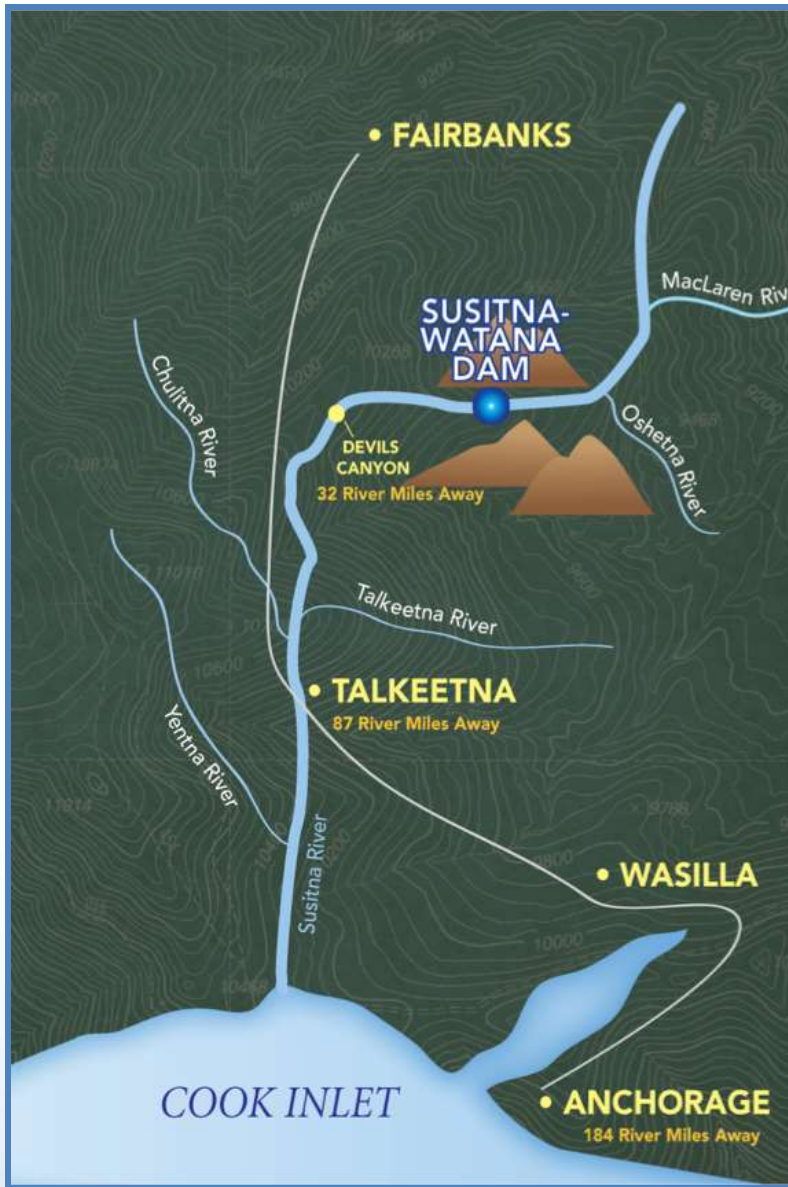


Technical Team
Meeting
*Riverine Modeling
Proof of Concept*

**Basis for Selection of
FA-128 (Slough 8A)**

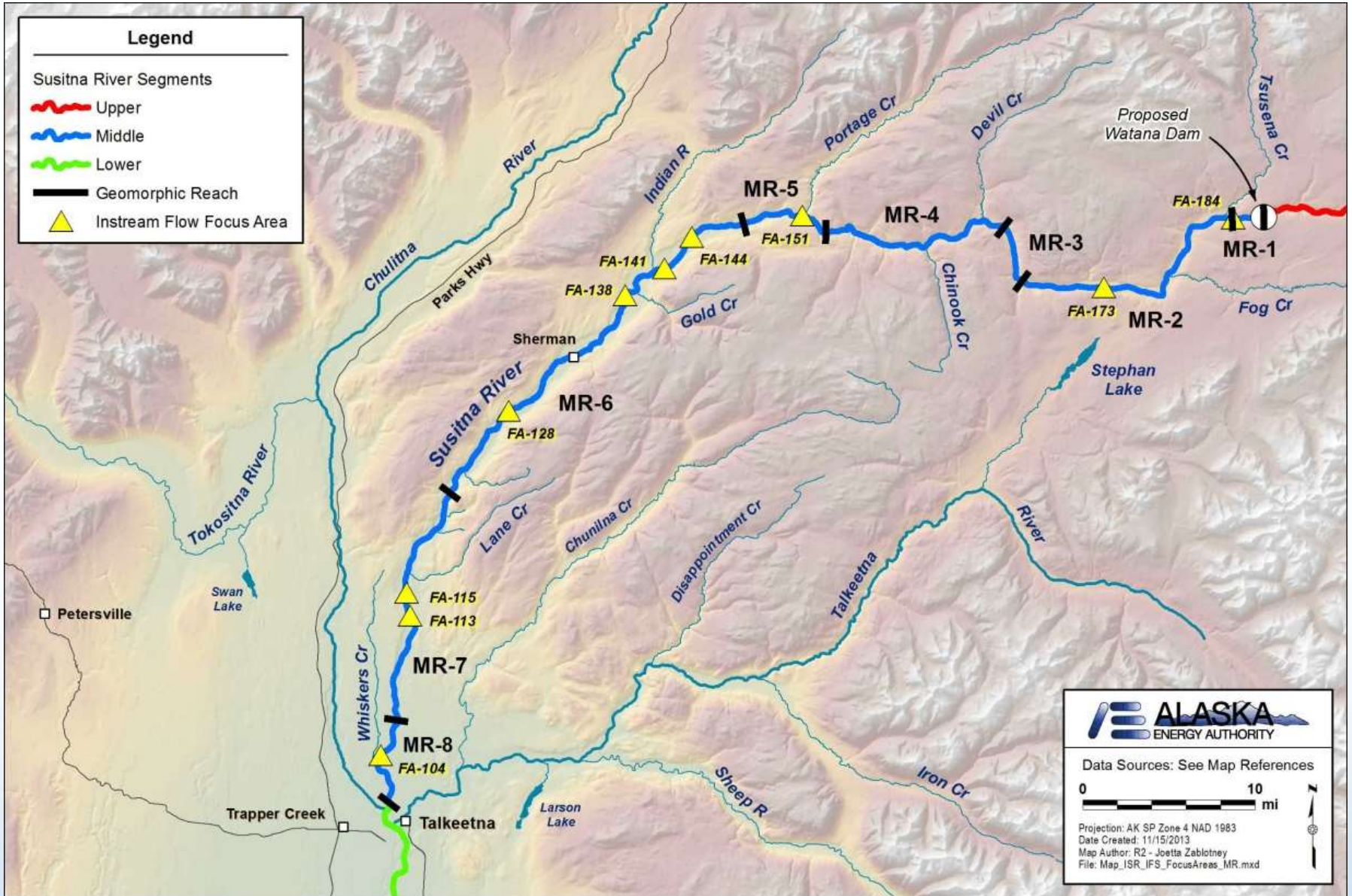
April 15-17, 2014

Prepared by
R2 Resource Consultants



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




Focus Areas



FA-184 (Watana Dam)



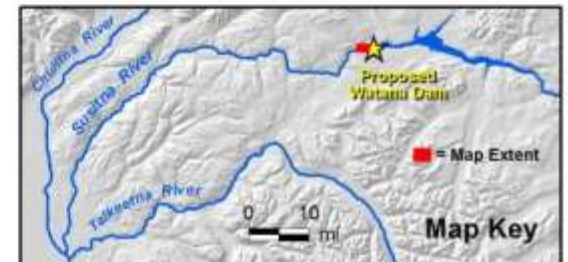
Legend

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



0 1,000
Feet

Projection: AK SP Zone 4 NAD 1983
Date Created: 11/19/2013
Map Author: R2 - Joetta Zabolney
File: Map_ISR_IFS_FocusAreas.mxd



Orthophoto Source: 2012 Tetra Tech, Inc. Data Sources: See Map References

FA-173 (Stephan Lake Complex)



Legend

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



0 1,000
Feet

Projection: AK SP Zone 4 NAD 1983
Date Created: 11/19/2013
Map Author: R2 - Joella Zabolney
File: Map_ISR_IFS_FocusAreas.mxd






Orthophoto Source: 2012 Tetra Tech, Inc. Data Sources: See Map References

FA-151 (Portage Creek)

Photo Date: September 30, 2012
17,000 cfs at Gold Creek Gage



Legend

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



0 500
Feet

Projection: AK SP Zone 4 NAD 1983
Date Created: 11/19/2013
Map Author: R2 - Joetta Zabolney
File: Map_ISR_IFS_FocusAreas.mxd



Orthophoto Source: 2012 Tetra Tech, Inc.




Data Sources: See Map References

FA-144 (Slough 21)

Photo Date: September 30, 2012
17,000 cfs at Gold Creek Gage



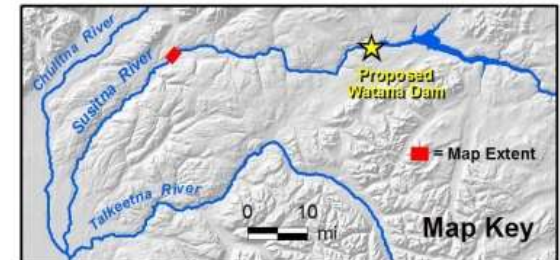
Legend

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



0 1,000
Feet

Projection: AK SP Zone 4 NAD 1983
Date Created: 11/19/2013
Map Author: R2 - Joetta Zabolney
File: Map_ISR_IFS_FocusAreas.mxd



Orthophoto Source: 2012 Tetra Tech, Inc.

Data Sources: See Map References

FA-141 (Indian River)

Photo Date: September 10, 2012
12,900 cfs at Gold Creek Gage



Legend

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



Projection: AK SP Zone 4 NAD 1983
Date Created: 11/19/2013
Map Author: R2 - Joetta Zablotney
File: Map_ISR_IFS_FocusAreas.mxd



Orthophoto Source: 2012 Tetra Tech, Inc. Data Sources: See Map References

FA-138 (Gold Creek)

Photo Date: September 10, 2012
12,900 cfs at Gold Creek Gage



Legend

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



Projection: AK SP Zone 4 NAD 1983
Date Created: 11/19/2013
Map Author: R2 - Joetta Zabolney
File: Map_ISR_IFS_FocusAreas.mxd



Orthophoto Source: 2012 Tetra Tech, Inc. Data Sources: See Map References

FA-128 (Slough 8A)

Photo Date: September 10, 2012
12,900 cfs at Gold Creek Gage



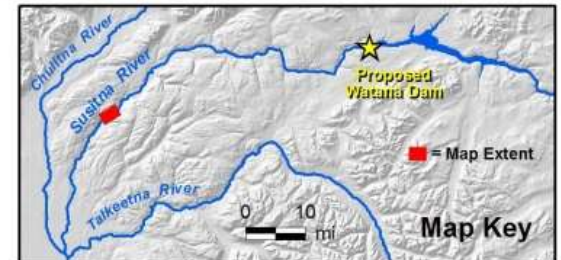
Legend

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



0 1,000
Feet

Projection: AK SP Zone 4 NAD 1983
Date Created: 11/19/2013
Map Author: R2 - Joetta Zabolney
File: Map_ISR_IFS_FocusAreas.mxd






Orthophoto Source: 2012 Tetra Tech, Inc.

Data Sources: See Map References

FA-115 (Slough 6A)

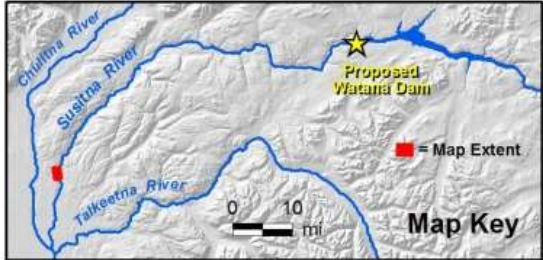


Legend

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



Projection: AK SP Zone 4 NAD 1983
 Date Created: 11/19/2013
 Map Author: R2 - Joetta Zabolney
 File: Map_ISR_IFS_FocusAreas.mxd






Orthophoto Source: 2012 Tetra Tech, Inc. Data Sources: See Map References

FA-113 (Oxbow 1)

Photo Date: September 10, 2012
12,900 cfs at Gold Creek Gage



Legend

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



Projection: AK SP Zone 4 NAD 1983
Date Created: 11/19/2013
Map Author: R2 - Joetta Zabolney
File: Map_ISR_IFS_FocusAreas.mxd






Orthophoto Source: 2012 Tetra Tech, Inc. Data Sources: See Map References

FA-104 (Whiskers Slough)



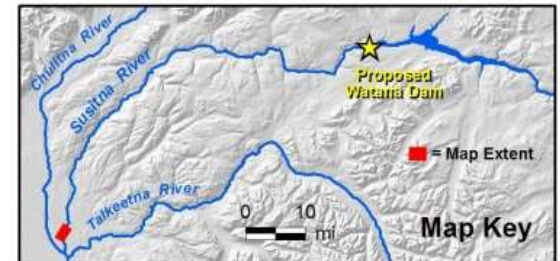
Photo Date: September 10, 2012
12,900 cfs at Gold Creek Gage

Legend

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



Projection: AK SP Zone 4 NAD 1983
Date Created: 11/19/2013
Map Author: R2 - Joetta Zabolney
File: Map_ISR_IFS_FocusAreas.mxd



Orthophoto Source: 2012 Tetra Tech, Inc. Data Sources: See Map References

Basis for Selection of FA-128 (Slough 8A)

- Full complement of habitat types present
- Habitats highly complex
- Contains areas of known groundwater-surface water interactions
- Sampled in 1980s – Biologically important
- Studied by multiple resource disciplines

- 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 (Slough 8A): 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 (Slough 8A): HSC

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



FA-128 (Slough 8A): Groundwater

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

- Surface Water Sample
- Groundwater Sample
- Point Sample



FA-128 (Slough 8A): Water Quality

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



Additional bed and water surface elevations will be needed at the upstream inlet to this channel.

FA-128 (Slough 8A): Breaching, Fish Passage

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



FA-128 (Slough 8A): Flow Routing

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







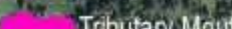







FA-128 (Slough 8A): Geomorphology

- 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 (Slough 8A): Riparian

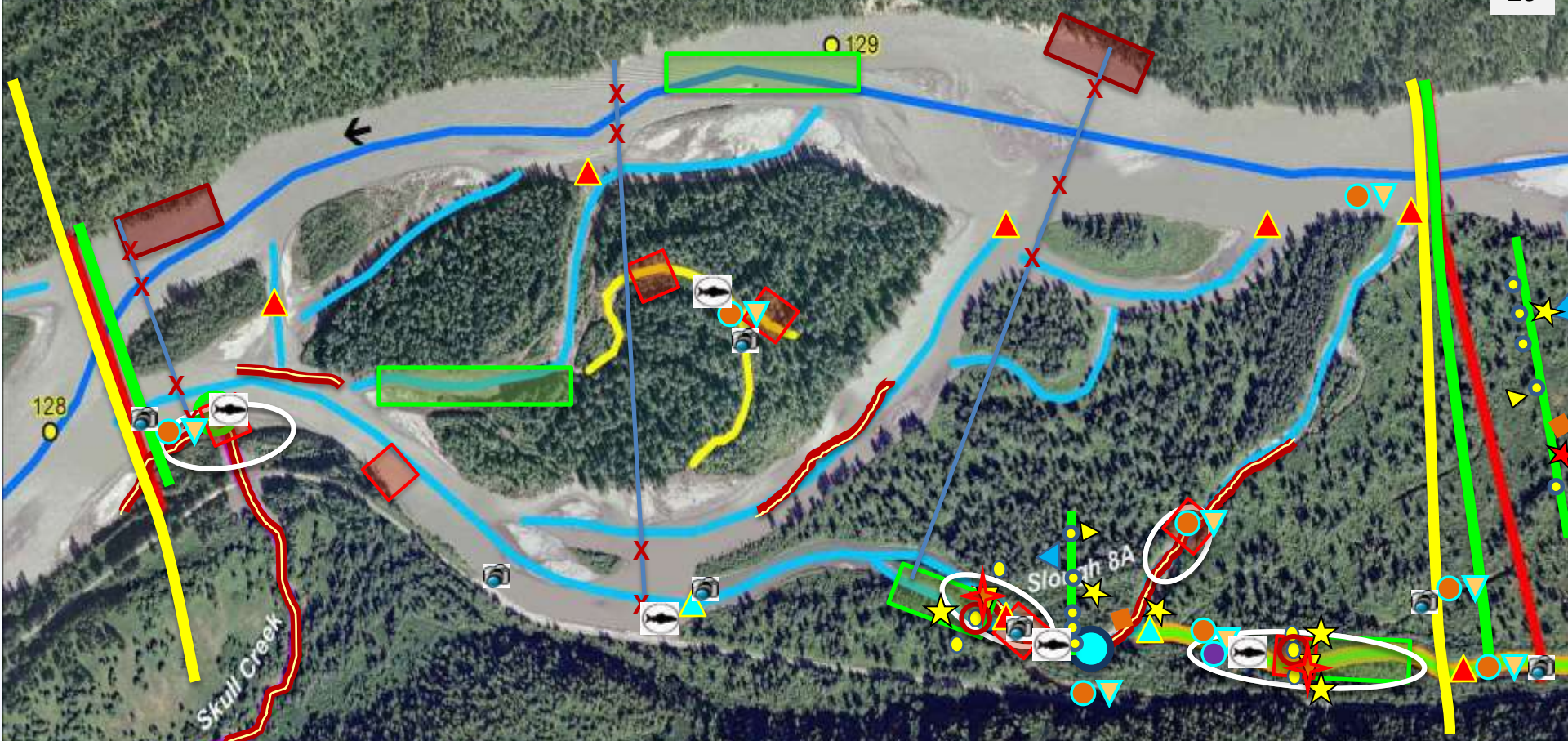
-  Main Channel
-  Side Slough
-  Tributary
-  Beaver
-  Side Channel
-  Upland Slough
-  Tributary Mouth
-  Fish capture site
-  Underwater video observation site
-  Surface and intergravel temperature monitoring site
-  Intergravel dissolved oxygen monitoring site
-  Water level monitoring site



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

FA-128 (Slough 8A): Winter Studies

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



FA-128 (Slough 8A): All