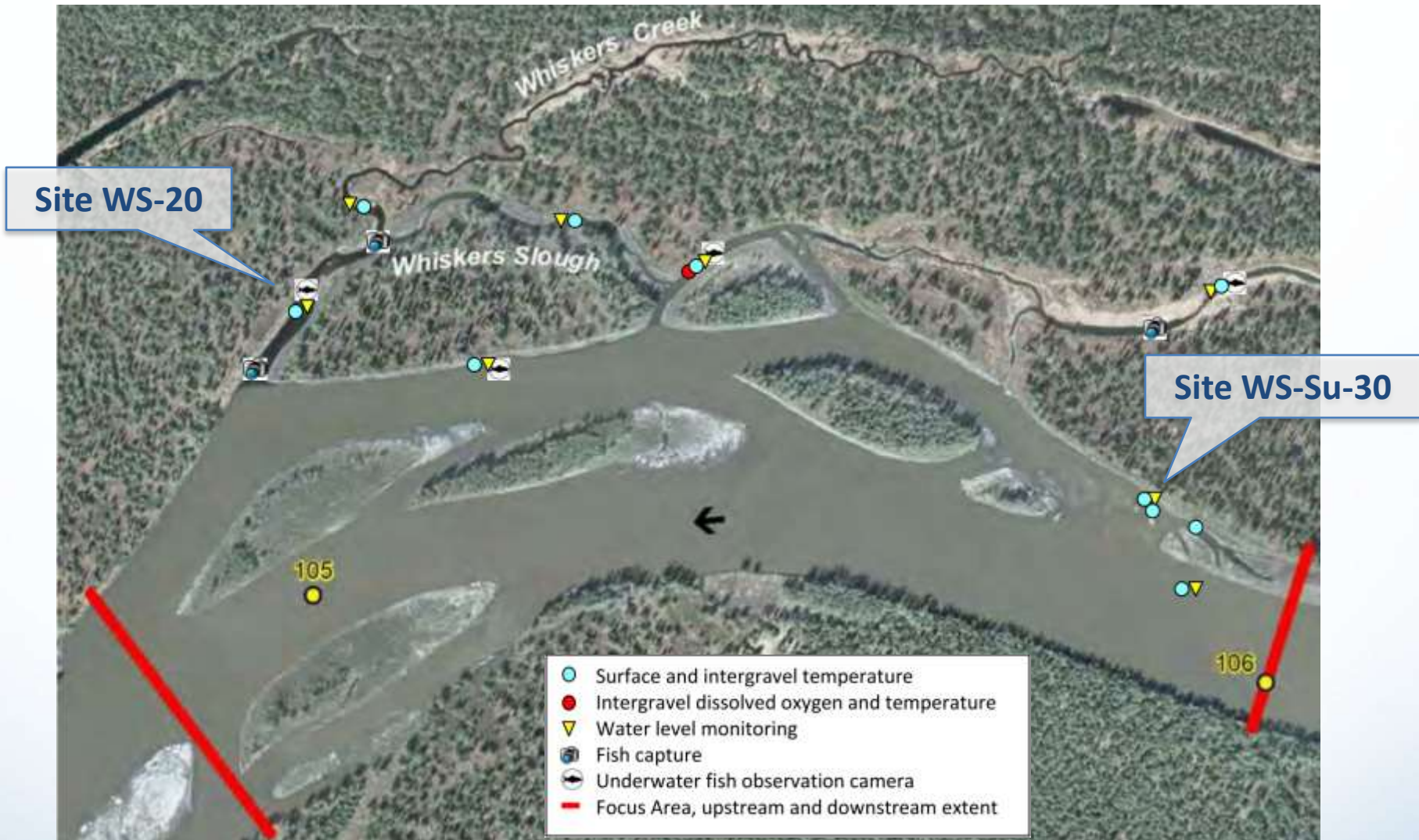
- Study update at March and June 2013 TWG meetings
- Distribute preliminary results September 2013

2013-2014 Implementation Plan: In Progress

- Plan details at September 2013 TWG meeting



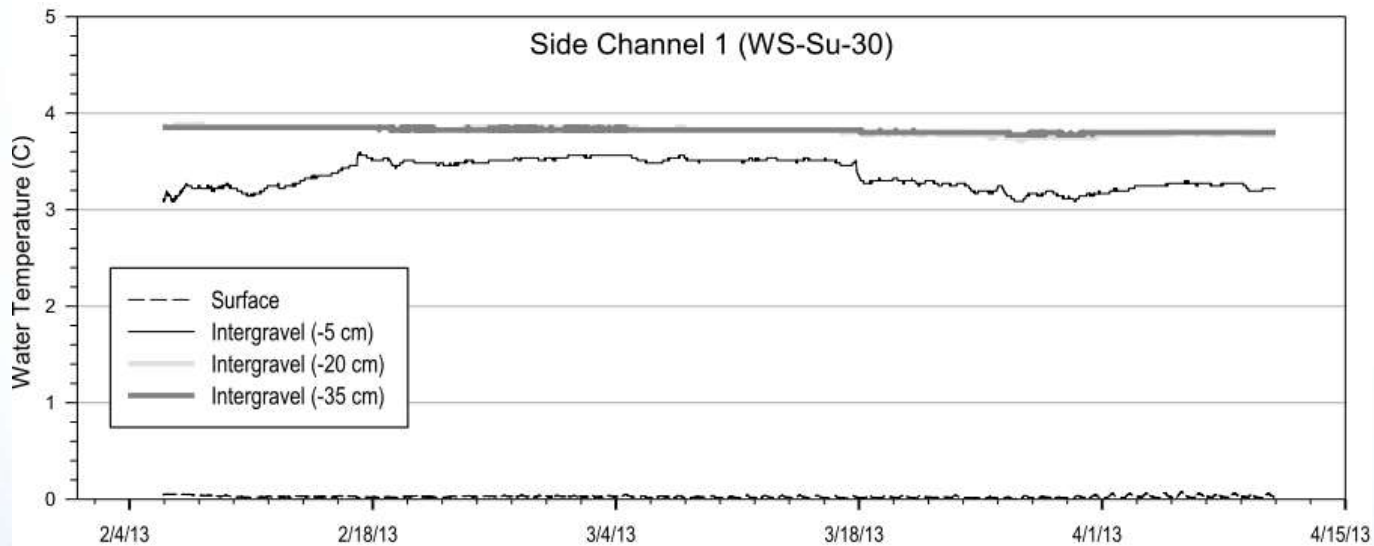
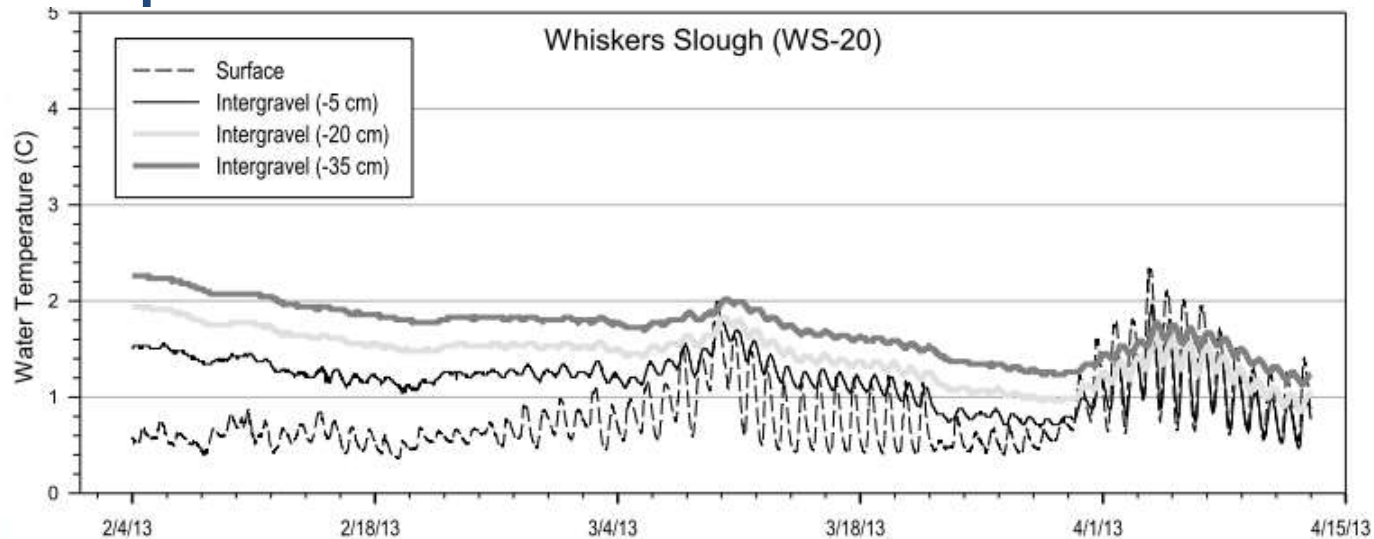
Sampling Locations: Whiskers Slough



Sampling Locations: Skull Creek Complex



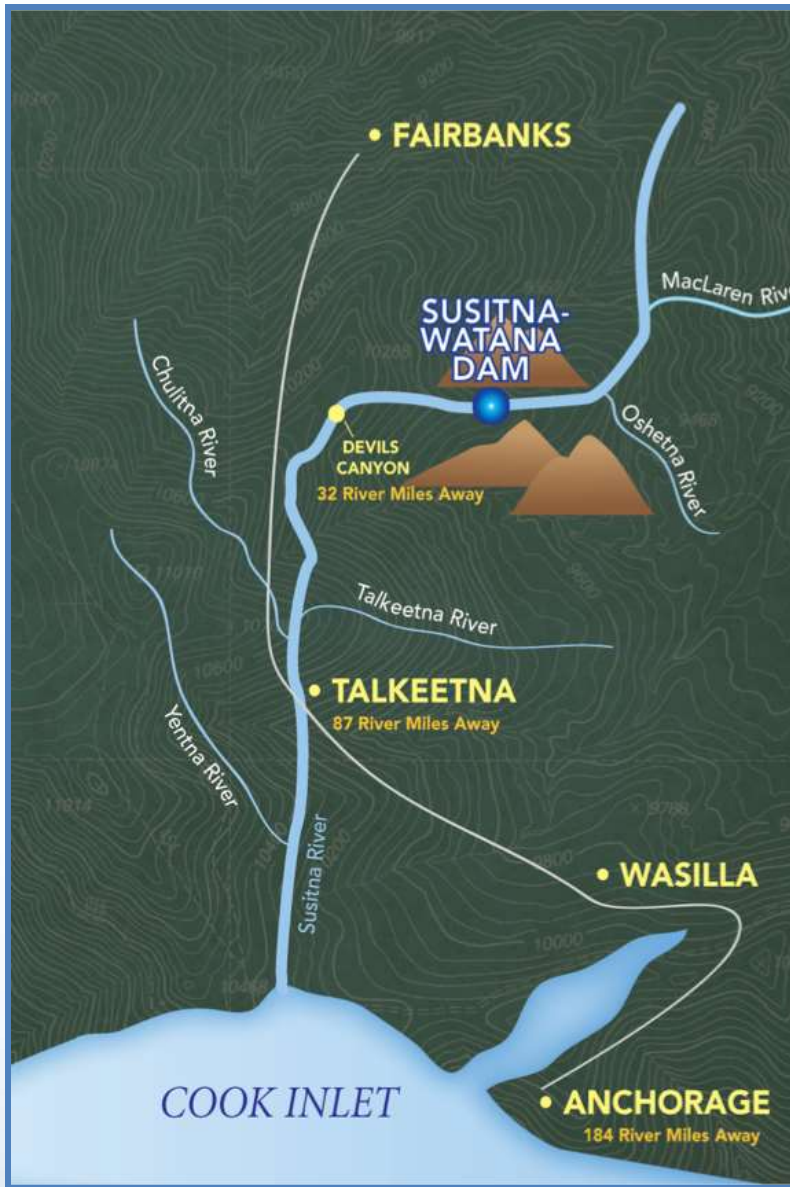
Temperature Data: Winter 2012-2013



HSC Data: Winter 2012-2013

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



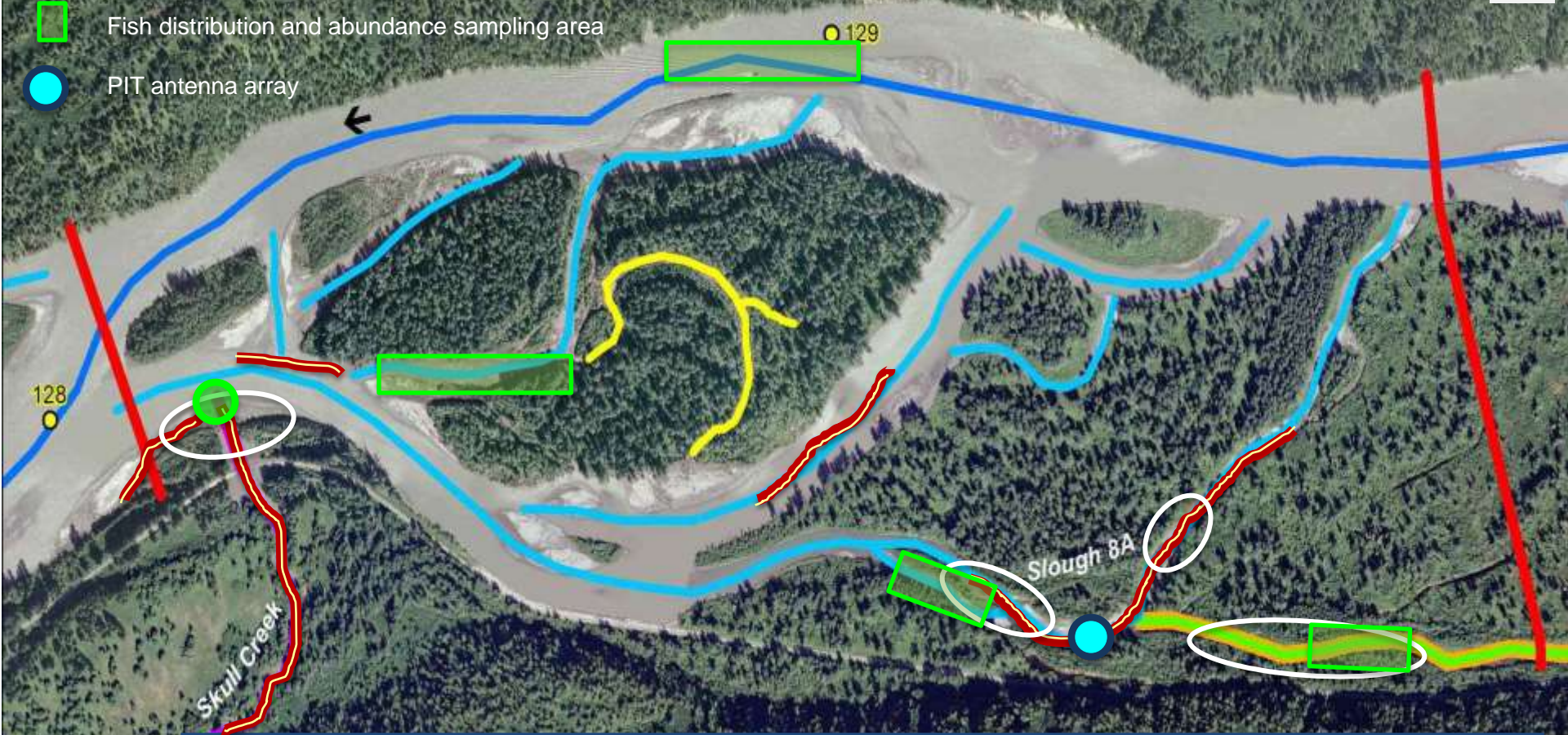


Multi-Disciplinary Study Integration within Focus Areas

FA-128 Example

Slough 8a/Skull Creek

- Main Channel
- Side Slough
- Tributary
- Beaver
- Side Channel
- Upland Slough
- Tributary Mouth
- Early life history sampling area
- 2012 and/or 1980s fish use area
- Fish distribution and abundance sampling area
- PIT antenna array



FA-128, Skull Creek Complex: Fisheries Studies

- Main Channel
- Side Slough
- Tributary
- Beaver
- Side Channel
- Upland Slough
- Tributary Mouth
- 100m sample site
- 50m sample site
- 2012 and/or 1980s fish use area



FA-128, Skull Creek Complex: **HSC**

- Main Channel
- Side Slough
- Tributary
- Beaver
- Side Channel
- Upland Slough
- Tributary Mouth
- Cluster Well Station
- Drive Points Wells
- Streambed Temp Profile



FA-128, Skull Creek Complex: **Groundwater**

- Main Channel
- Side Slough
- Tributary
- Beaver
- Side Channel
- Upland Slough
- Tributary Mouth
- Surface Water Sample
- Groundwater Sample
- Point Sample



FA-128, Skull Creek Complex: **Water Quality**

- Main Channel
- Side Slough
- Tributary
- Beaver
- Side Channel
- Upland Slough
- Tributary Mouth
- Inlet breaching measurement site
- Outlet connectivity measurement site



FA-128, Skull Creek Complex: Breaching, Fish Passage

- Main Channel
- Side Slough
- Tributary
- Beaver
- Side Channel
- Upland Slough
- Tributary Mouth
- Flow routing cross section



FA-128, Skull Creek Complex: Flow Routing

- Main Channel
- Side Slough
- Tributary
- Beaver
- Side Channel
- Upland Slough
- Tributary Mouth
- Geomorphology cross section



FA-128, Skull Creek Complex: **Geomorphology**

- Main Channel
- Side Slough
- Tributary
- Beaver
- Side Channel
- Upland Slough
- Tributary Mouth
- ★ Cluster Station
- ▼ Single Station
- Drive Points Wells
- ▲ 3 Trees w/Sap Flow
- ★ Met (ET) Station, Cluster
- ◆ 4 Trees w/ Sap Flow



FA-128, Skull Creek Complex: Riparian

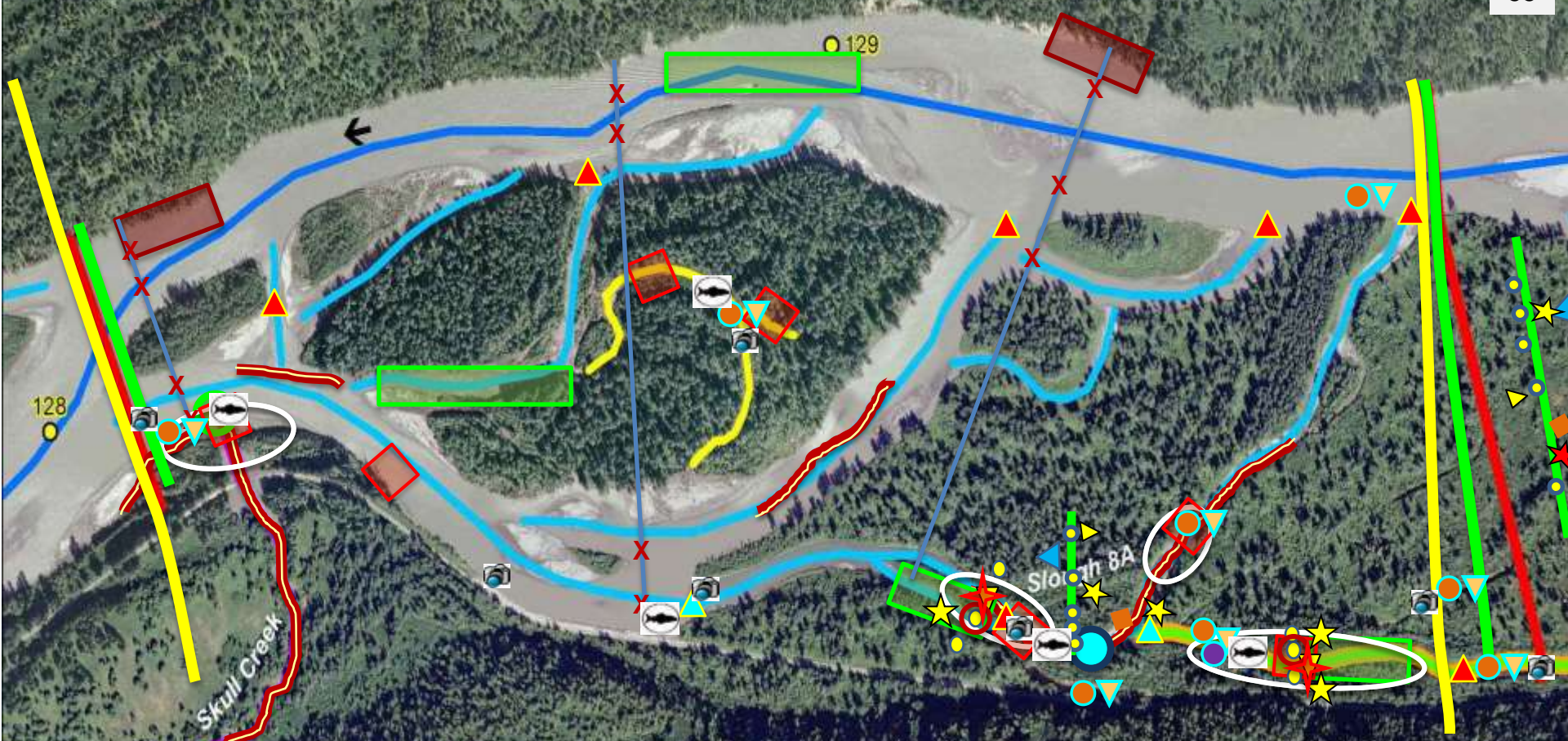
- Main Channel
- Side Slough
- Tributary
- Beaver
- Side Channel
- Upland Slough
- Tributary Mouth
- Fish capture site
- Underwater video observation site
- Surface and intergravel temperature monitoring site
- Intergravel dissolved oxygen monitoring site
- Water level monitoring site



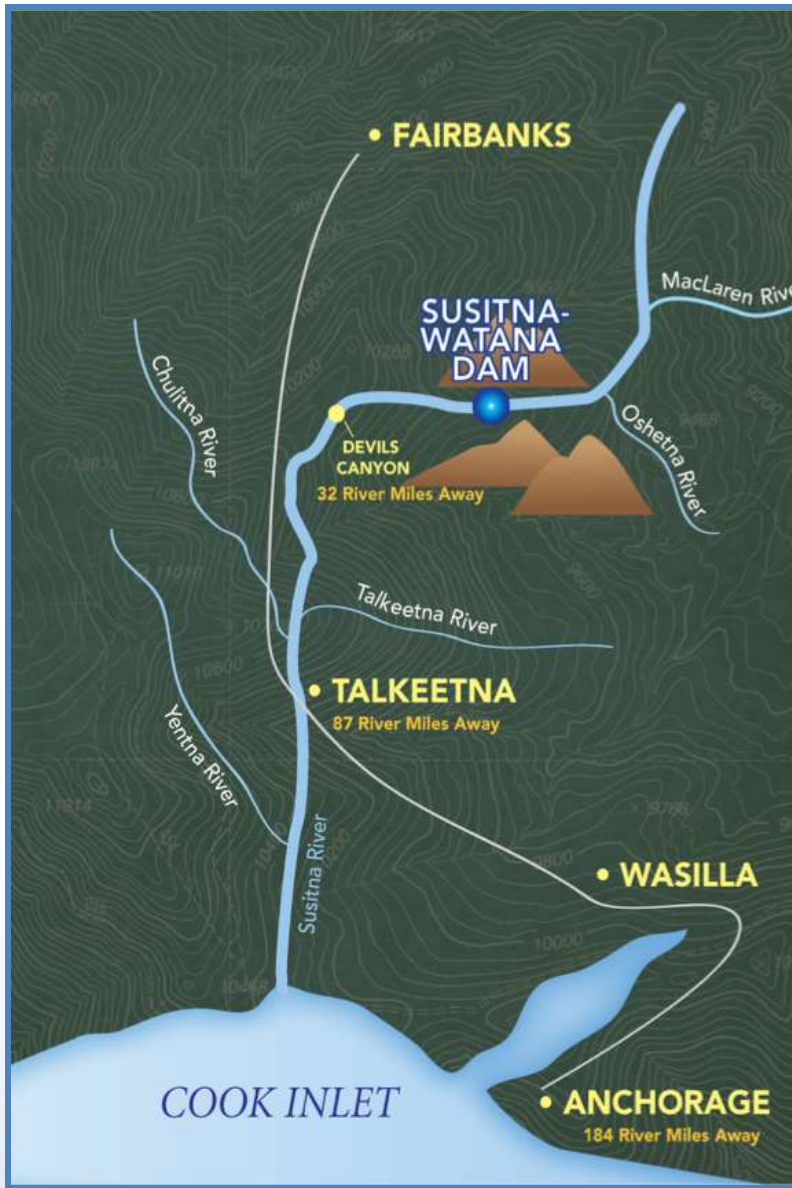
Spot measurements of surface water temperature, conductivity and dissolved oxygen will occur at all sampling locations during field visits

FA-128, Skull Creek Complex: Winter Studies

- Main Channel
- Side Slough
- Tributary
- Beaver
- Side Channel
- Upland Slough
- Tributary Mouth



FA-128, Skull Creek Complex: All



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



OTHER TOPICS



Challenges

- Access
- Weather –Late ice-out
- Safety Considerations
- Logistical Considerations
- Flows

