

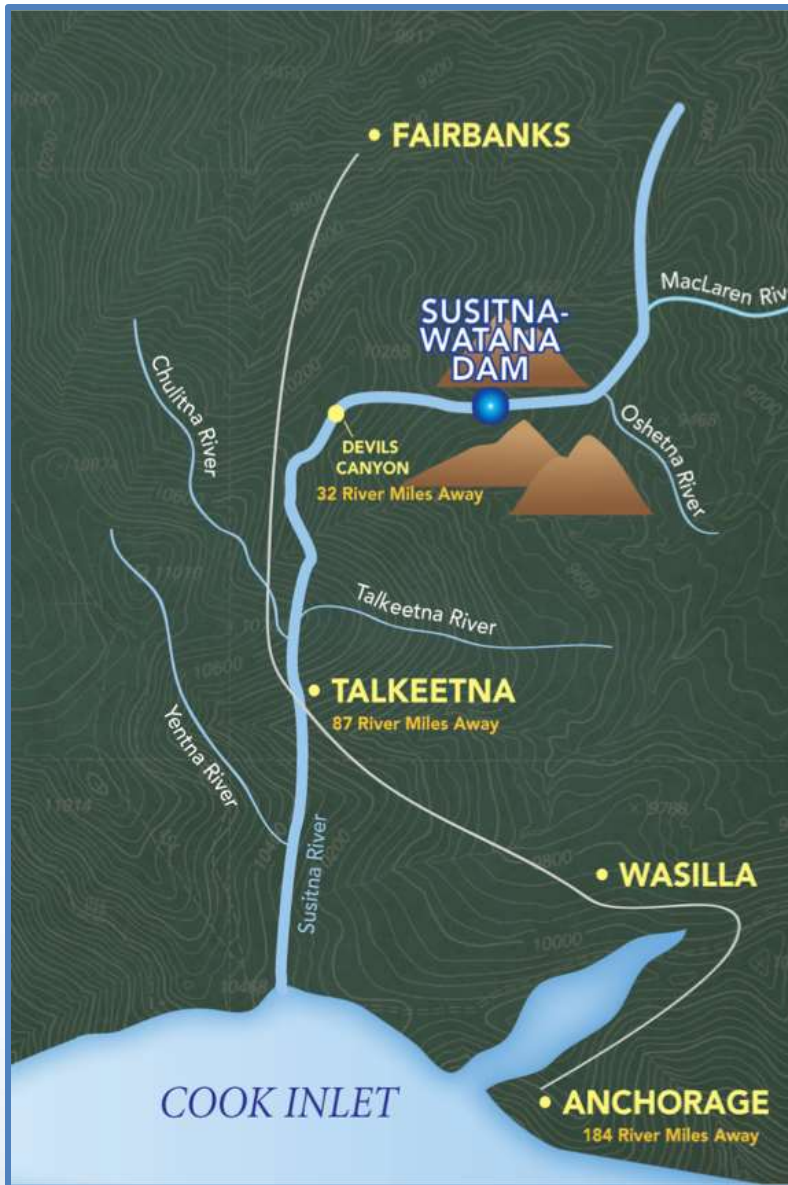
Technical WorkGroup Meeting Q4 2013 TWG

Riparian IFS Q4 Update

December 3, 2013

Prepared by R2 Resource
Consultants

Prepared for Alaska Energy
Authority




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

Study 8.6 RIFS – Presentation Overview

- *Q4 2013 Update and Status Summary*
- *Field Operations and Data Analysis Update*
 - Seed Dispersal study
 - Seedling Establishment study
 - Vegetation and Dendrochronology sampling
 - Tree Ice Scar Surveys – Ice Processes study
 - Riparian GW/SW hydroregime study
- *Study Variances*
- *Next Steps*

Study 8.6 RIFS – Q4 2013 Update

Activity	2013			
	Q 1	Q 2	Q 3	Q 4
Critical review of 1980s Susitna River Data, Current Scientific research concerning hydro project floodplain vegetation effects; and unimpacted, natural floodplain vegetation research.				
Implement Groundwater / Surface Water Installation and Sampling				
Riparian Vegetation: Field data collection				
Seed Dispersal Study				
Tree Ice Scar Mapping				
Focus Area vegetation mapping and sampling				
Dendrochronology sampling				
Soil Sampling, Sediment Dating and Analysis				
Develop GW/SW models				
Develop vegetation flow-response models				

Study 8.6 RIFS Field Operations

2013 RIFS field operations ended Q4 (Oct. 4):

- **Seed dispersal study**
- **Seedling Establishment study**
- **Vegetation and Dendrochronology sampling**
- **Tree ice scar – Ice Effects surveys**
- **Riparian GW/SW hydroregime study**

ISR is under development to summarize 2013 findings for all study components.

Study 8.6 RIFS Data Analyses

On-going data analysis in Q4 2013 – Q1 2014

- **Seed dispersal study peak release modeling**
- **Seedling Establishment data analysis**
- **Vegetation and Dendrochronology data analysis**
- **Tree ice scar – Ice Effects analysis**
- **Riparian GW/SW hydroregime study analysis**

Study 8.6 RIFS – Seed Release Study Update

Site Name	Number of Shrubs	Shrub Species	Number of Trees	Tree Species
Deshka Landing – PRM 32	12	<i>Salix alaxensis</i> & <i>Salix barclayi</i>	6	<i>Populus balsamifera</i>
Highway 3 Bridge – PRM 88	6	<i>Salix alaxensis</i> & <i>Salix sitchensis</i>	6	<i>Populus balsamifera</i>
Talkeetna – PRM102	6	<i>Salix barclayi</i>	6	<i>Populus balsamifera</i>
Indian River – PRM 142	12	<i>Salix alaxensis</i> & <i>Salix sitchensis</i>	6	<i>Populus balsamifera</i>

Talkeetna Poplar Grove Site

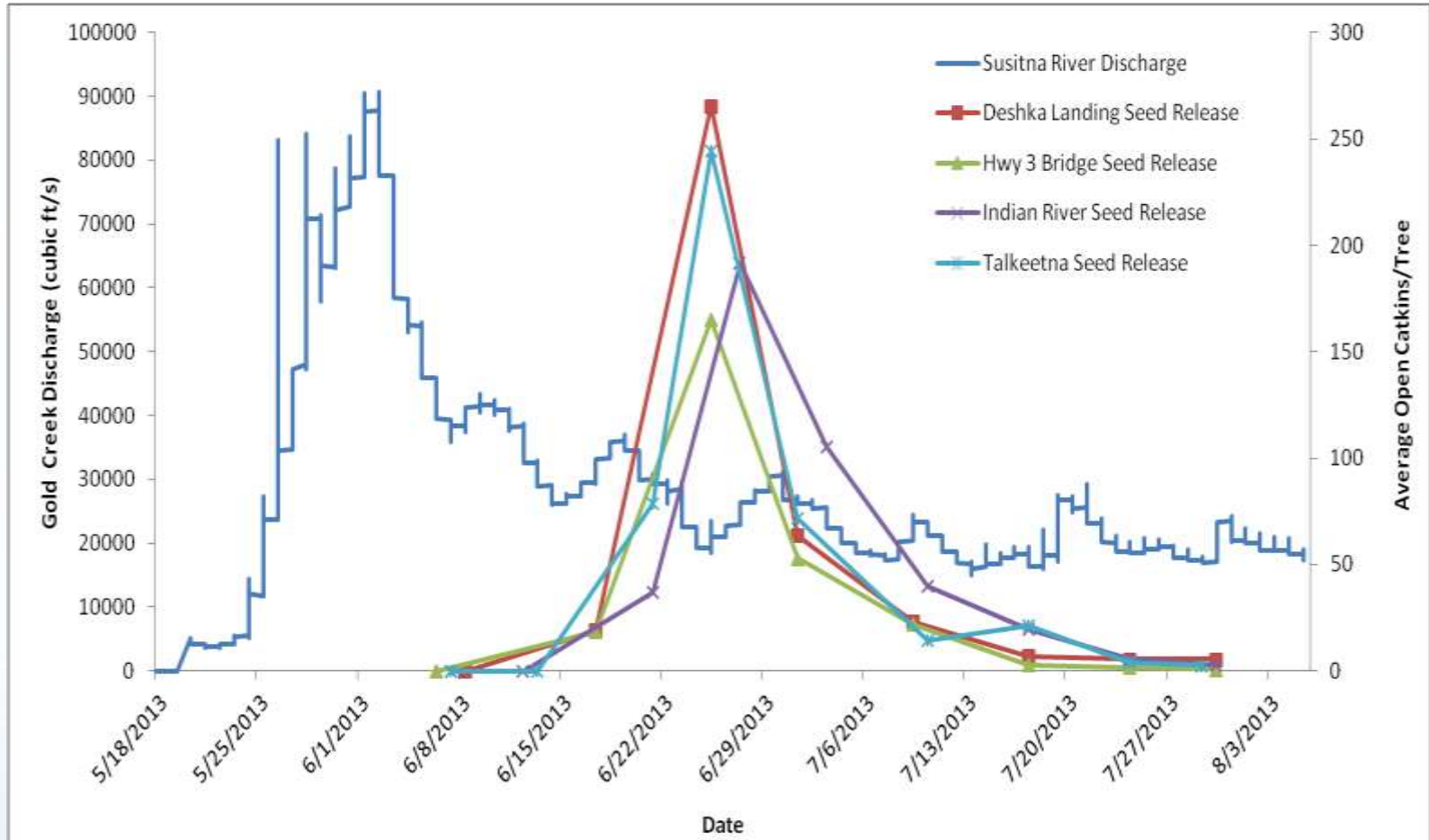


Study 8.6 RIFS - Seed Dispersal Study

Preliminary results for day of year when plants have released 20% (DY₂₀) and 80% (DY₈₀) of seeds from 2013 observations. (Julian Day 170 = June 19)

Site	Species	Number of Plants	DY20	DY80	Peak Duration
Deshka Landing	<i>Populus balsamifera</i>	6	170	177	7
Hwy 3 Bridge	<i>Populus balsamifera</i>	6	170	179	9
Talkeetna	<i>Populus balsamifera</i>	6	171	179	7
Indian River	<i>Populus balsamifera</i>	6	173	180	7
Hwy 3 Bridge	<i>Salix alaxensis</i>	3	164	188	25
Deshka Landing	<i>Salix barclayi</i>	6	170	198	29
Talkeetna	<i>Salix barclayi</i>	6	172	201	28
Indian River	<i>Salix sitchensis</i>	5	166	182	17

Study 8.6 - Seed Dispersal Study



Study 8.6 RIFS

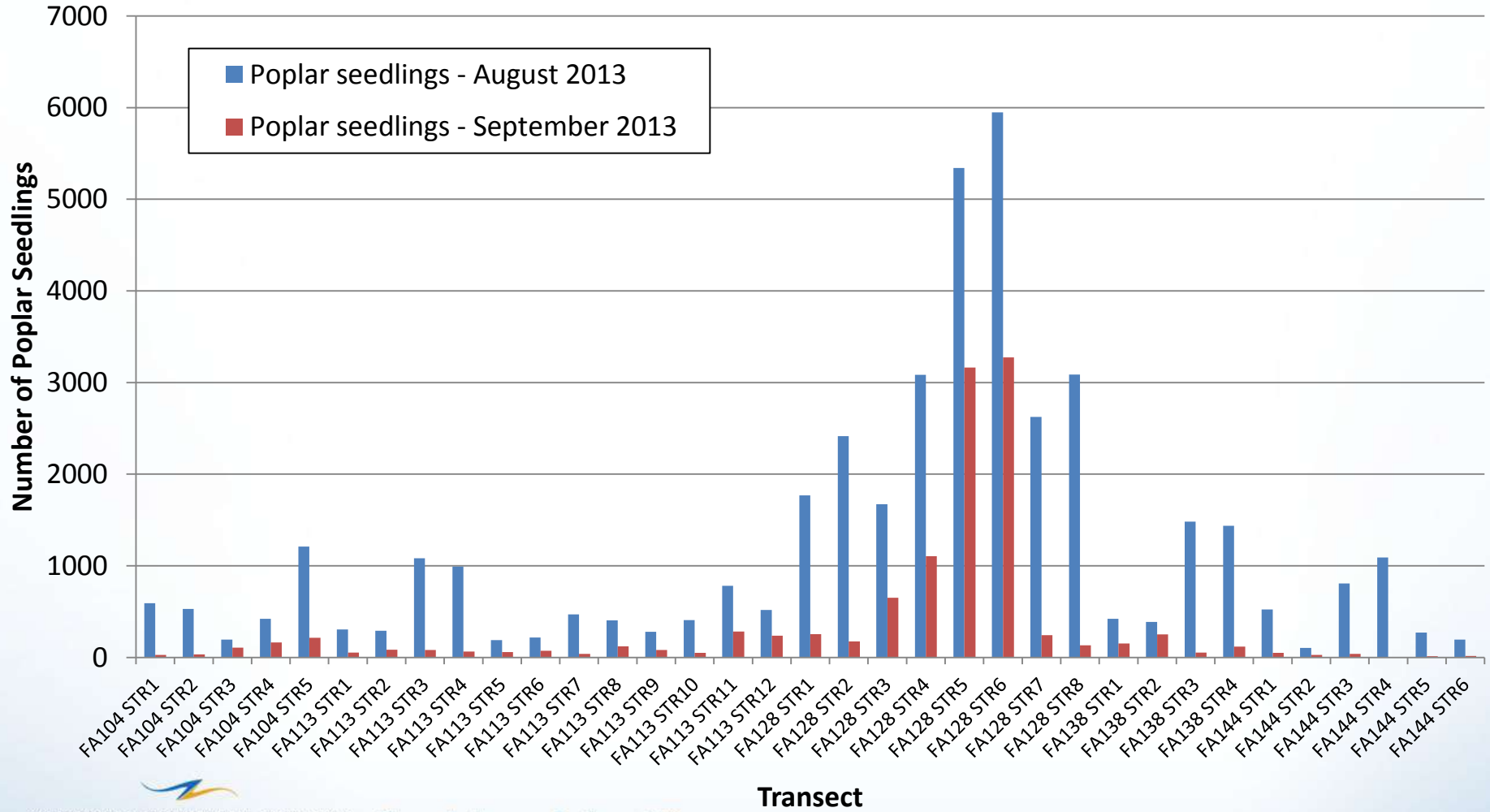
Seedling Establishment Update

River Mile	Focus Area	Number of Transects	Number of Plots
104	Whiskers Slough	5	114
113	Lane Creek	12	222
128	Skull Creek	8	194
138	Gold Creek	4	126
144	Side Channel 21	6	168



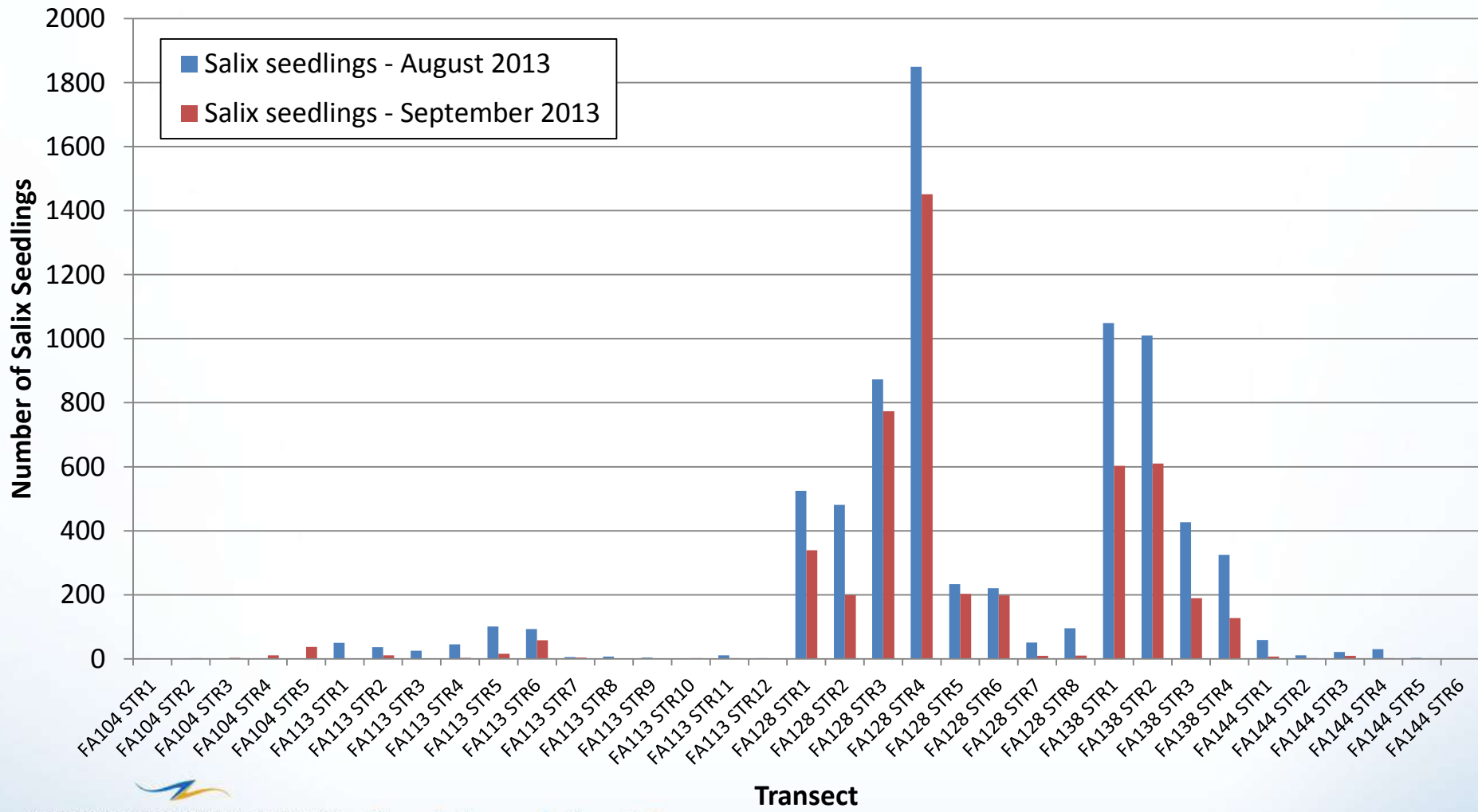
Study 8.6 RIFS - Seedling Establishment

Poplar seedling counts



Study 8.6 RIFS - Seedling Establishment

Salix seedling counts



Study 8.6 RIFS – Vegetation and Dendrochronology Sampling Update



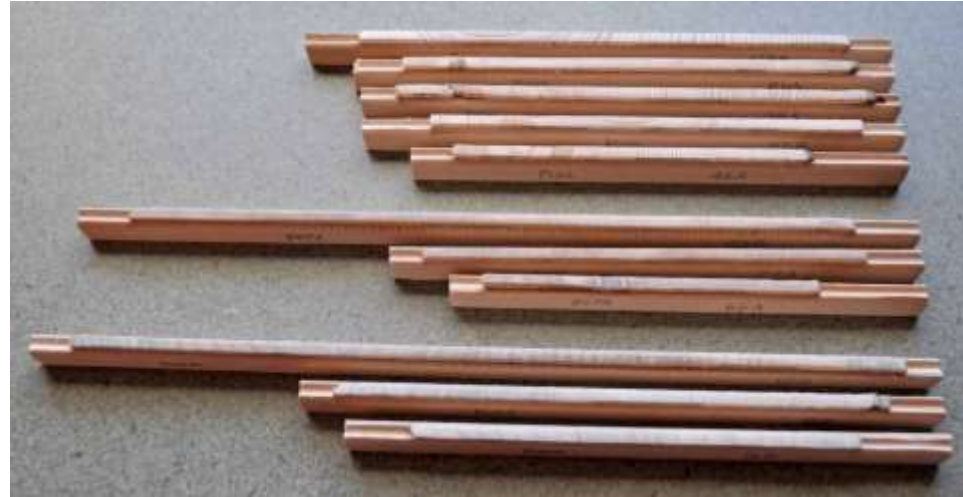
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Study 8.6 RIFS – Dendrochronology

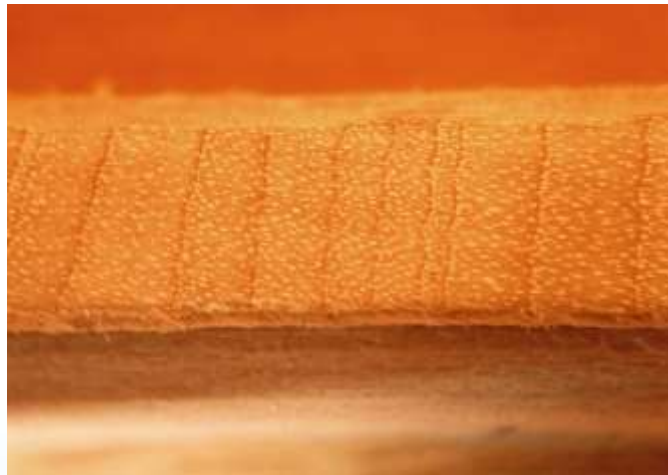
Study Update



Mounted tree cores



Sanded tree cores ready for measurement & counting



Microscopic analysis
Betula papyrifera

Study 8.6 RIFS – Tree Ice Scar Update

Description	Number Completed
Ice Scars Present and Measured	222
Stop with No Ice Scars Present	190
Ice Scars Present but Not Measured	29
Ice Scar Wedges Sampled	48



Tree Ice Scar



Stop with No Ice Scars Present



Legend

-  Flow Arrow
-  Project River Mile
-  Instream Flow Focus Area (Upper and Lower Extent)
-  Ice Scars Not Measured
-  No Ice Scars Present
-  Ice Scars Measured



Projection: Alaska SP, Zone 4, NAD83
 Date Created: 11/12/2013
 Map Author: R2 - Kate Legner
 File: Ice Scar Polygons.mxd



Map Key

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

Study 8.6 RIFS – Ice Scar Study Update

Data Collected
GPS point
Photographs
Floodplain height above water
Ice scar height above floodplain
Number of ice scars between GPS points
DBH of sampled trees
Ice scar wedge at sampled trees



Ice scar height

Floodplain height

Study 8.6 RIFS – Tree Ice Scar Study Update



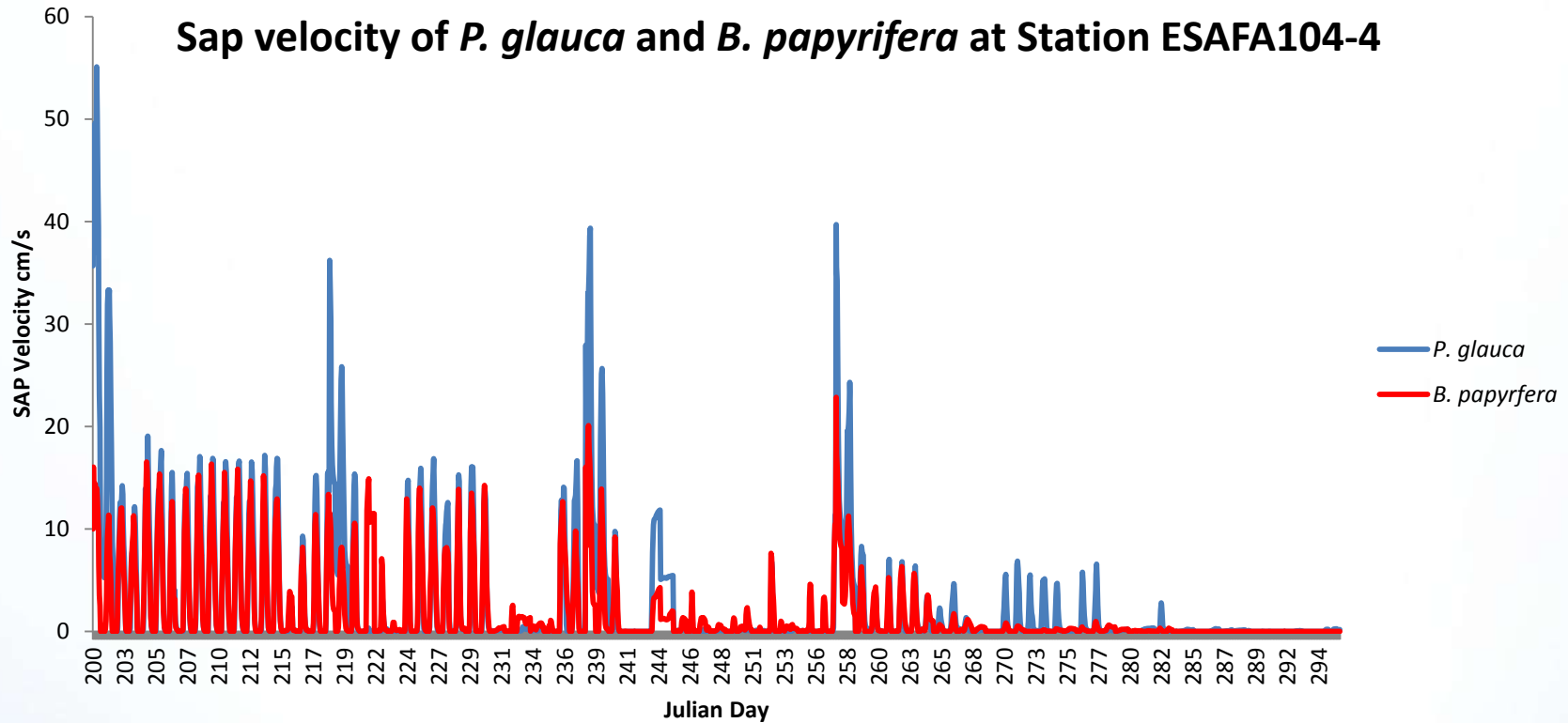
Tree Ice Scar Wedge Samples
Collected

Study 8.6 Riparian GW/SW Study - Sap Flow

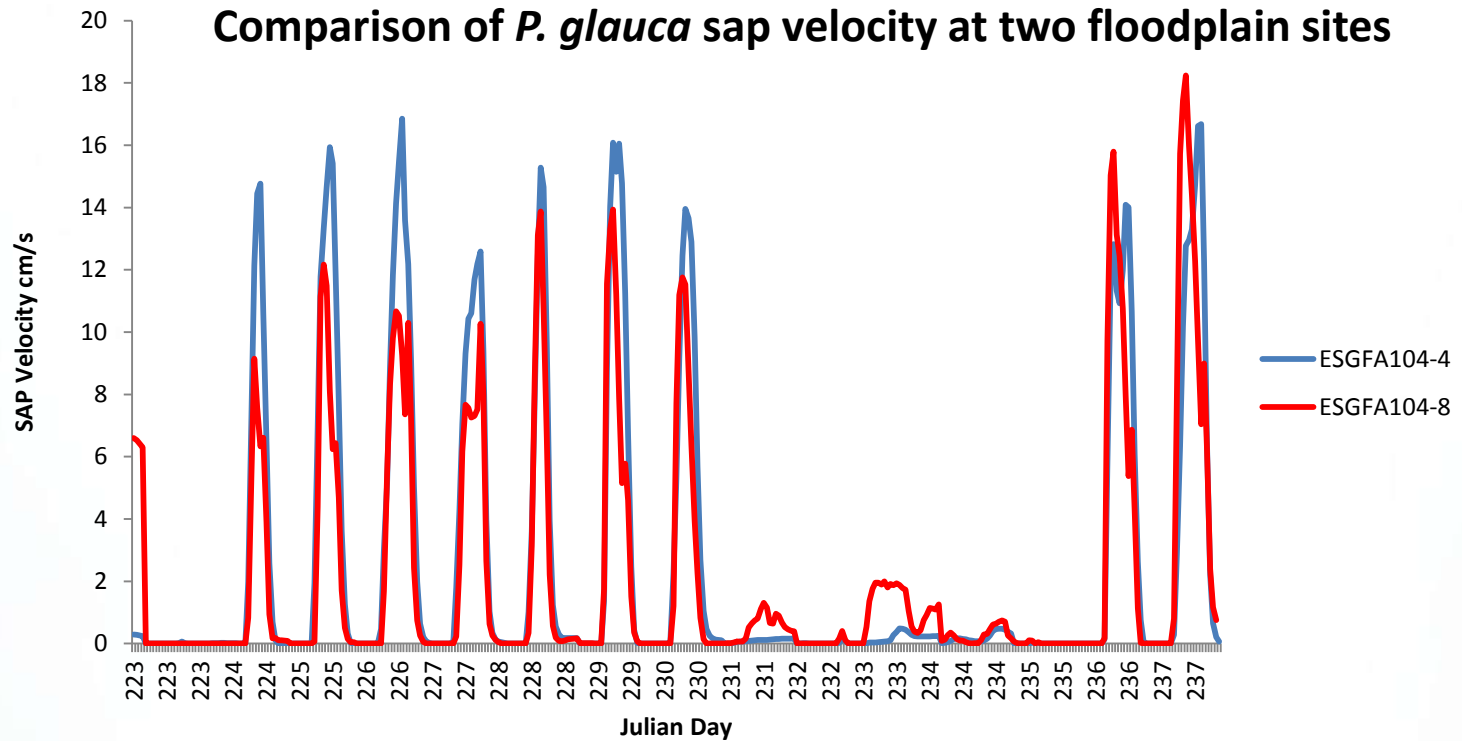
- Sap flow monitors have been removed from all trees
- Data is being processed for the following species
 - Alder species
 - Cottonwood
 - Paper Birch
 - White Spruce
 - Willow species
- Sap flow monitoring ended in mid-October 2013 and will resume in March 2014



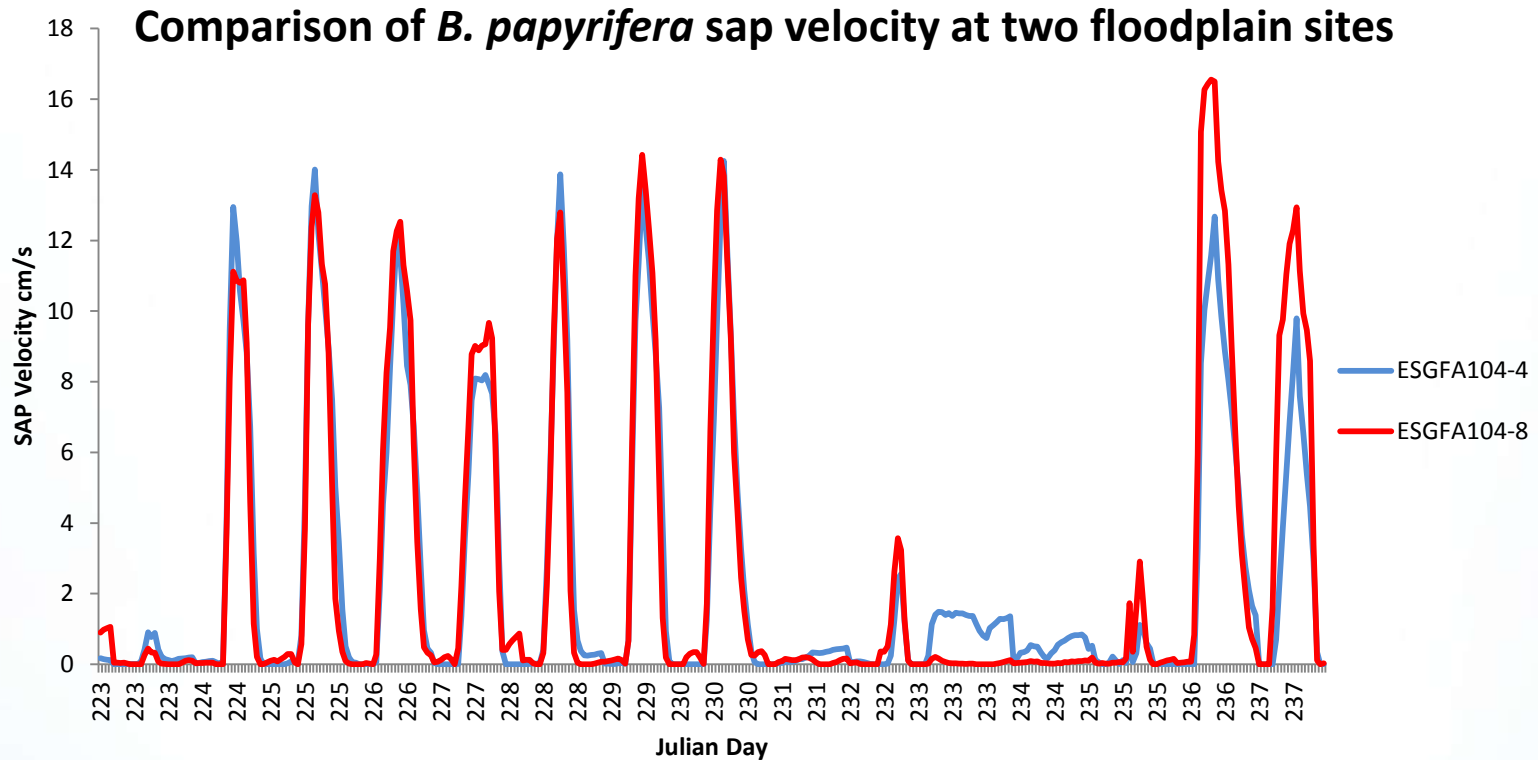
Study 8.6 RIFS – Riparian GW/SW Study



Study 8.6 RIFS – Riparian GW/SW Study



Study 8.6 RIFS – Riparian GW/SW Study



Study 8.6 RIFS – Riparian GW/SW

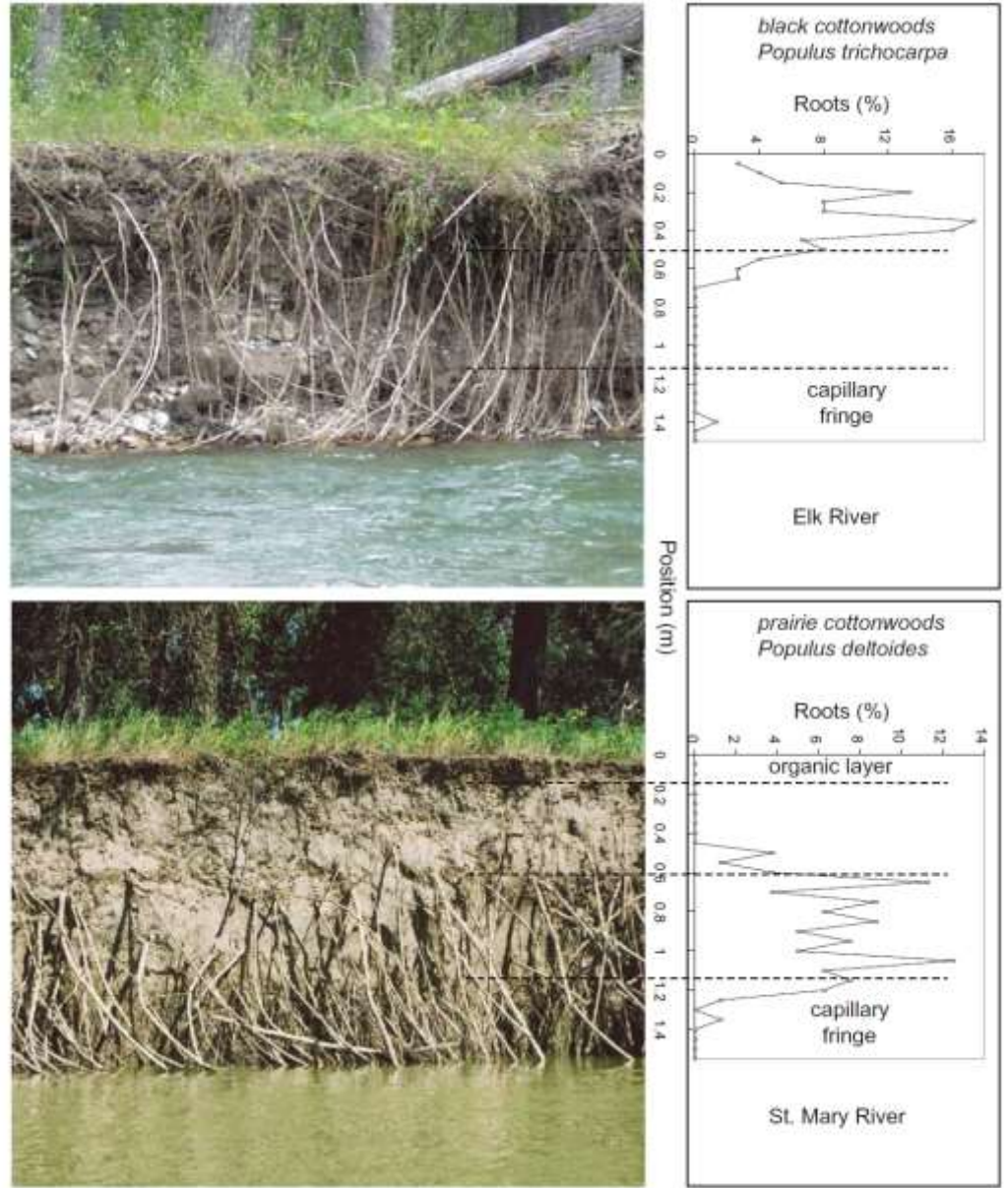
Tree Rooting Depths

Species	Number of Trees Photographed
<i>Populus balsamifera</i>	20
<i>Betula papyrifera</i>	9
<i>Alnus incana ssp. tenuifolia</i>	1
Total:	30



Populus Root Architecture Measurements (Rood et al. 2011)

- Natural hydraulic excavation of root systems.
- Use image analysis software to map and measure the number and distribution of Populus roots in cut banks from photographs.
- Will use this data along with soil core root samples to estimate tree rooting depths.



Study 8.6 RIFS– Variances

- *No variances have occurred in 2013.*

Study 8.6 RIFS– Next Steps

Activity	2013				2014			
	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4
Focus Area and Study Site Selection	—			—				
Critical review of 1980s Susitna River Data, Current Scientific research concerning hydro project floodplain vegetation effects; and unimpacted, natural floodplain vegetation research.	—							
Implement Groundwater / Surface Water Installation and Sampling		—	—	—				
Riparian Vegetation: Field data collection		—	—			—	—	
Seed Dispersal Study		—	—			—	—	
Tree Ice Scar Mapping		—	—			—	—	
Focus Area vegetation mapping and sampling		—	—			—	—	
Dendrochronology sampling		—	—			—	—	
Soil Sampling, Sediment Dating and Analysis		—	—			—	—	
Develop GW/SW models	—	—	—	—				
Develop vegetation flow-response models				—	—	—	—	
Develop vegetation Project operational flow-response model							—	—
Riparian vegetation impact analyses							—	—
Alternative operational scenarios								—

Study 8.6 RIFS– Next Steps

- ISR will be filed with FERC February 3, 2014
- Data analysis will continue through Q4 2013 and into Q1-Q4 2014.
- Q1 2014 focus on developing riparian metrics and modeling analyses
- Field efforts will resume in March 2014.