

Understanding the Role of Ice on Riparian Plant Processes on the Susitna River

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Study Collaborators:

Alaska Energy Authority

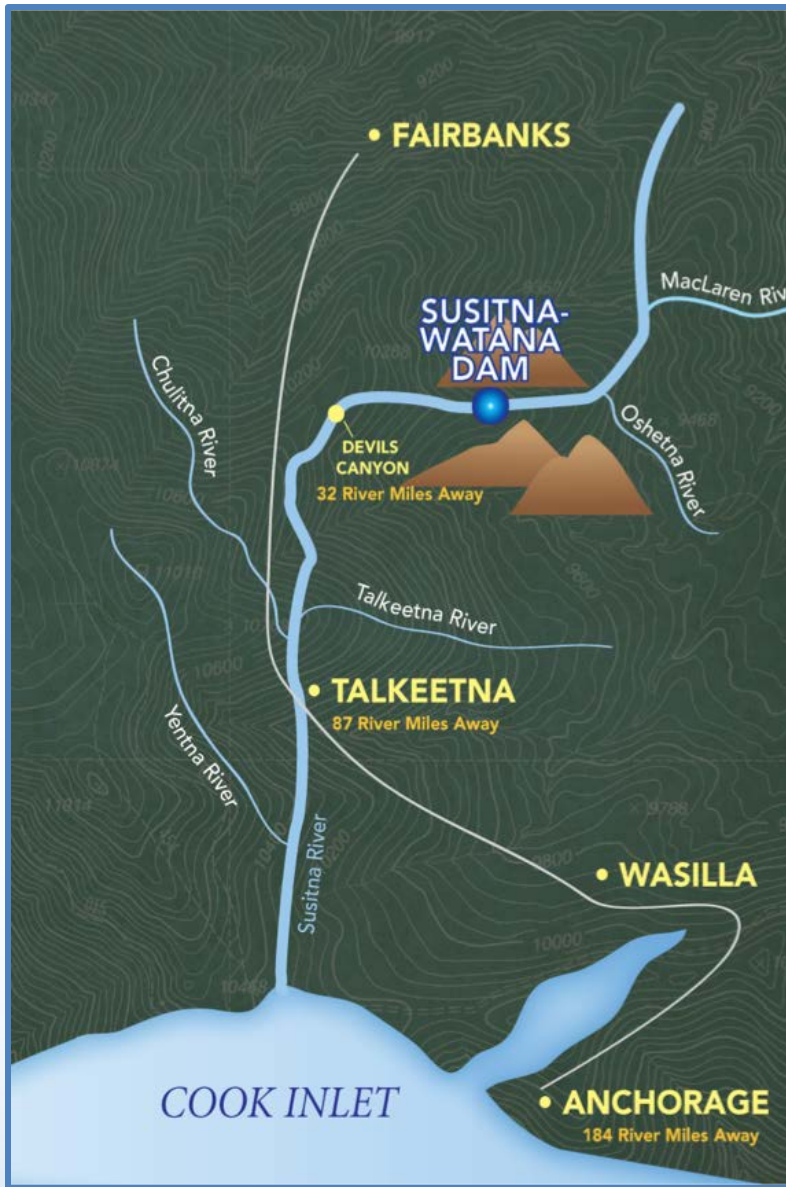
ABR, Inc.

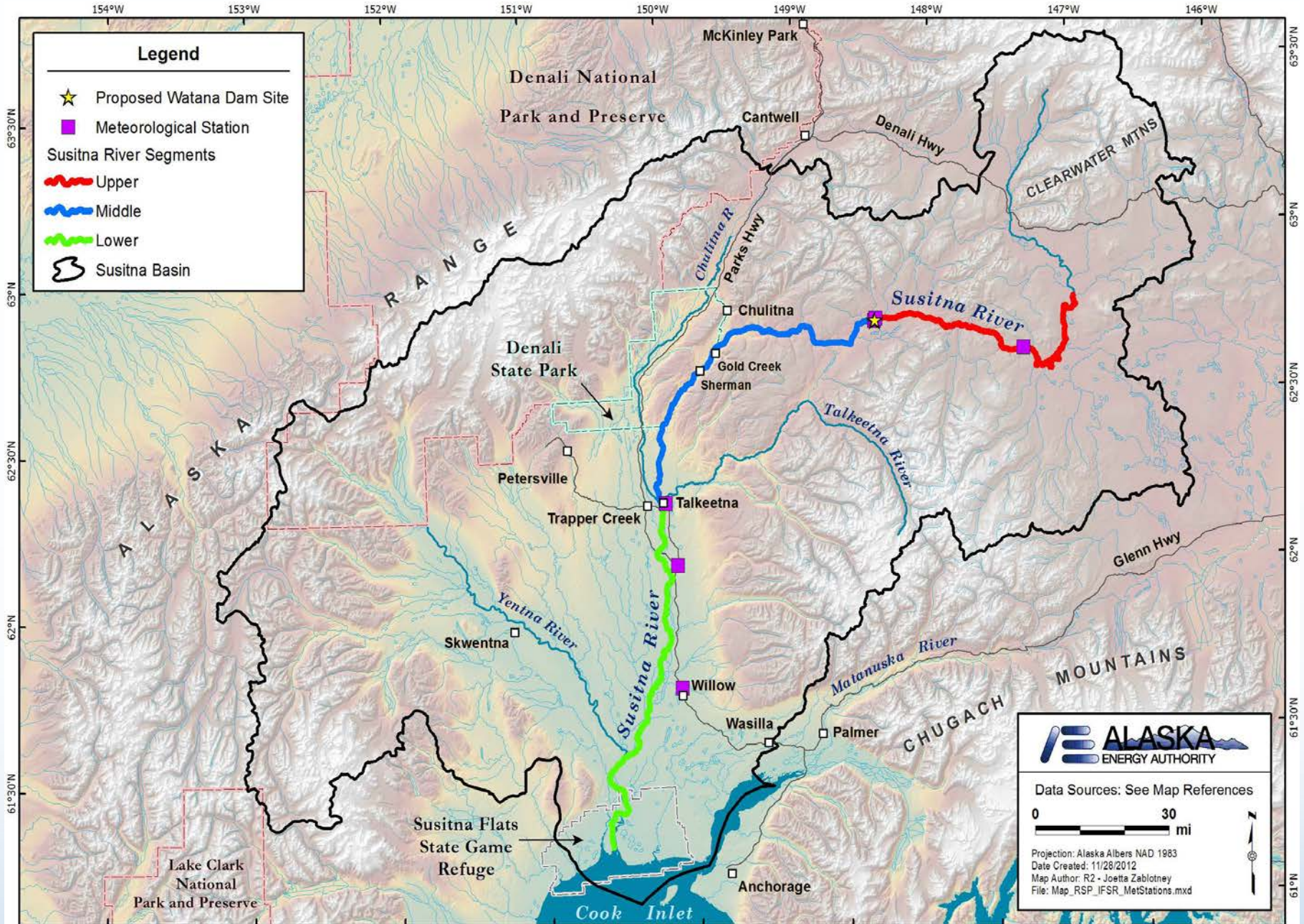
Geo-Watershed Scientific

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Tetra Tech





Riparian Instream Flow Study Goal

The goal of the Riparian Instream Flow Study is to provide a quantitative, spatially-explicit model to predict potential impacts to downstream floodplain vegetation from Project operational flow modification of natural Susitna River flow, sediment, and ice process regimes. (Section 8.6.1.1 FSP)



Riparian Instream Flow Study

Objectives

- Seed dispersal and seedling establishment of riparian trees species
- Role of erosion and sediment deposition in the formation of floodplain surfaces, soils, and vegetation
- Floodplain vegetation groundwater and surface water maintenance hydroregime
- Focus Area to riparian process domain scaling and Project operations effects modeling
- Role of river ice in the establishment and recruitment of dominant floodplain vegetation



How Does Ice Impact Floodplain Vegetation?



How Does Ice Impact Floodplain Vegetation?



Break up 2013



rs.

Aftermath



Ice jams form localized flooding events across the floodplain



Ice chunks shear lateral margins of stream banks



Photo Location: 62.720806, -149.791547

Depositing new sediment layer
on floodplain

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

Ice is still covering the floodplain
landscape as of June 12, 2013

Photo Location: 62.706181, -149.821361





Direct disturbance to riparian
vegetation through scarring,
bulldozing and shearing



Our Approach

- Ice break up field observations
- Tree ice scar mapping
- Tree ice scar dendrochronology
- Sediment isotope geochronology analysis of sediment deposition rates
- Riparian plant community mapping and characterization



Ice scar height

Floodplain height

Data Collected

- Mapped ice scars from PRM 102-151 (three river confluence to about Portage Creek) and from PRM 167-183 (Above Devil's Canyon to just below the proposed dam site)
- 714 ice impacted locations and floodplain elevations were recorded
- 73 ice scar wedges were collected for dendrochronology analysis
- 38 sediment isotope samples

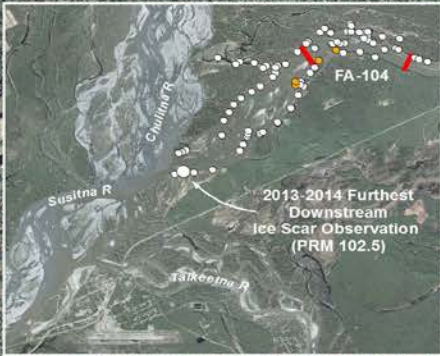
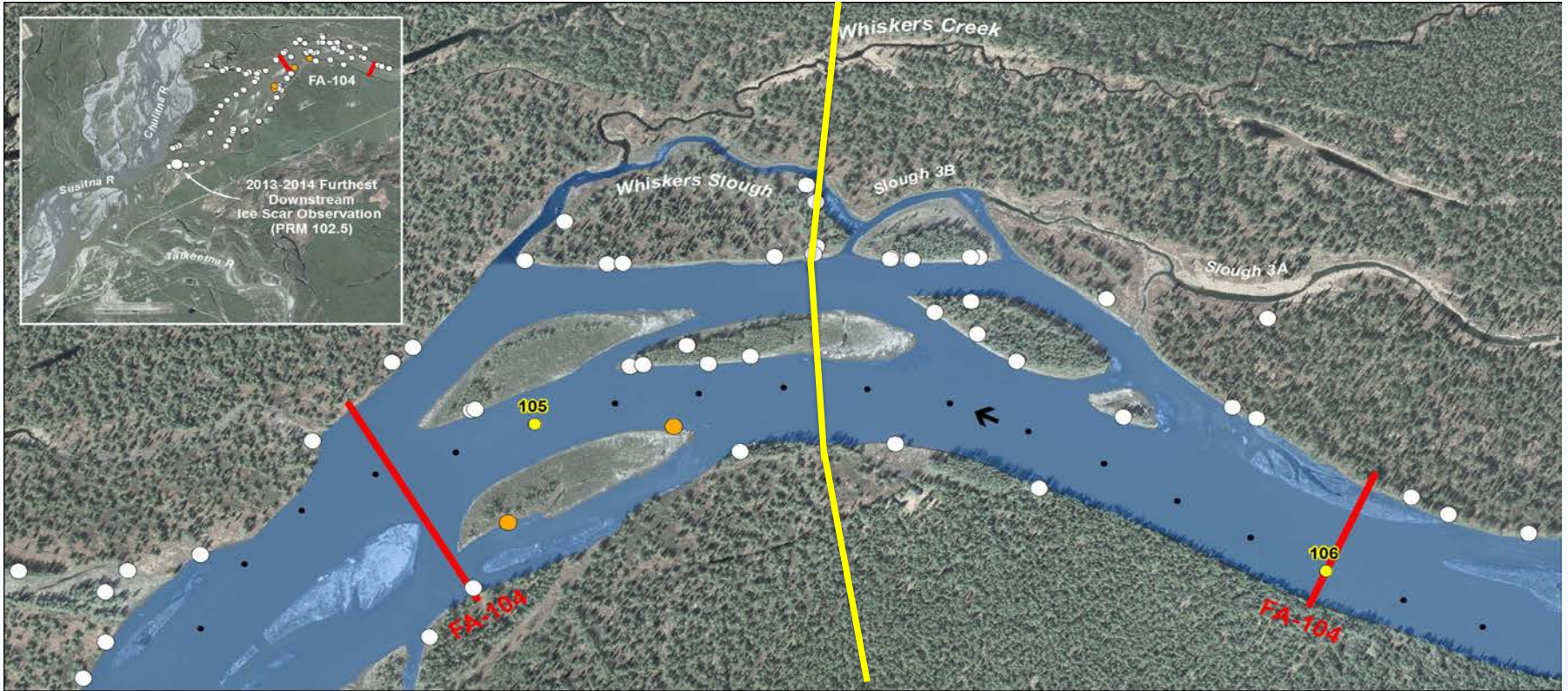


Tree Ice Scar Mapping



Ice Scar Sampling

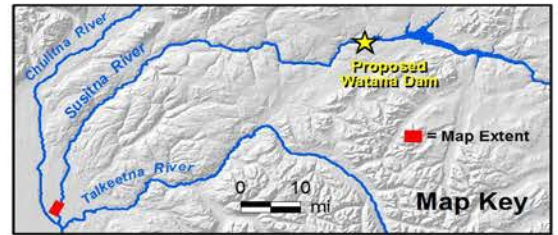
Preliminary Results



- Legend**
- Tree Ice Scar Present
 - Ice Vegetation Laydown
 - Zone of Ice Influence
 - Flow Arrow
 - Project River Mile
 - Instream Flow Focus Area

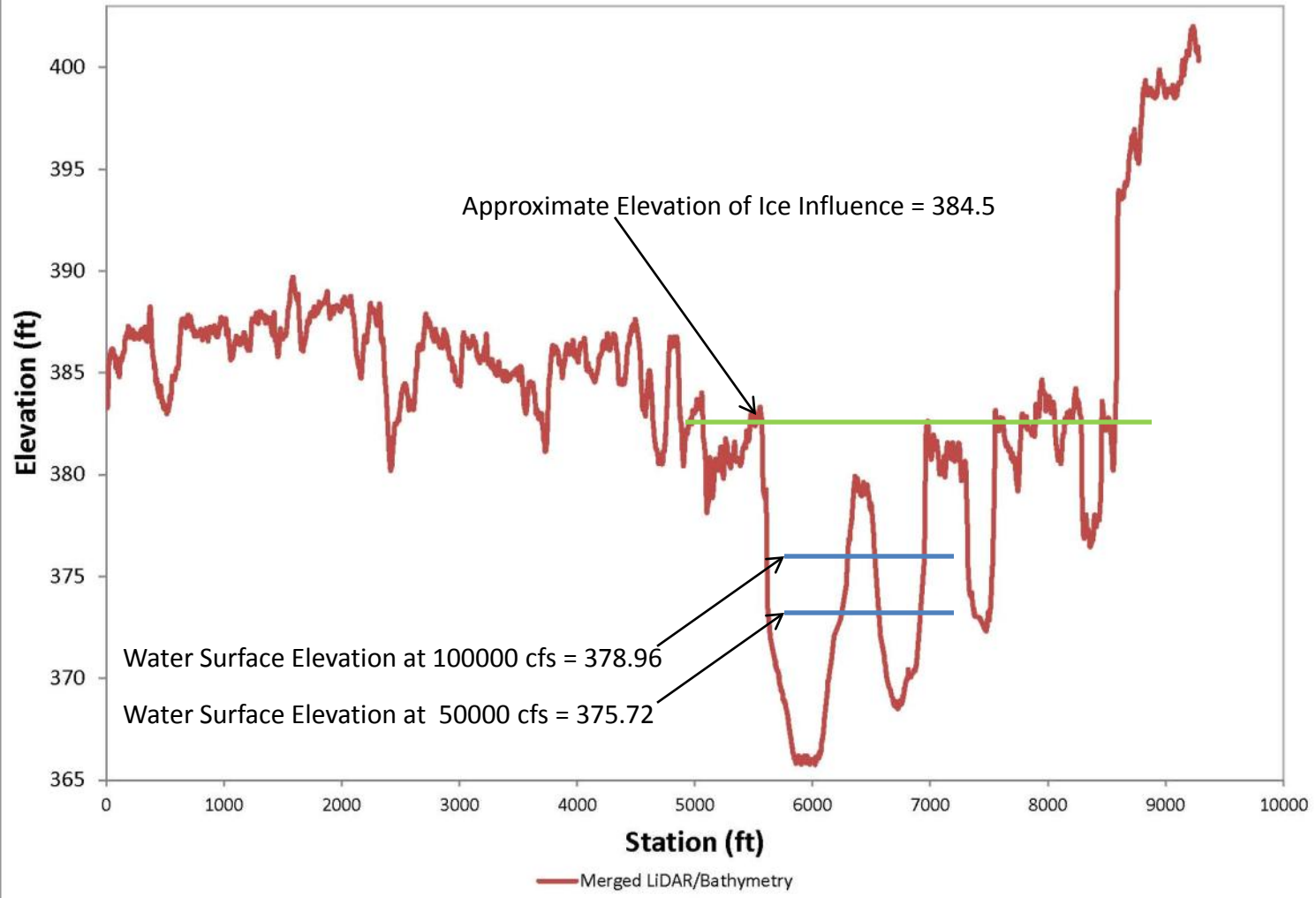


Projection: AK SP Zone 4 NAD 1983
 Date Created: 10/9/2015
 Map Author: R2 - Joetta Zabloney
 File: Map_YER_IFSR_IceScars104.mxd



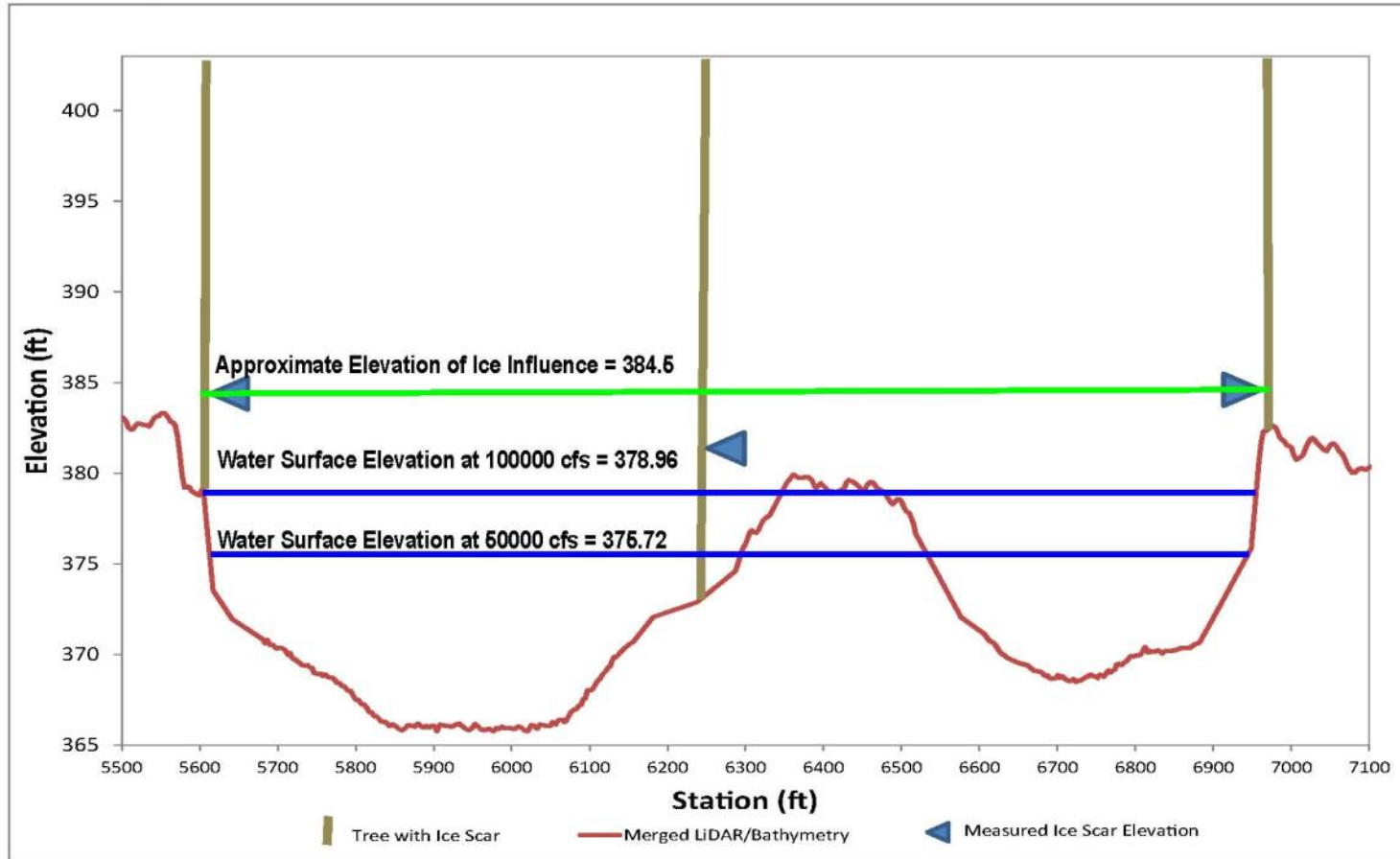
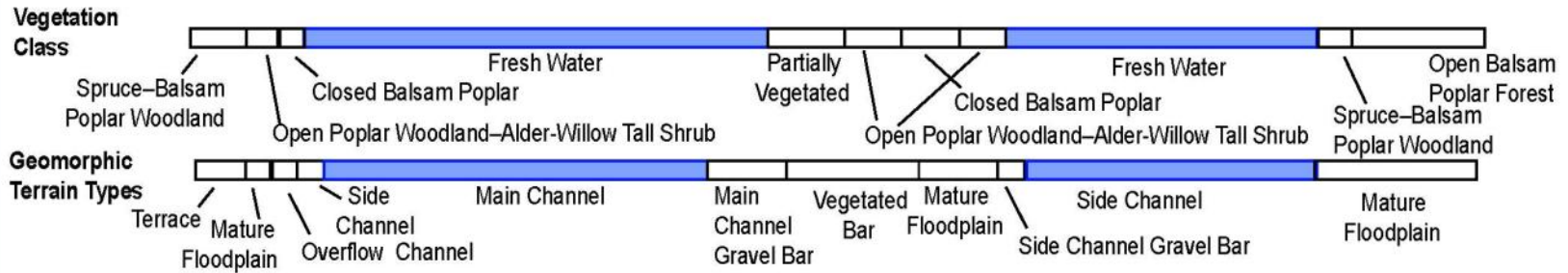
Orthophoto Source: 2011 Matanuska-Susitna Borough LiDAR & Imagery Project

PRM 105.3



(DRAFT)

Ice Scar Observations Along PRM 105.3



How Does This Relate to Fish?

- Maintaining riparian tree and plant community patterns and functioning riparian ecosystems
- Creating and maintaining aquatic habitats important to fish
- Ice dams increase flood frequency on a local scale which could be important to fish movement between off channel habitats



Riparian Instream Flow & Vegetation

Study Team

- Thanks to the Riparian IFS Team!
 - Kevin Fetherston, R2 Study Lead
 - Kate Knox, R2
 - Joetta Zabloutney, R2 GIS Lead
 - Suart Beck, R2 Hydrologist
 - Alice Shelly, R2 Environmental Statistician
 - Aaron Wells, ABR Botanist and Soil Scientist
 - Tracy Christopherson, ABR Soil Scientist & Remote Sensing
 - Ellen Trainor, ABR Botanist
 - Allison Zusi-cobb, ABR GIS Lead



Questions?

