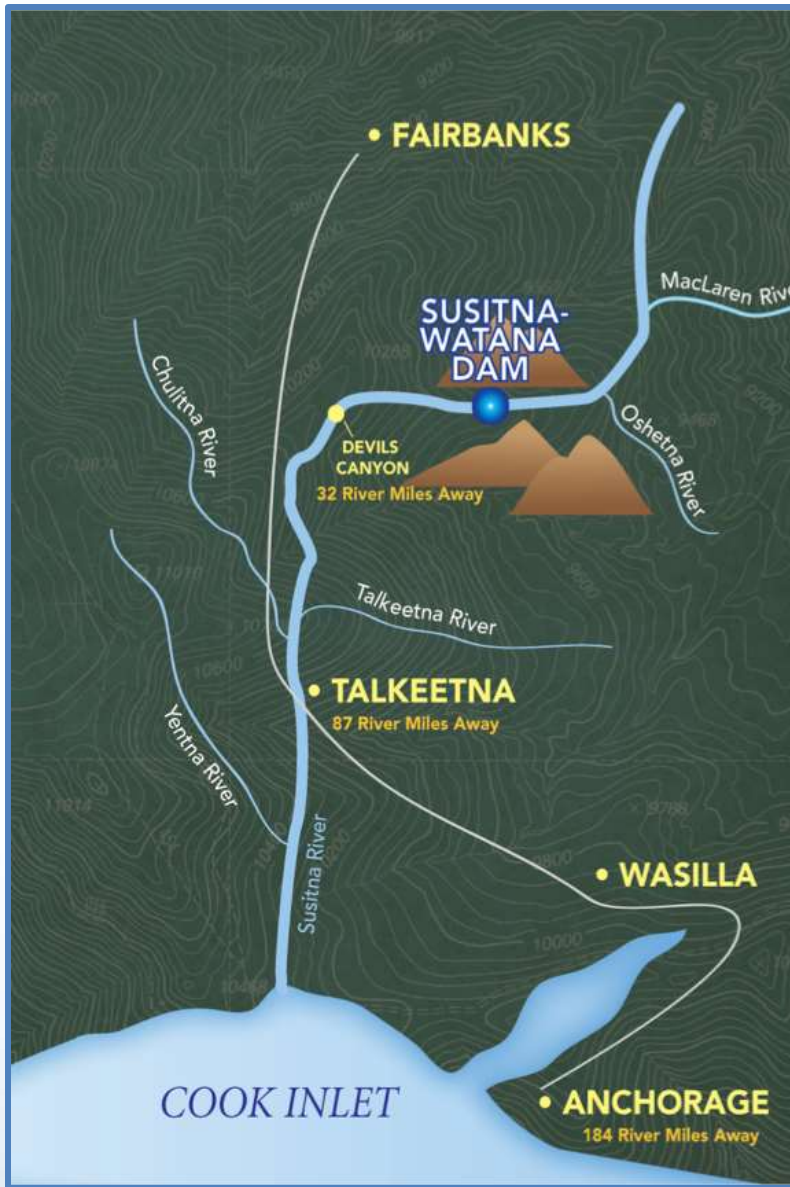


Technical WorkGroup Meeting

Riparian Instream Flow Riparian Q2 2013 Report

25 June 2013

Prepared by
R2 Resources, GW Scientific &
ABR, Inc.



Road Map for Today's Presentation

- I. Review of 2013 Q2 Riparian IFS Tasks
- II. Riparian IFS Q2 Field Operations
- III. Riparian Technical Work Group Meetings
- IV. Riparian Groundwater / Surface Water Field Design
- V. Planned Q3 Riparian IFS Task



I. Primary 2013 Q2 RIFS Tasks

Activity	2012				2013			
	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4
8.6.3.1. Critical review of 1980s Susitna River Data, Current Scientific research concerning hydro project floodplain vegetation effects; and unimpacted, natural floodplain vegetation research.								
Develop a detailed outline of the final literature review chapter and preliminary bibliography								
8.6.3.2. Focus Area Study Site Selection								
Riparian Process Domain delineation								
8.6.3.3.1. Seed Dispersal Study: Field data collection								
8.6.3.3.2. Seedling Recruitment Study: Field data collection (July & August)								
8.6.3.4. Ice Effects Study: Field data collection - Tree ice scar mapping								
8.6.3.5. Sediment deposition study: Field data collection - Soil sampling								
8.6.3.6. Characterize natural floodplain vegetation GW/SW maintenance hydroregime								
Finalize Riparian GW/SW Field Design								
Implement Riparian GW/SW Installation Sampling								
Develop GW/SW models								

II. RIFS Q2 Field Operations

Field operations began in mid-May with recon surveys and site selection for instrumentation and layout.

Studies initiated in Q2 include:

- Seed Dispersal Study
- Geomorphology sediment deposition study
- Ice Effects Surveys
- Riparian Groundwater Surface Water Study
- Focus Area vegetation mapping and sampling

Seed Dispersal Study

- Poplar trees and willows monitoring sites established during week of June 4, 2013.
- On-going weekly monitoring of seed dispersal
- Site specific temperature instrumentation
- Project Area wide poplar grove sites located at:
 - Deshka Landing, Sunshine, Talkeetna, Indian River



Sediment Deposition Study

Whiskers Slough soil pits



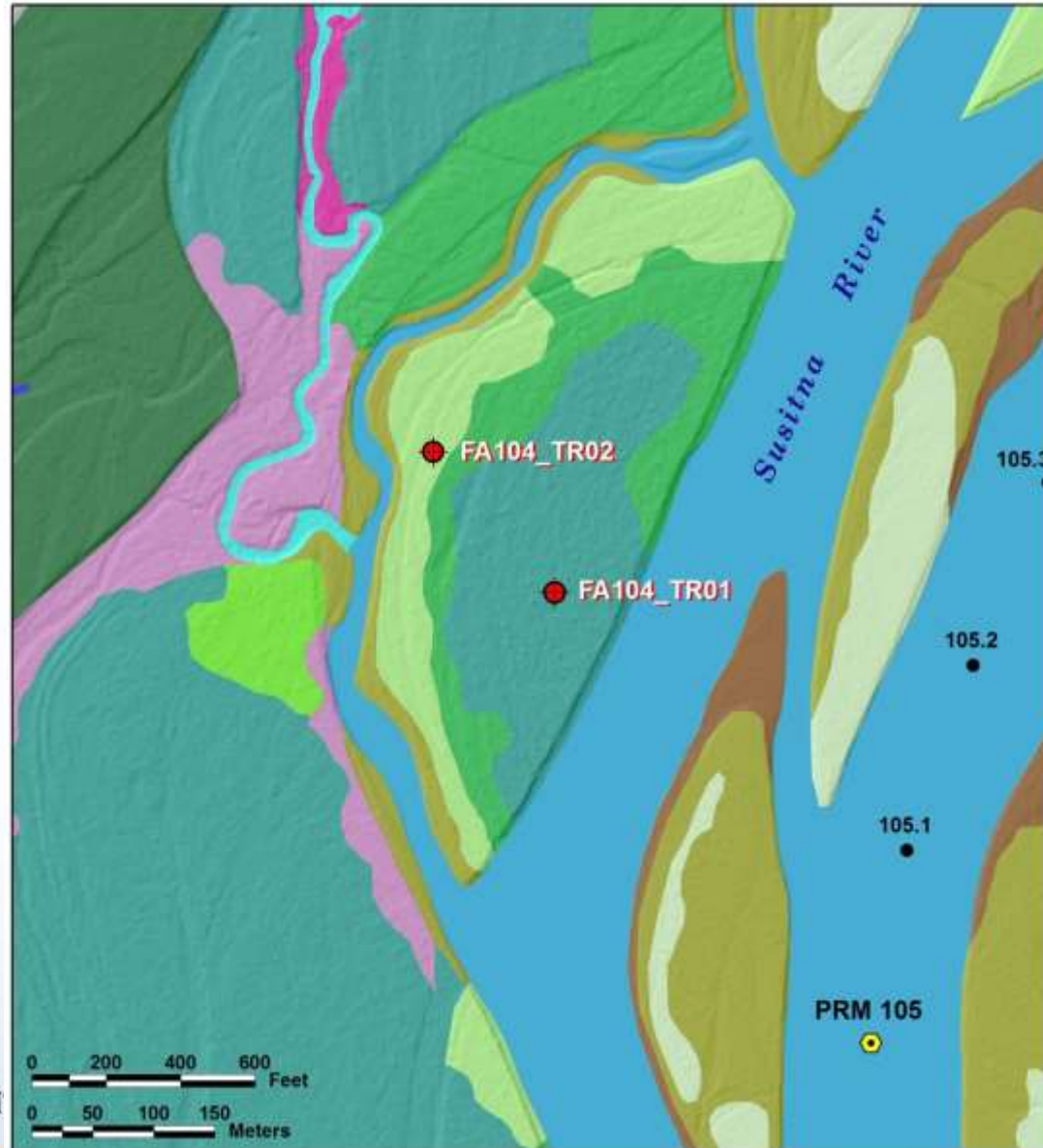
Geomorphology, Sediment Deposition & Vegetation Type Verification

- April 30th - May 3rd, 2013
 - ABR, Inc. & R2: Integrated Terrain Unit (ITU) Modeling
 - Vegetation Community Type Verification (Viereck Level 3)
 - Surficial Geomorphology Verification
- May 19th – May 22nd, 2013
 - ABR, Inc. & R2: Intensive ITU Sample Protocols
 - Two soil trenches excavated to original cobble bed layer
 - Complete soil stratigraphy
 - Laboratory Samples collected
 - Isotope Analysis
 - Sieve Analysis
 - Field Transect Ground Verified in Whisker's Slough area



ABR, Inc. & R2 Staff

Focus Area 104 – Directed ITU Intensive Sample Locations May 2013



Ecotype

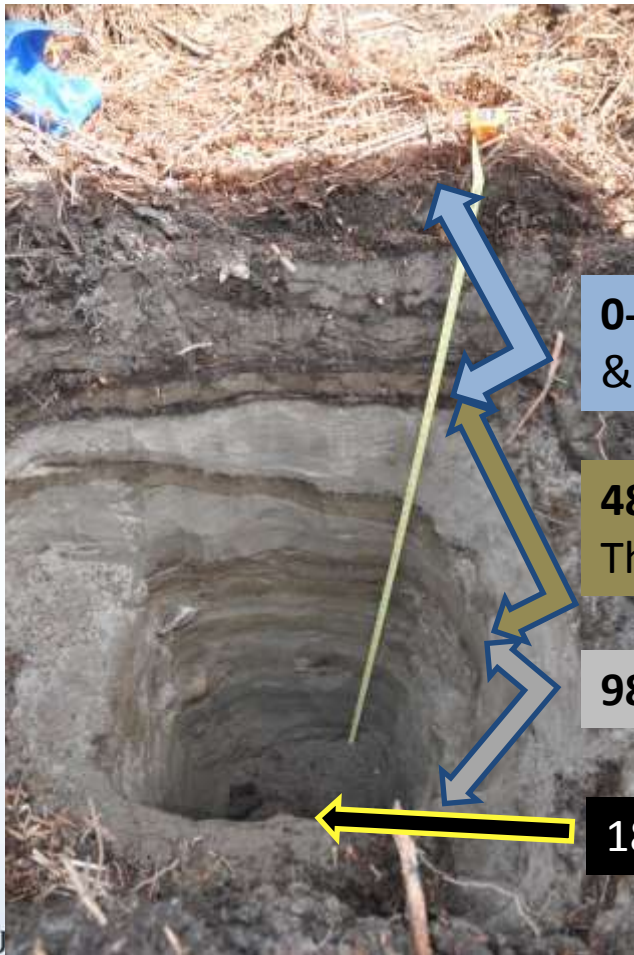
-  Lowland Headwater Stream
-  Riverine Circumneutral Beaver Pond
-  Riverine Circumneutral Glacial River
-  Riverine Gravelly Wormwood-Horsetail Barrens and Partially Vegetated
-  Riverine Loamy Ostrich Fern Meadow
-  Riverine Sandy Bluejoint-Herb Meadow
-  Riverine Sandy Balsam Poplar Sapling-Alder-Willow Tall Shrub
-  Riverine Sandy Pole-sized Balsam Poplar Forest
-  Riverine Sandy Timber-sized Balsam Poplar Forest
-  Riverine Sandy-Loamy Balsam Poplar Large Tree Forest
-  Riverine Sandy-Loamy Spruce-Balsam Poplar Forest
-  Riverine Loamy Spruce-Birch Forest
-  Upland Loamy Spruce-Birch Forest

Whisker's Slough

Focus Area 104

Riverine Loamy Spruce-Birch Forest Ecotype

Sampled May 20, 2013



General Soil Stratigraphy

0-48cm Surface Organic Mat & Loamy Mantle

48-98cm Stratified Sands & Thin Buried Organic Horizons

98-183cm Stratified Sands

183cm+ Gravel & Cobble Bed

General Site History

4th – Forest Establishment; Infrequent Flooding

3rd- Vegetation Establishment; Frequent Flooding

2nd – Island Formation; Very Frequent Flooding

1st – Original River Bed; Permanent Flooding

Floodplain Ice Effects Study



Floodplain Ice Effects Study

Susitna River break up, May 25-26, 2013



Tree Ice Scarification



Floodplain & Vegetation Ice Shearing



Whiskers Slough Ice Shearing



Ill Riparian Technical Work Group Meetings

- April 23, 2013
- June 6, 2013
- Conferred concerning FERC Determination Requests



III Riparian Technical Work Group

Meetings Consultation Topics

Riparian IFS 8.6 & Riparian Vegetation Study 11.6

- Plant functional groups and Viereck Level IV Classes
- Robert Henszey, USFW, presentation of Platte River floodplain groundwater study and plant response curve analyses
- Riparian Groundwater Study approach and operational details
- Description of methods used to estimate shape of transpiration flux
- Adequacy of MODFLOW and Xylem Water Isotope Sampling to Establish
- Groundwater/Hydroperiod Relationships
- Sampling design for collection of plant xylem water
- Vegetation sampling design within and outside the Focus Areas.
 - Detailed sampling design, including schematic of sampling design for each Focus Area, stratification factors, and basis for number of plots within and outside Focus Areas

Groundwater Study 7.5

- Construction of necessary data sets for MODFLOW RIP-ET
 - Detailed description of specific methods used in plant functional group determination.
 - Detailed description of methods used to measure rooting depth.
 - Description of methods related to water level/depth data to extinction and saturated extinction depths.

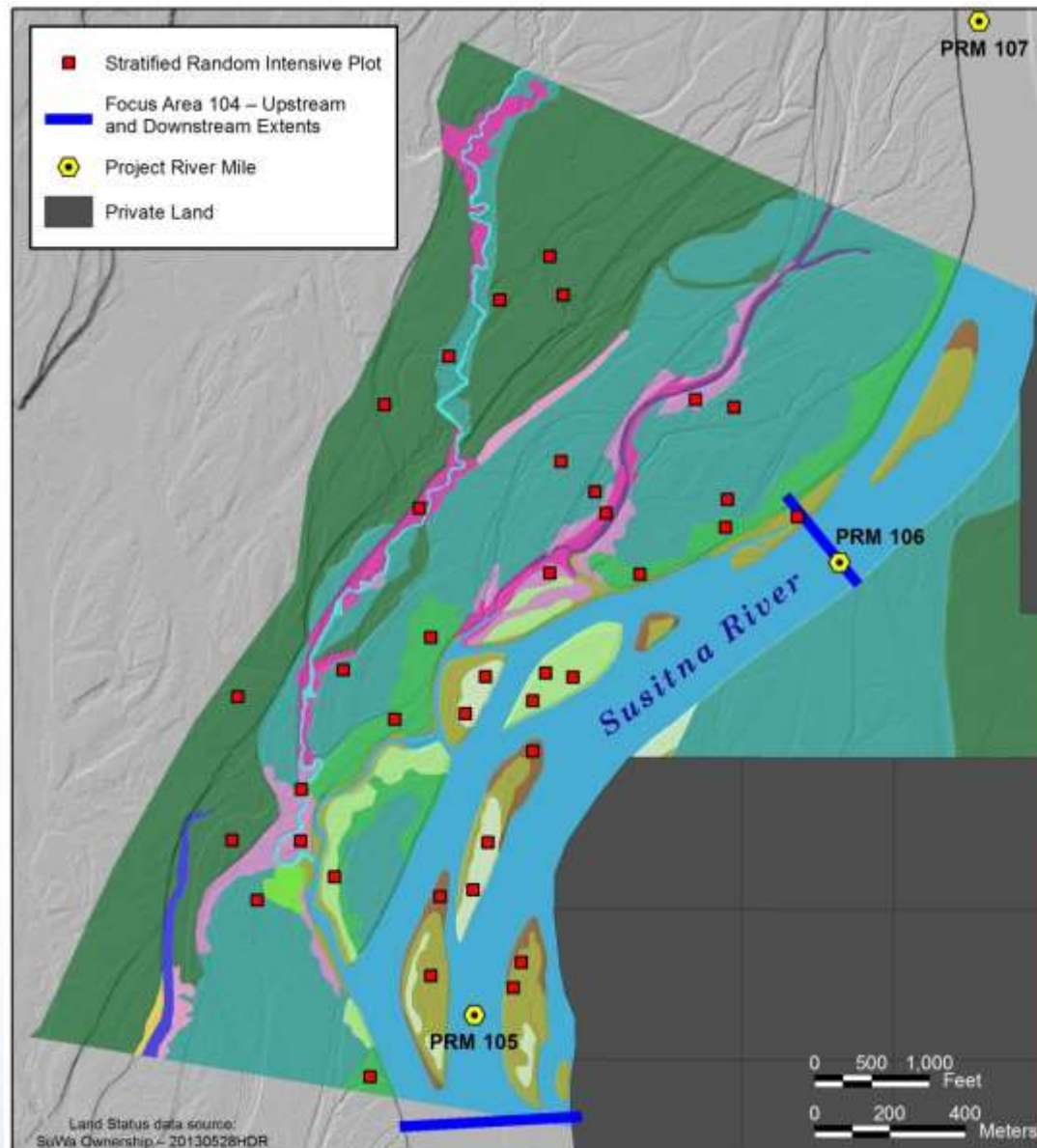


Riparian Vegetation Sampling Strategy

- Focus Areas
 - Stratified, random sampling plan
 - Point-intercept sampling
 - Strata weighted by Ecotype from Preliminary ABR, Inc. Integrated Terrain Unit (ITU) Mapping
 - 25 plots per focus area; 118 total plots
- Non-Focus Areas:
 - Directed, targeted sampling
 - Necessary for ensuring under represented ecotypes in Focus Areas are sufficiently sampled (eg. Herbaceous)
 - 94 total plots
- Integrated Terrain Unit Transects
 - Directed, targeted sampling
 - 2013 – Priority is Upper and Middle Susitna River
 - Approximately 60 transects



Focus Area 104 – ITU Stratified Random Intensive Sampling Locations

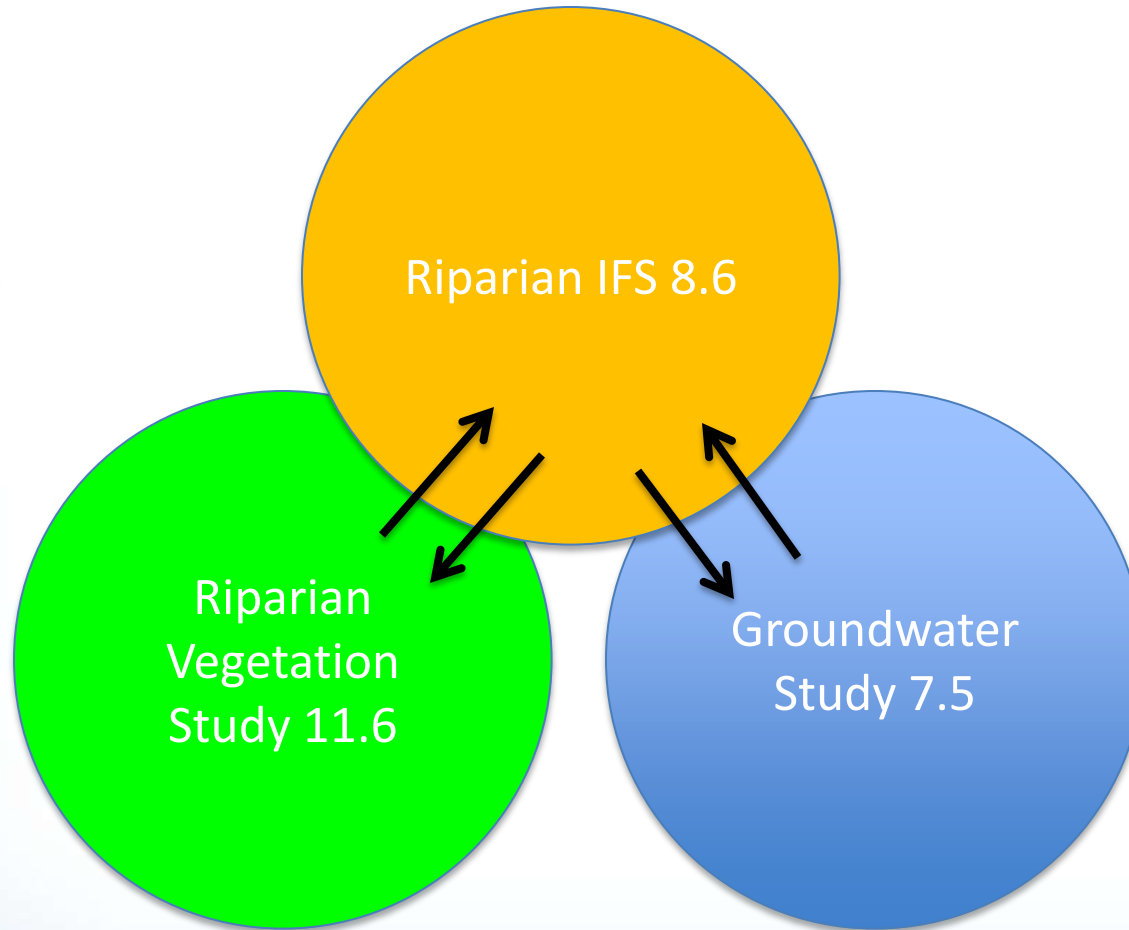


Ecotype

- Lowland Headwater Stream
- Lowland Organic-rich Bluejoint-Herb Meadow
- Riverine Circumneutral Beaver Pond
- Riverine Circumneutral Glacial River
- Riverine Slough
- Riverine Gravelly Wormwood-Horsetail Barrens and Partially Vegetated
- Riverine Loamy Ostrich Fern Meadow
- Riverine Sandy Bluejoint-Herb Meadow
- Riverine Wet Sedge-Forb Marsh
- Riverine Sandy Balsam Poplar Sapling-Alder-Willow Tall Shrub
- Riverine Sandy Pole-sized Balsam Poplar Forest
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- Riverine Sandy-Loamy Balsam Poplar Large Tree Forest
- Riverine Sandy-Loamy Spruce-Balsam Poplar Forest
- Riverine Loamy Spruce-Birch Forest
- Upland Loamy Spruce-Birch Forest



IV Integrated Riparian Groundwater (RIPGW) Studies



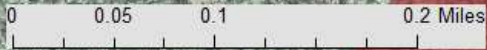
IV 2013 Riparian GW/SW Field Study

1. Studies to be conducted at:
Whiskers Slough (FA 104), Lane Creek (FA 115), Slough 8A (FA 128), Gold Creek (FA 138)
2. Study Design to include 2D and 3D MODFLOW Modeling Approaches
3. 2D MODFLOW Modeling at:
Whiskers Slough (FA 104), Lane Creek (FA 115), Gold Creek (FA 138)
4. 3D MODFLOW Modeling at:
Slough 8A (FA 128)



IV 2013 Riparian GW/SW Field Study

- GW/SW Initial transect field layout conducted
 - Whiskers Slough (FA 104), Lane Creek (FA115), Slough 8A (FA 128), Gold Creek (FA 138)
- Evapotranspiration study initiated
 - Leaf porometer measurements
 - Leaf area index measurements
- Plant and Soil Isotope Analysis sampling initiated



Whiskers Slough

Whiskers Creek

Whiskers Slough

Prior Section

Existing Station (IFS)

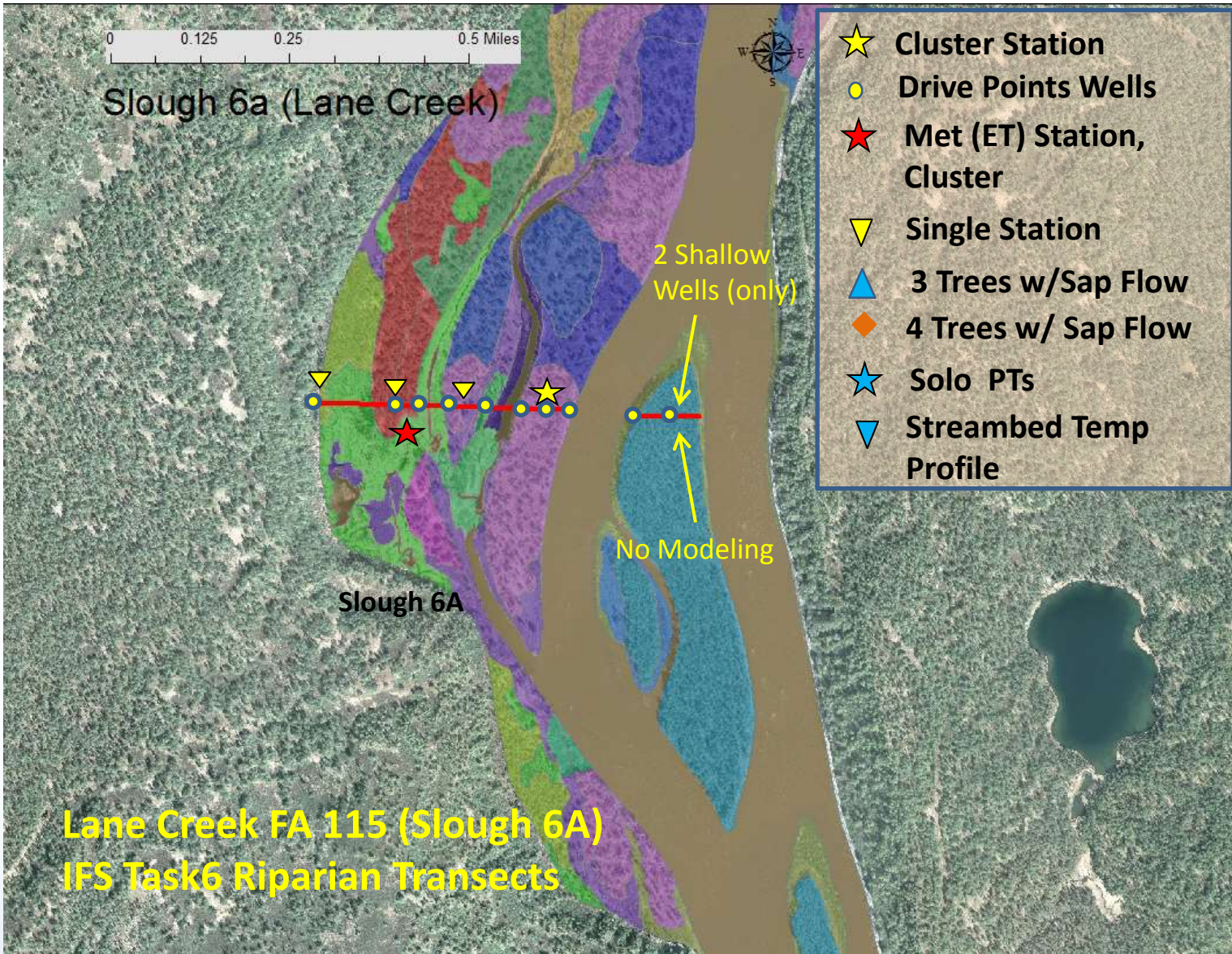
Pink Spawning Area (IFS)

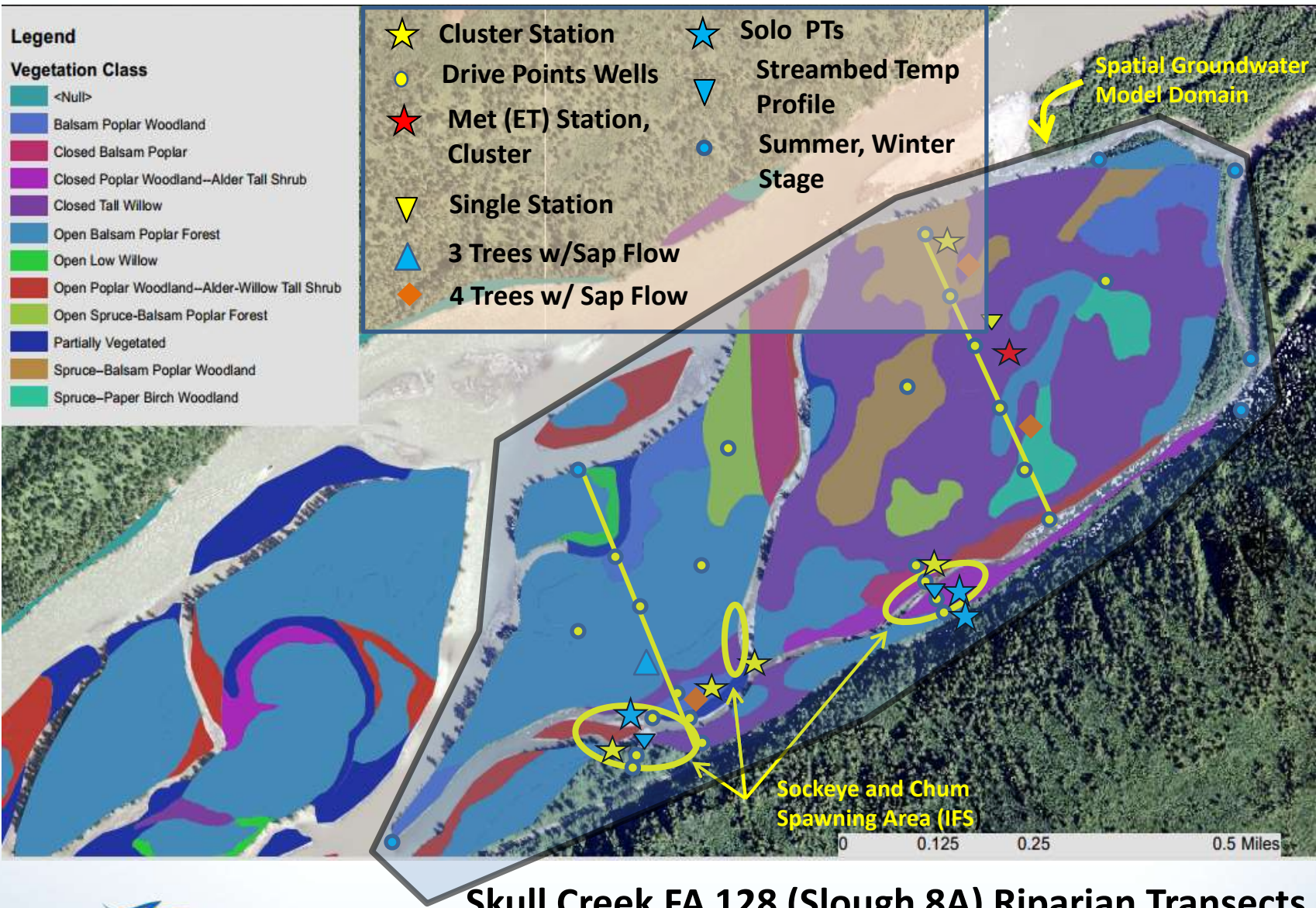
2 Shallow Wells (only)

- ★ Cluster Station
- Drive Points Wells
- ★ Met (ET) Station, Cluster
- ▽ Single Station
- ▲ 3 Trees w/Sap Flow
- ◆ 4 Trees w/ Sap Flow
- ★ Solo PTs
- ▽ Streambed Temp Profile



Whiskers Slough FA 104– IFS Task6 Riparian Transects





Skull Creek FA 128 (Slough 8A) Riparian Transects

Legend

Vegetation Class

- <Null>
- Balsam Poplar Woodland
- Closed Balsam Poplar
- Closed Poplar Woodland--Alder Tall Shrub
- Closed Tall Willow
- Open Balsam Poplar Forest
- Open Low Willow
- Open Poplar Woodland--Alder-Willow Tall Shrub
- Open Spruce-Balsam Poplar Forest
- Partially Vegetated
- Spruce-Balsam Poplar Woodland
- Spruce-Paper Birch Woodland

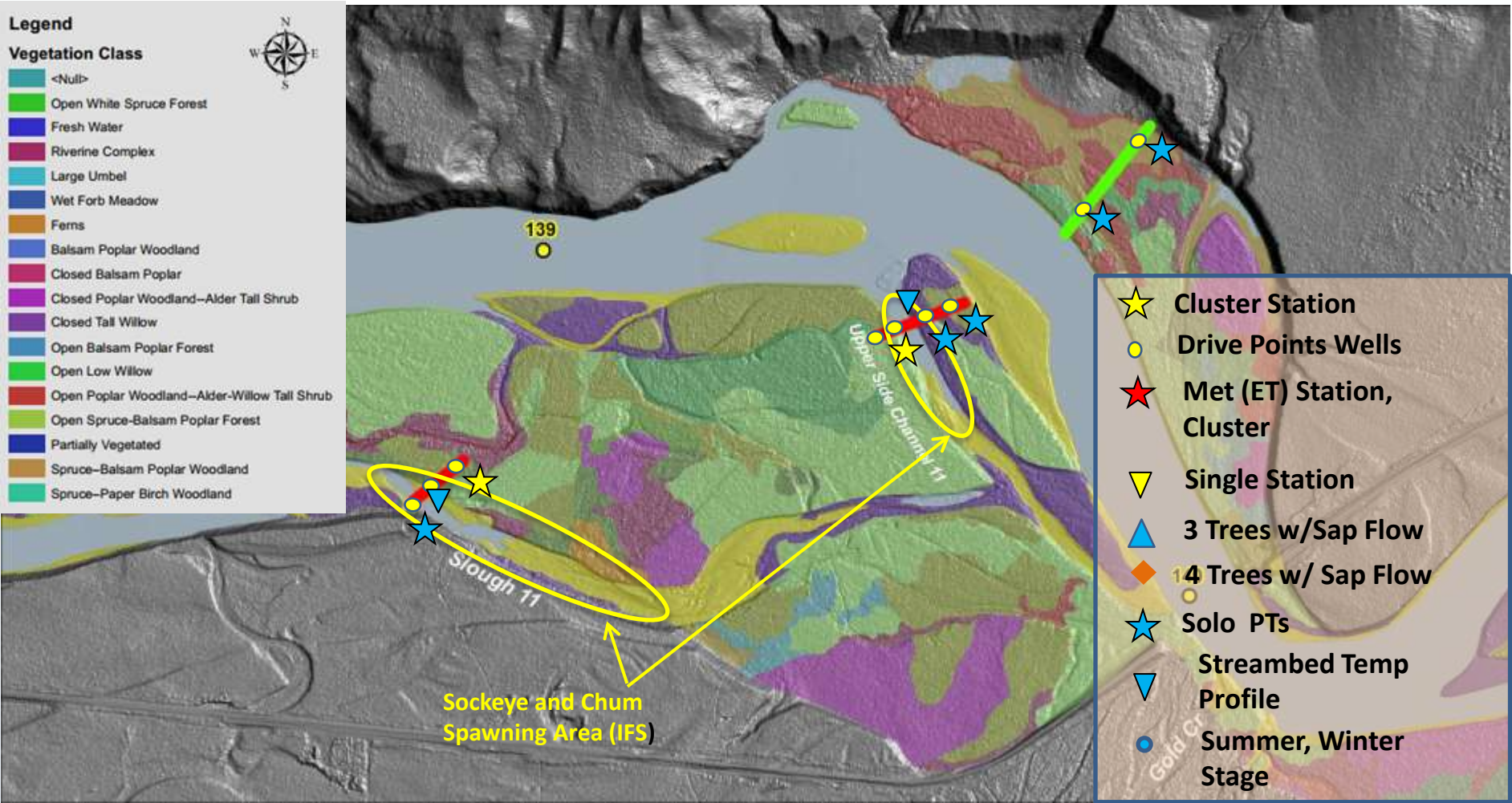
- ★ Cluster Station
- Drive Points Wells
- ★ Met (ET) Station, Cluster
- ▼ Single Station
- ▲ 3 Trees w/Sap Flow
- ◆ 4 Trees w/ Sap Flow
- ★ Solo PTs
- ▼ Streambed Temp Profile
- Summer, Winter Stage

Spatial Groundwater Model Domain

Sockeye and Chum Spawning Area (IFS)

0 0.125 0.25 0.5 Miles

Skull Creek Complex FA (Slough 8A) Riparian Transects



Gold Creek Focus Area 138, Riparian Transects

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