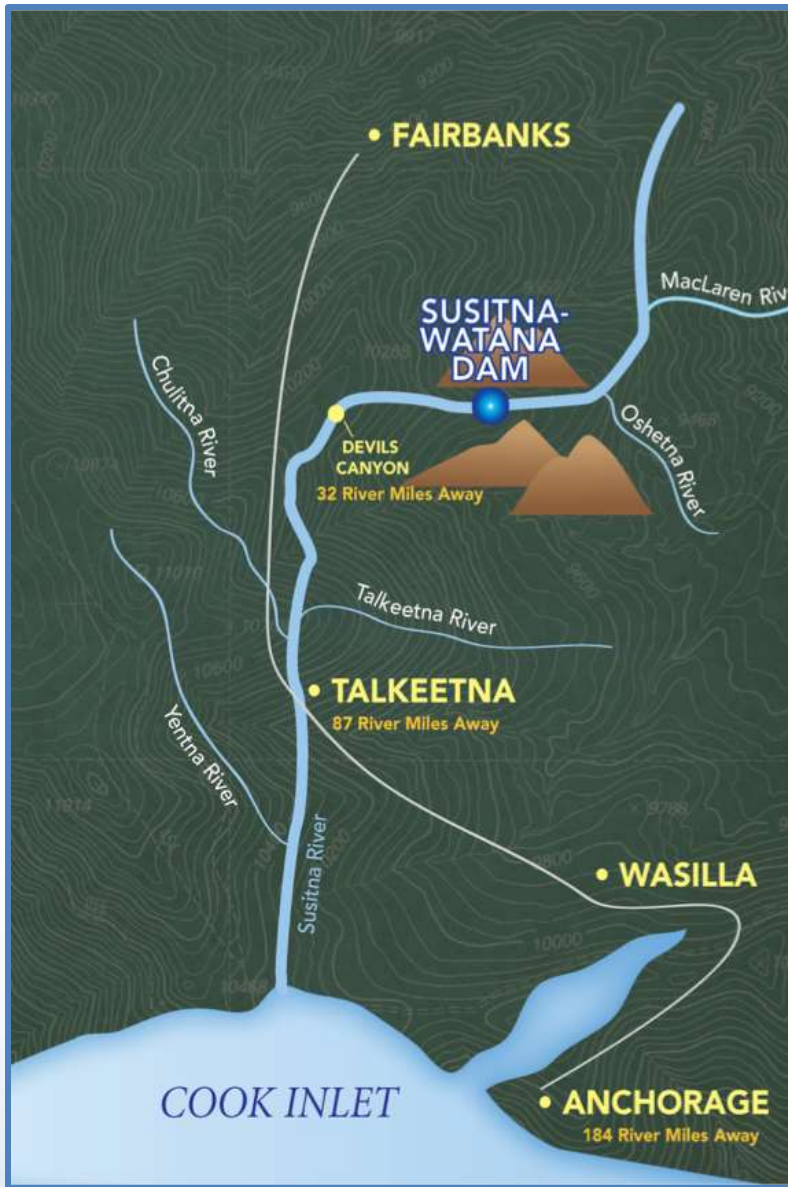


# Riparian IFS Technical Meeting Day Two

## Riparian & Riverine Modeling

April 30, 2014

Prepared by  
R2 Resource Consultants



  
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# Welcome back to the Riparian IFS Meeting



# RIPARIAN IFS MEETING DAY TWO

<b>8:30 – 9:00 (AKST)</b>	<b>Recap of day 1 activities, planned day 2 activities</b>
<b>9:00 – 10:30</b>	<b>Ice Processes: study objectives and riparian evaluation metrics (HDR)</b>
<b>10:30– 10:45</b>	<b>Break</b>
<b>10:45-11:30</b>	<b>Riparian ice studies modeling and metrics</b>
<b>11:30-12:30</b>	<b>Lunch</b>
<b>12:30-2:00</b>	<b>Riparian IFS Output: fluvial geomorphology, hydrology, and ice processes studies study modeling and metrics</b>
<b>2:00-3:00</b>	<b>Riparian IFS Output: wildlife habitat modeling &amp; metrics overview (ABR)</b>
<b>3:00-4:00</b>	<b>Open discussion</b>
<b>4:00</b>	<b>Adjourn</b>

# Ice Processes



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# Riparian Ice Processes Study

## Questions/Baseline Studies

### Key Questions (RSP 8.6.3.4):

1. What are the types of ice floodplain vegetation disturbance?
2. Does floodplain ice scouring/shearing control floodplain vegetation pattern? If so, how and where?

### Baseline Studies:

1. Real time field observations of river ice break-up ice / floodplain interactions, 2013.
2. Post ice break-up field observations of ice floodplain vegetation disturbance.
3. Vegetation sampling of observed areas of ice rafting / ice sediment deposition vegetation disturbances.

# Riparian Ice Processes Study

## Questions/Baseline Studies

### Key Questions (RSP 8.6.3.4):

1. Is ice dam backwater flood sediment deposition a significant floodplain aggradational process? If so, what is the spatial distribution of ice dam backwater flooding effects?
2. Do ice dam backwater flood sediment deposits create sites for tree seedling establishment?
3. Do ice dam effects control spatial distribution of riparian tree and plant community establishment pattern? If so, at what scale?

### Baseline Studies:

1. Modeling of ice dams at select locations using both ice process and open water hydraulic (1-D, 2-D Ice Processes Models; 1-D and 2-D modeling of floodplain flooding recurrence intervals).
2. Assessment of ice dam backwater flooding and extent of ice effects.
3. Sediment geochronology isotope studies of sediment deposition rates and dates.

# Riparian Ice Processes Study

## Questions/Baseline Studies

### Key Questions (RSP 8.6.3.4):

1. Throughout the Project area, where is ice effecting floodplain vegetation (spatial distribution of effects)?
2. At what frequency are ice dams effecting floodplain vegetation (temporal distribution of effects)?
3. Do ice scouring and depositional processes control salicaceae reproduction type (sexual/asexual)? If so, how and where?

### Baseline Studies:

1. Ice break up field observations.
2. Tree ice scar mapping.
3. Tree ice scar dendrochronology.
4. Sediment isotope geochronology analysis of sediment deposition rates.
5. Riparian plant community mapping and characterization.

### Metric:

1. Comparison of pre and post-Project flow regime and plant community type flood regimes.

# Riparian Ice Processes Study

## Questions/Baseline Studies/Proposed Metrics

### Key Questions (RSP 8.6.3.4):

1. Will river ice formation change with Project operations?
2. If river ice formation changes with Project operations, where will this occur and to what extent?
3. Will elevations of ice formation change relative to floodplain surfaces?
4. Will ice dam formation pattern change with Project operations?

### Baseline Studies:

1. Ice break up field observations.
2. 1-D, 2-D Ice Processes Models

### Proposed Metrics:

1. Ice process modeling maps of Project Area locations of ice formation change.



# Floodplain Vegetation Ice Effects (RSP 8.6.3.4)



Tree Ice Scar Survey Mapping and  
Ice break up dendrochronological  
documentation

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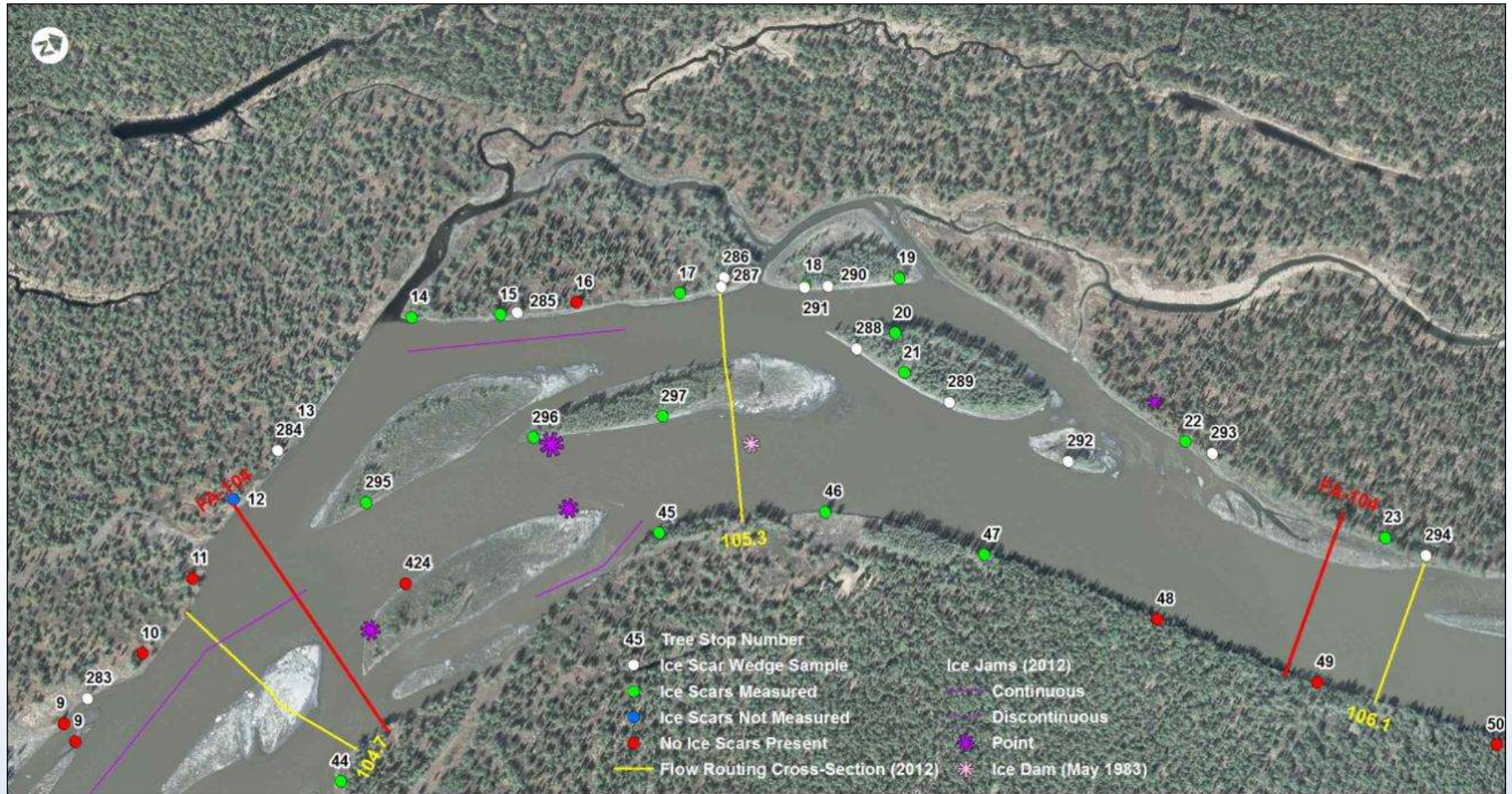
# Tree Ice Scar Mapping

Ice scar mapping  
September 2013



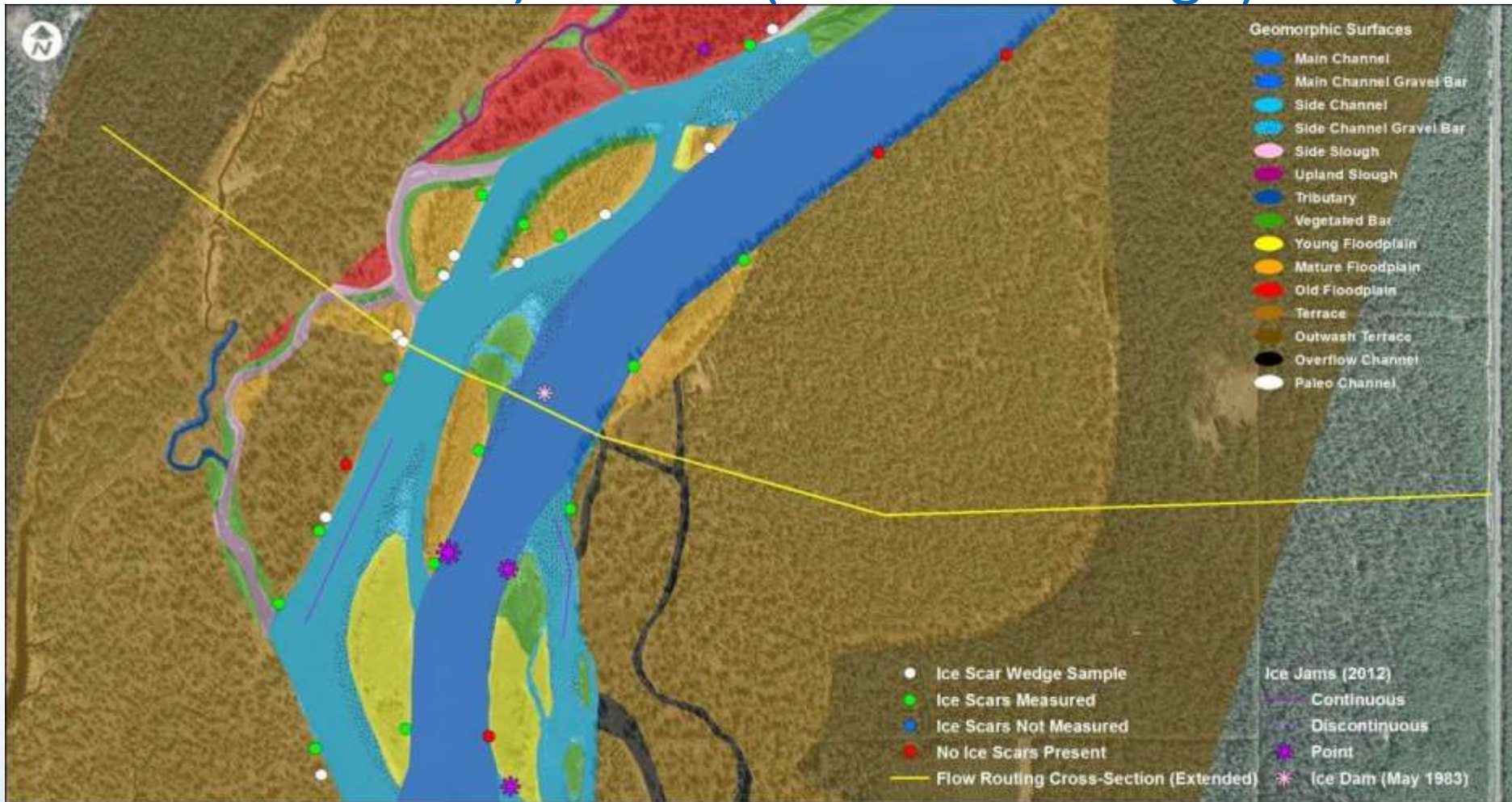
FA-104 (Whiskers Slough)  
2013 Ice Break-up

# RIFS 2013 Ice Scar Survey Points and Historic Ice Jam locations FA-104 (Whiskers Slough)



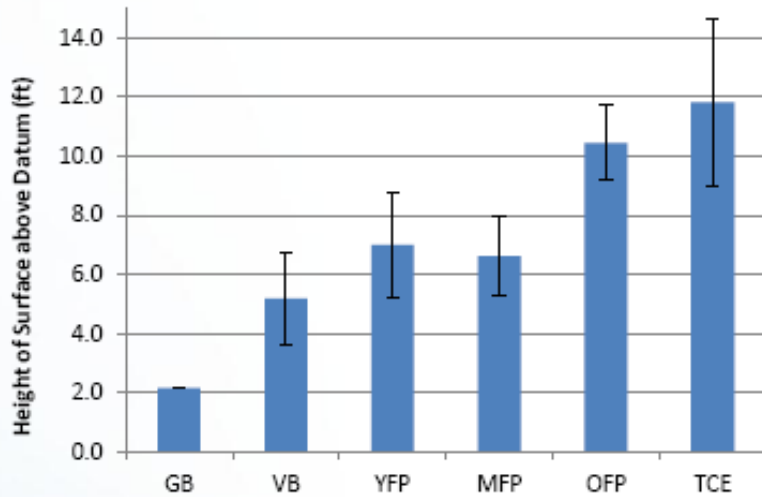
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# RIFS Ice Scar Survey and Geomorphic Surfaces; FA-104 (Whiskers Slough)

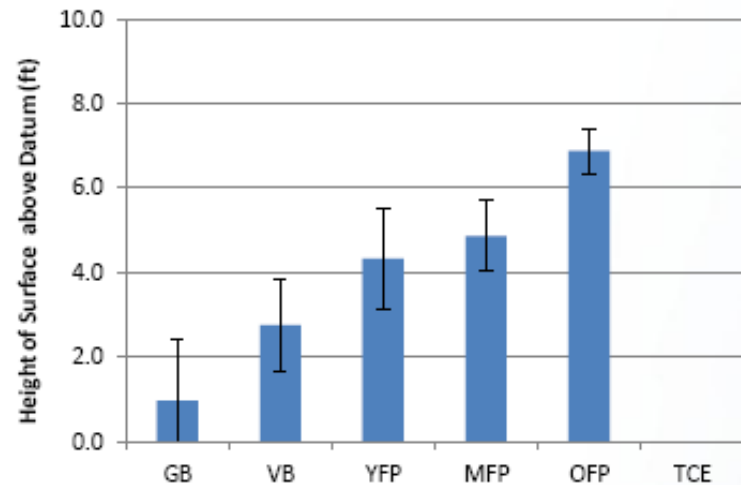


# Geomorphic Surface Heights Mean and Standard Deviation

## FA-104 (Whiskers Slough)



## FA-144 (Slough 21)



KEY	
GB = Gravel Bar	MFP = Mature Floodplain
VB = Vegetated Bar	OFP = Old Floodplain
YFP = Young Floodplain	TCE = Terrace



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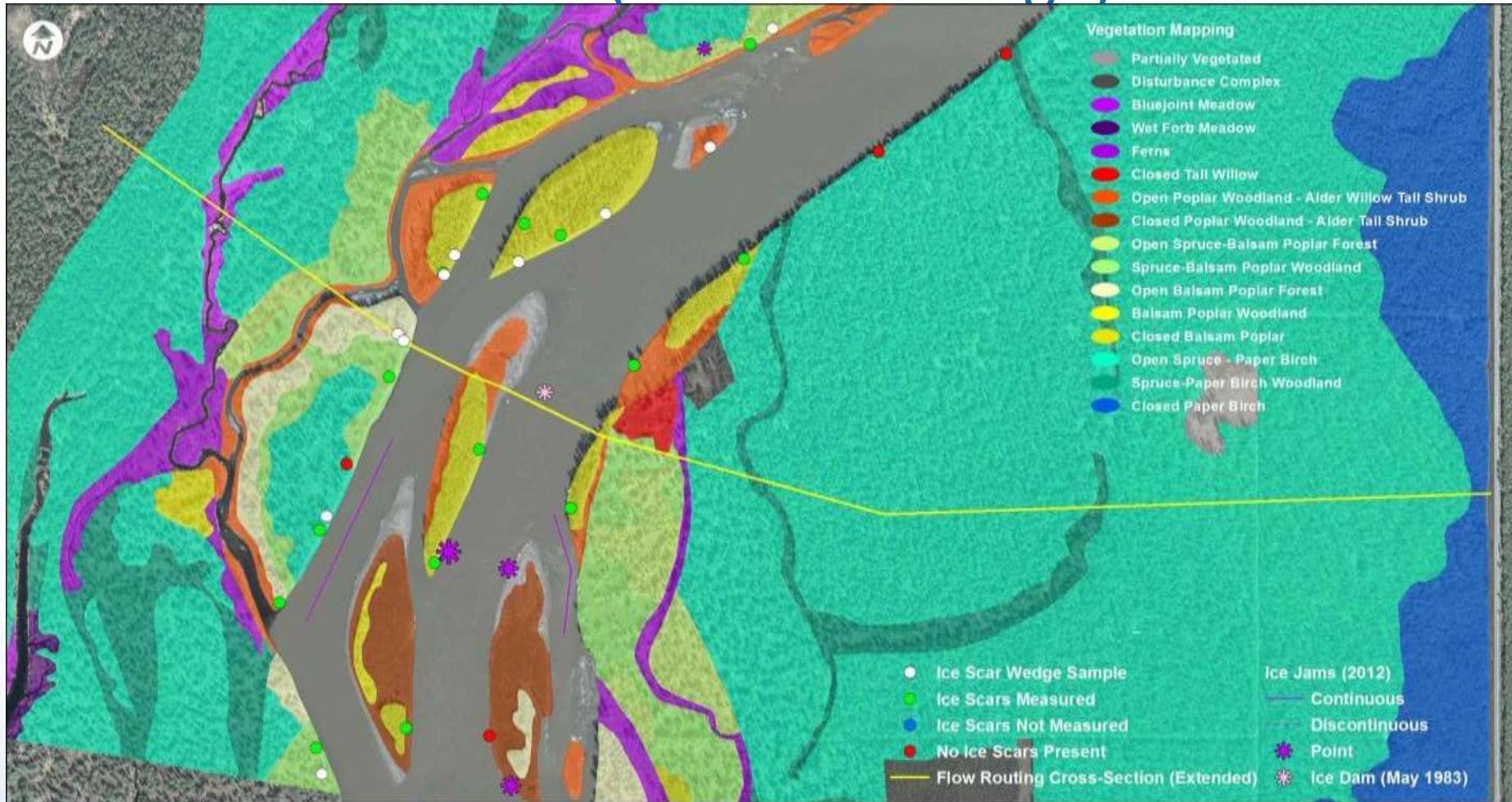
# Preliminary Analysis – Return Period of Overtopping Flows on Geomorphic Surfaces

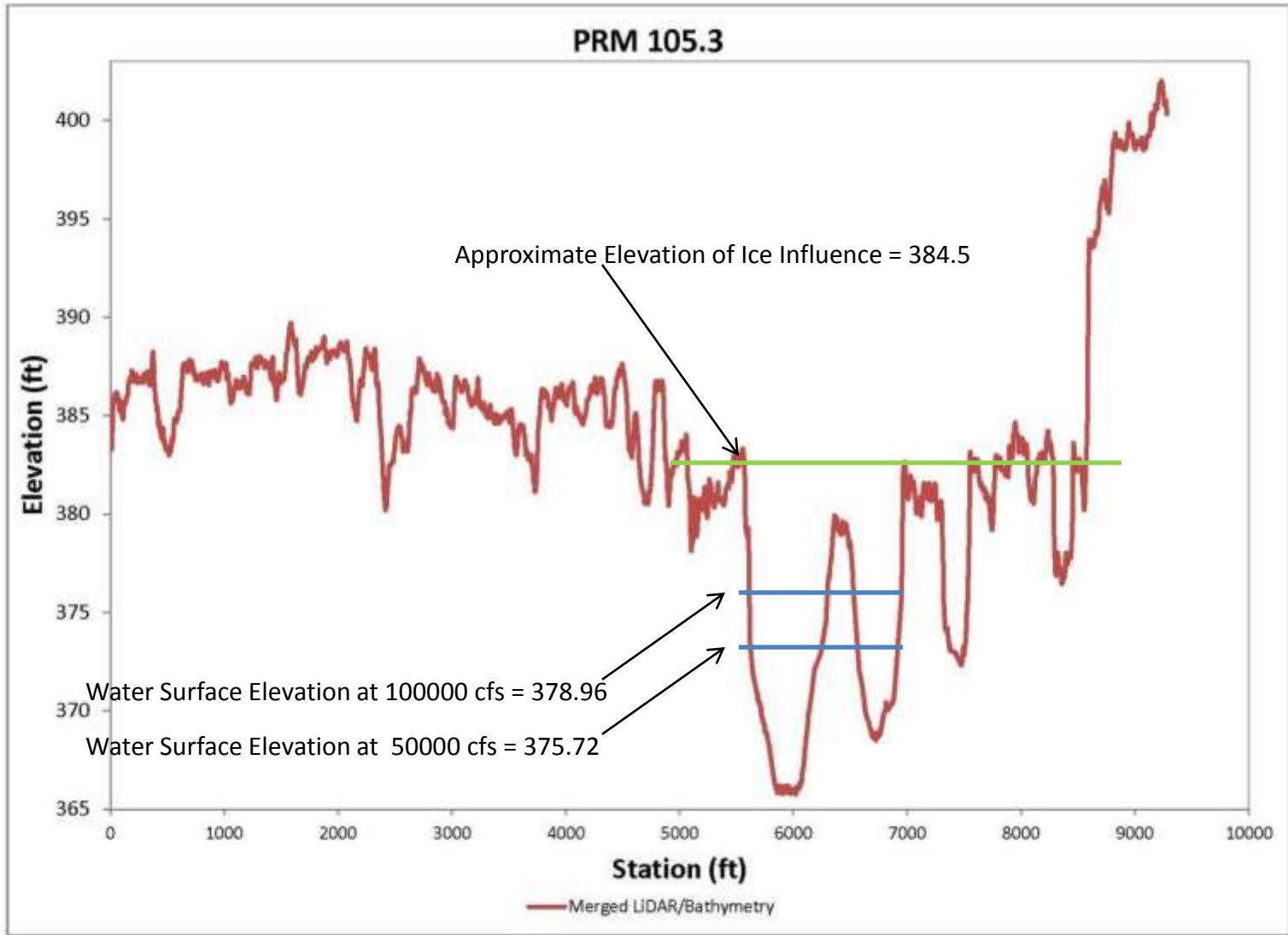
Focus Area	Return Period (yr)				
	VB	YFP	MFP	OFP	TCE
FA-104 Whiskers Slough	23	117	82	>1000	>1000
FA-113 Oxbow I	9	38	38	61	>500
FA-115 Slough 6A	6	n/a	75	125	>500
FA-128 Slough 8A	6	4	35	59	n/a
FA-138 Gold Creek	6	73	97	134	329
FA-141 Indian River	3	14	10	n/a	37
FA-144 Slough 21	13	82	153	>1000	n/a

<b>KEY</b>
VB = vegetated bar
YFP = young floodplain
MFP = mature floodplain
OFP = old floodplain
TCE = Terrace

Return Period determined with mean elevation for each geomorphic surface  
 Relative surface heights gathered in field. Respective elevations derived from Flow-Routing Model Rating Curves  
 No return period calculated if geomorphic surface was not observed/measured in field.

# RIFS Ice Scar Survey and Vegetation: FA-104 (Whiskers Slough)

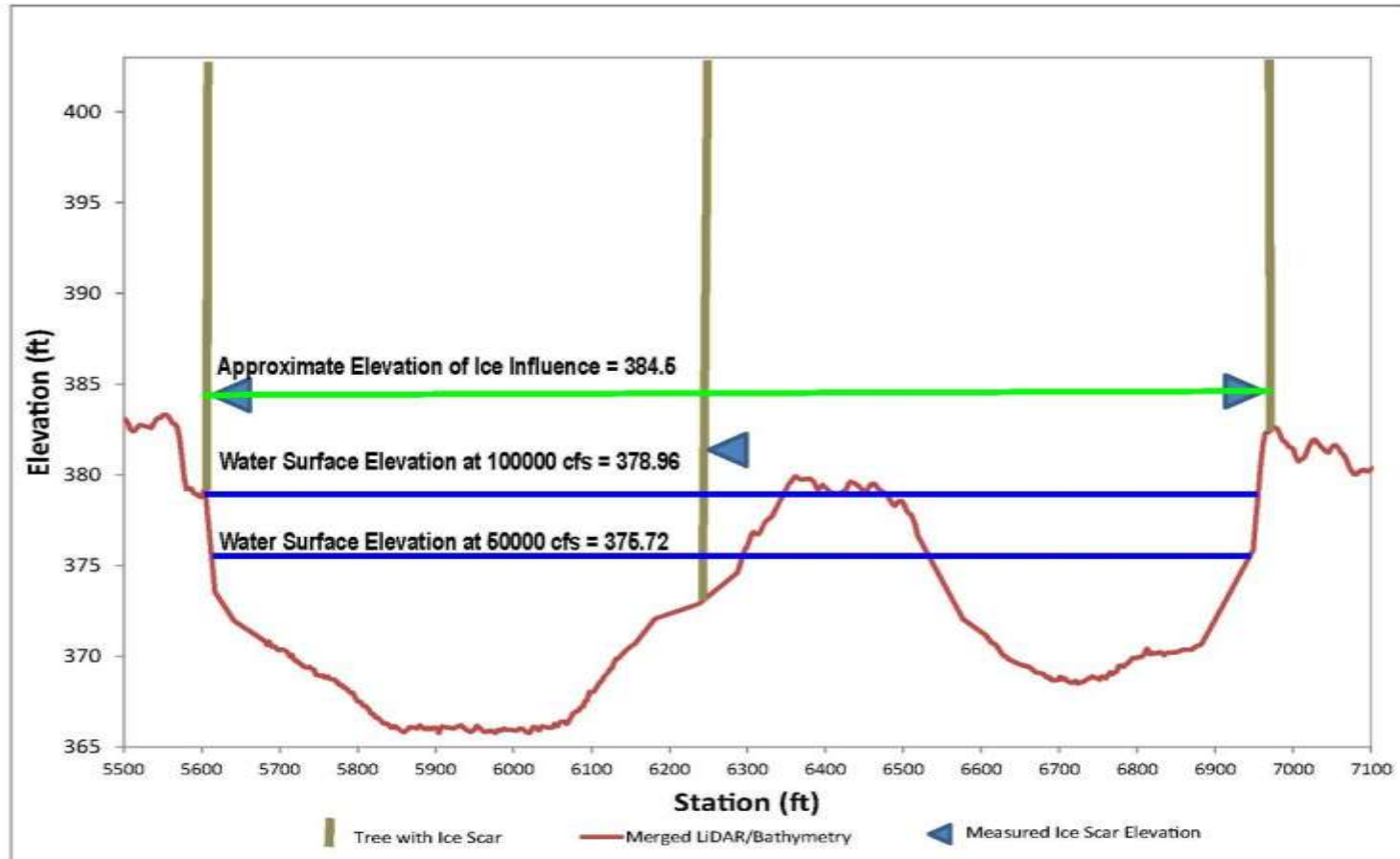
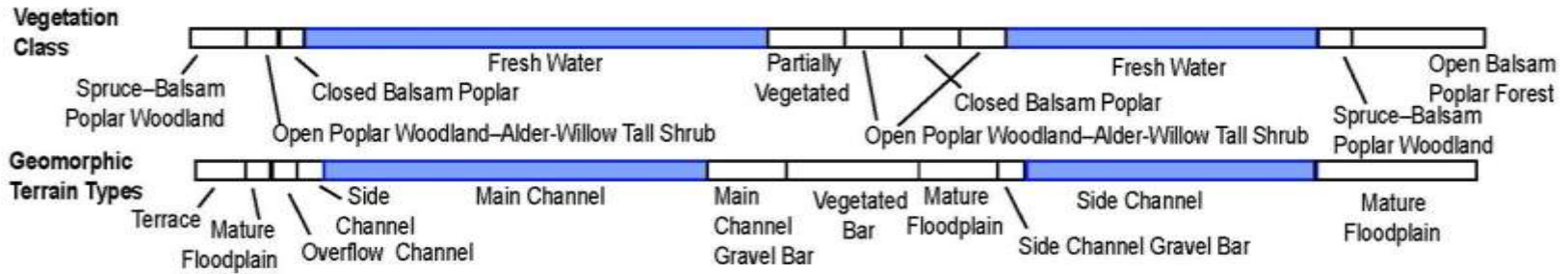




(DRAFT)



# Ice Scar Observations Along PRM 105.3



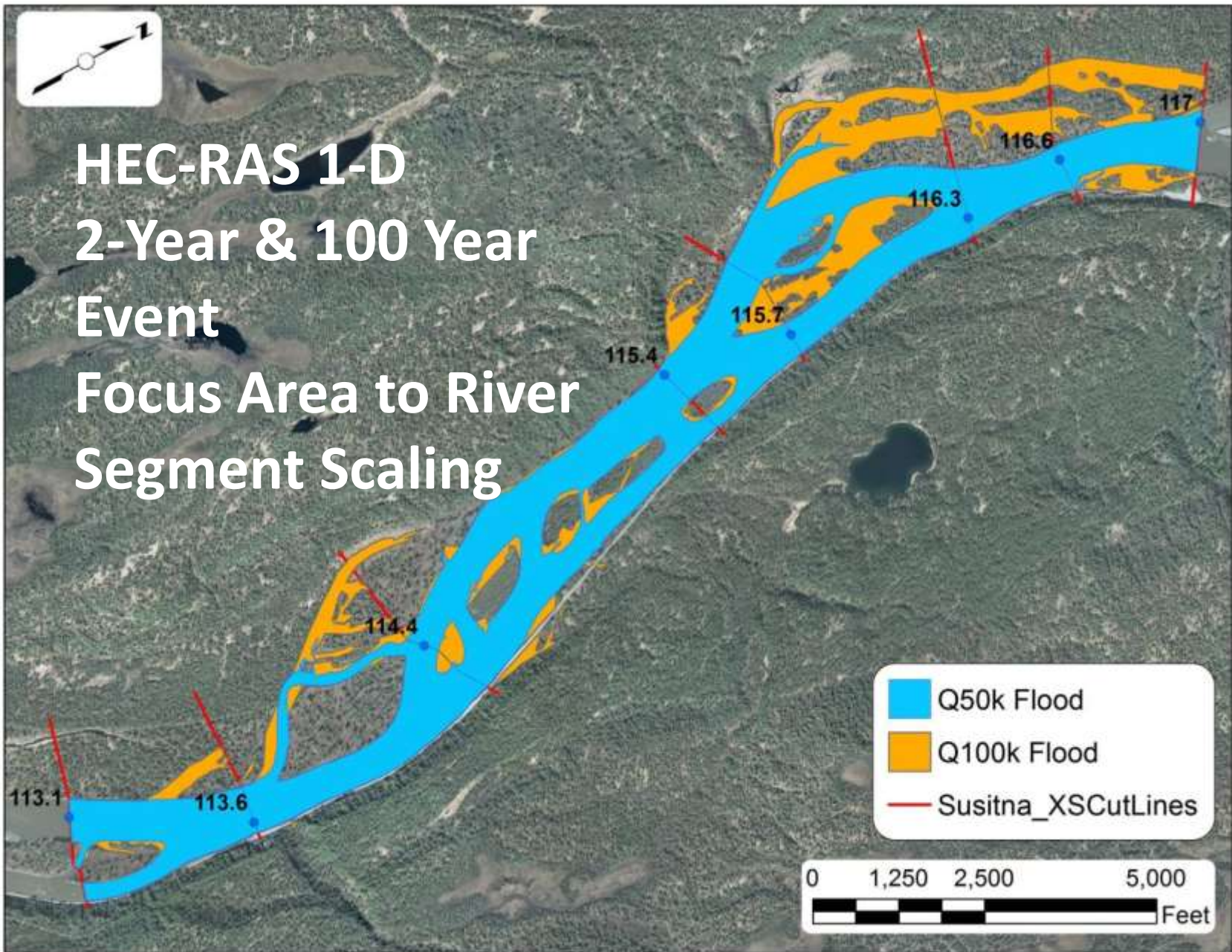
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# Above FA-104 (Whiskers Slough): May 2013 ice dam

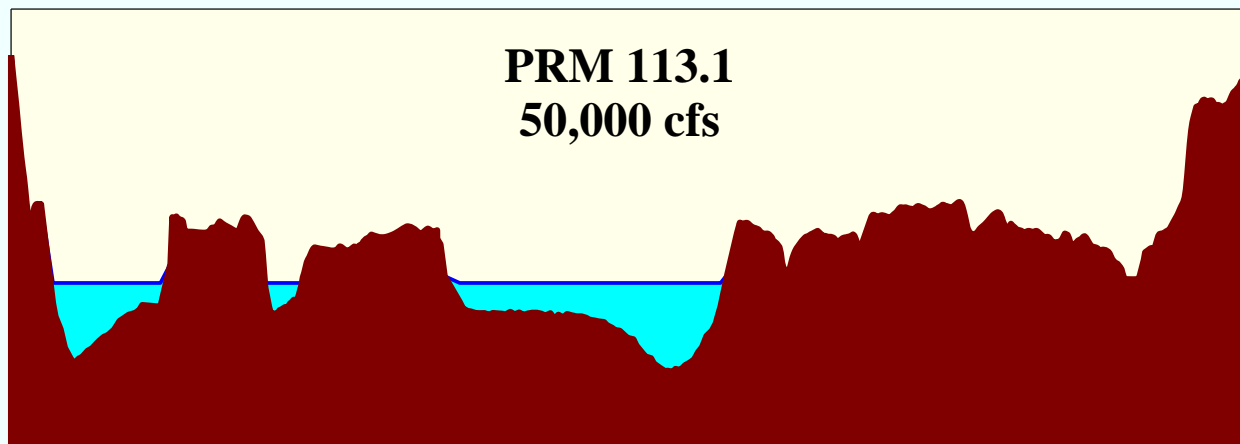
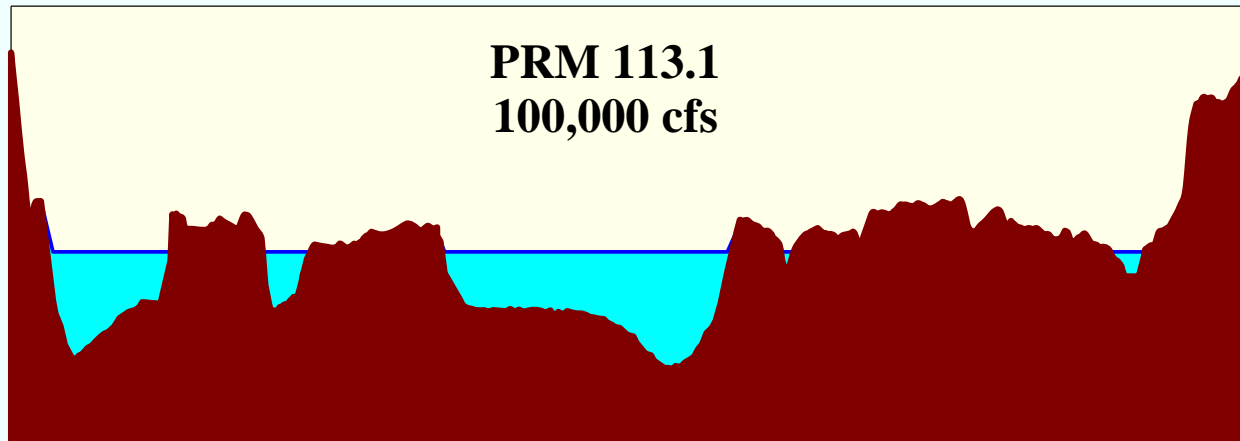




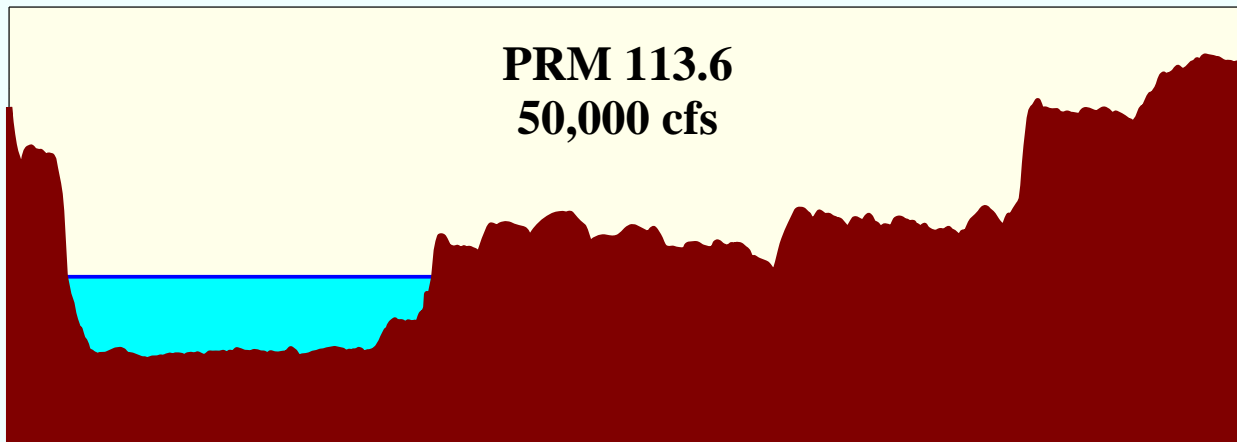
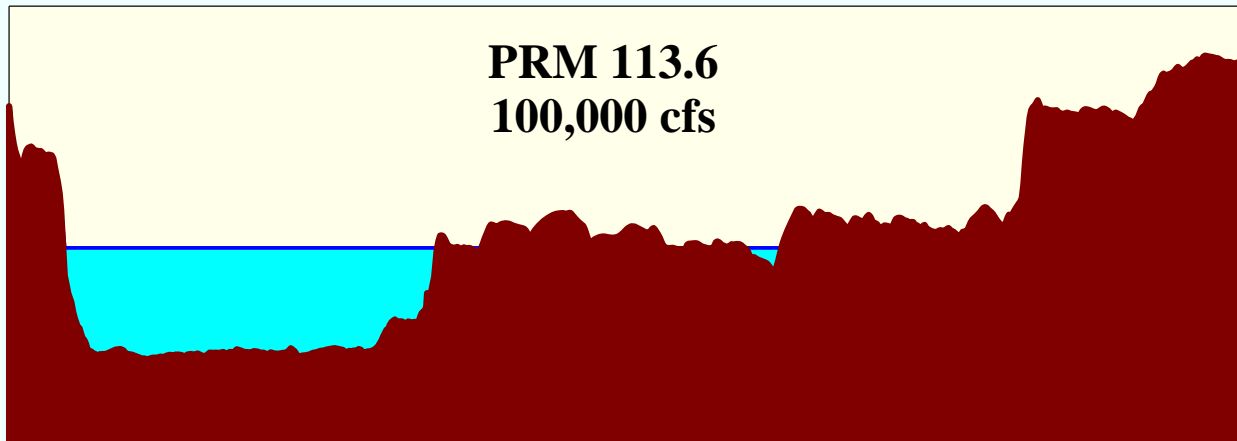
# HEC-RAS 1-D 2-Year & 100 Year Event Focus Area to River Segment Scaling



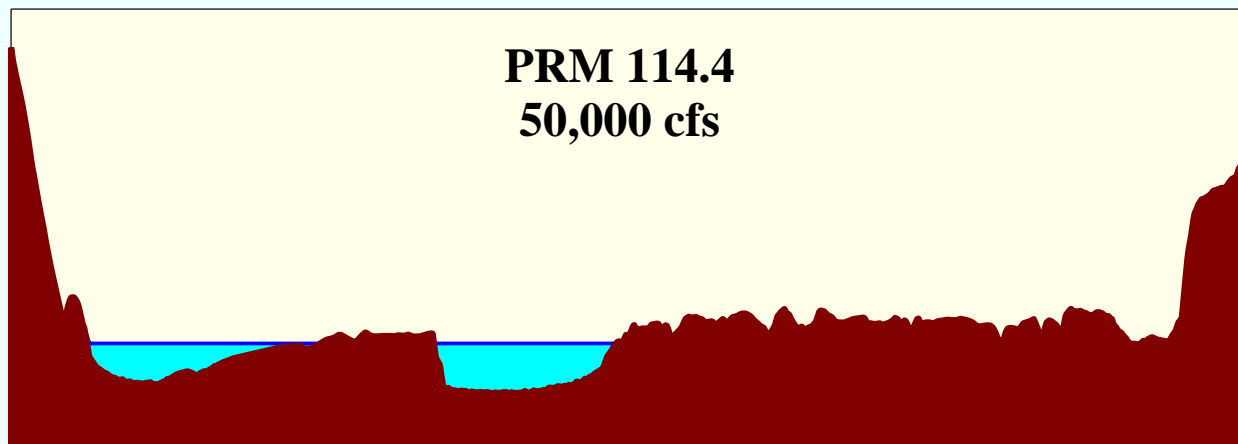
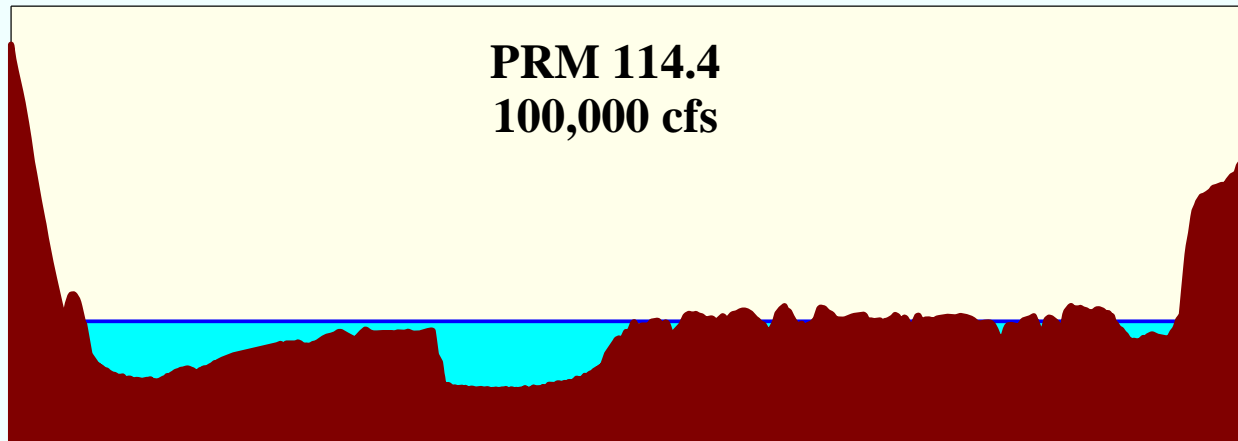
# Riparian Instream Flow Modeling



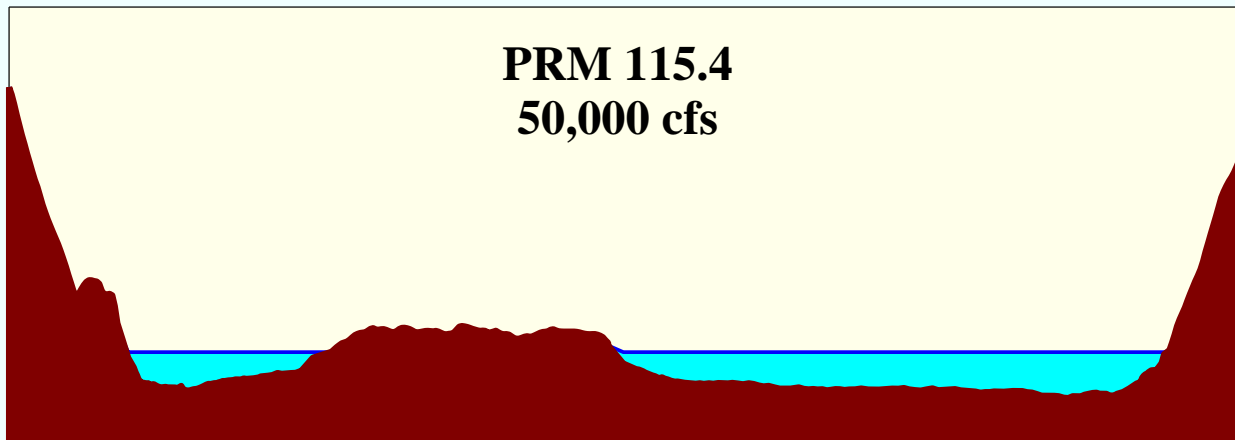
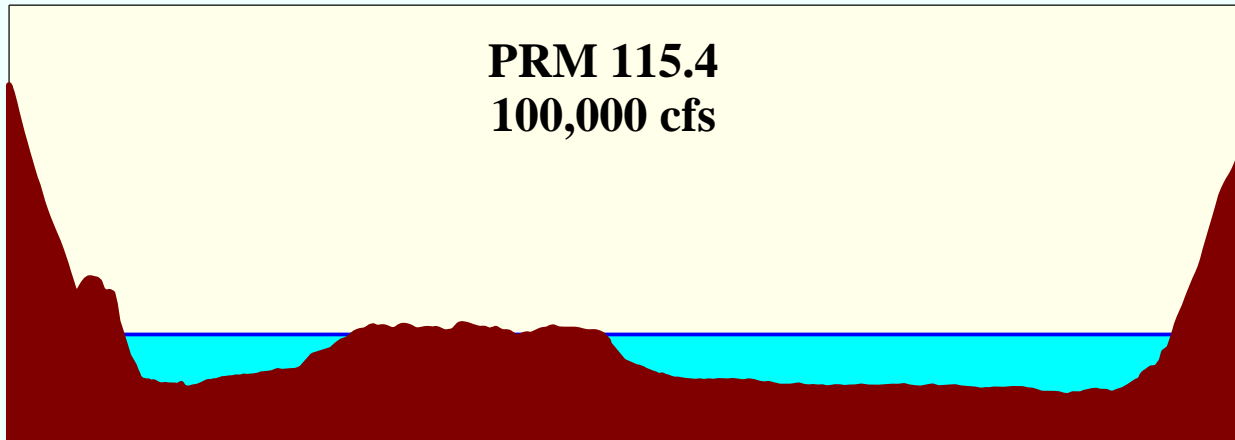
# Riparian Instream Flow Modeling



# Riparian Instream Flow Modeling

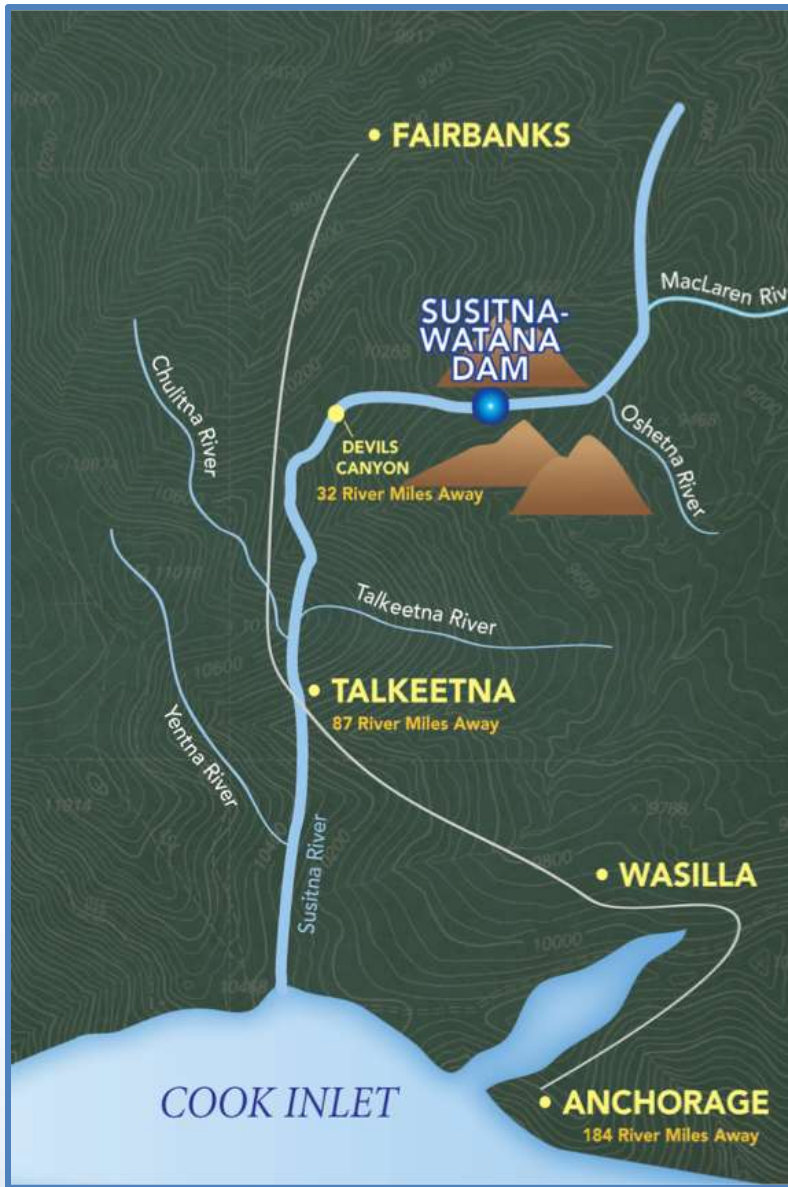


# Riparian Instream Flow Modeling



# 2013 Susitna River Ice Break-up

Prepared by  
R2 Resource Consultants & GW Scientific



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# FA-104 (Whiskers Slough) 2013 Breakup



S

# FA-104 (Whiskers Slough) 2013 Breakup Upstream of Whiskers Slough



# FA-104 (Whiskers Slough) 2013 Breakup



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# FA-104 (Whiskers Slough) 2013 Breakup



# FA-104 (Whiskers Slough) 2013 Breakup



# FA-104 (Whiskers Slough) Ice Shearing



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# FA-104 (Whiskers Slough)



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# FA-104 (Whiskers Slough) Backwater Ice at Whiskers Creek



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# FA-104 (Whiskers Slough) Ice



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# FA-104 (Whiskers Slough) Floodplain Ice Deposits



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# “Big Cut” Slough between Susitna and Chulitna Rivers



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# Main Channel Floodplain Ice Shearing



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# Mid-channel Island Ice sheet shearing



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# Mid-Channel Island Ice Shearing



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# Mid-Channel Island Ice Shearing



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# Mid-channel Island Ice Shearing & Ice Sheet Deposits



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# Mid-channel Island Ice Dam Backwater Flooding



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# Spruce / Birch Floodplain Ice Dam Backwater Flooding



SUSTAINABLE WATER HYDRO

# Spruce / Birch Ice Dam Backwater Flooding and Sediment Deposition



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# FA-113 (Oxbow I) 2013 Breakup



# FA-113 (Oxbow I) 2013 Breakup



# FA-138 (Gold Creek) 2013 Breakup River Right



# FA-138 (Gold Creek) 2013 Breakup River Right



# 2013 Breakup Below FA-138 (Gold Creek), looking upriver





# Other FAs 2013 Breakup



# Mid channel island Other FAs 2013 Breakup



# Below FA-173 (Stephan Lake Complex)



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# Floodplain Ice Effects

Susitna River break up, May 25-26, 2013



# FA-104 (Whiskers Slough) Tree Ice Scarification



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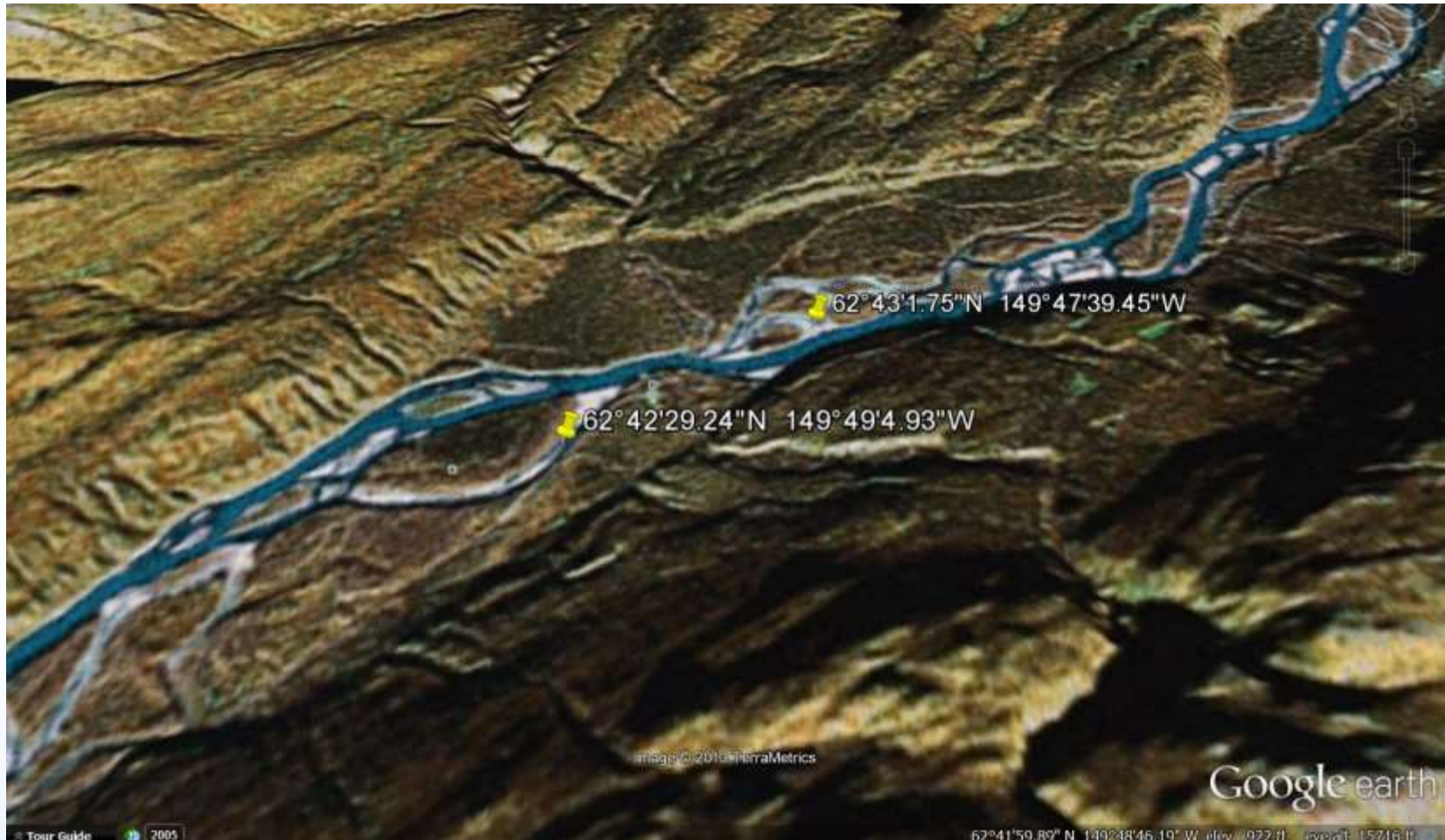
# Downstream of FA-104 (Whiskers Slough) Main Channel Floodplain & Vegetation Ice Shearing



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# Susitna River, Riparian Ice Interactions

## PRM 133- 135



Ice Jam Impacts on Riparian Conditions, June 12, 2013

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# Susitna River, Riparian Ice Interactions

## PRM 134.6



Ice Jam Impacts on Riparian Conditions, June 12, 2013



# Susitna River, Riparian Ice Interactions PRM 134.6



Ice Jam Impacts on Riparian Conditions, June 12, 2013

# Susitna River, Riparian Ice Interactions

## PRM 134.6



Ice Jam Impacts on Riparian Conditions, June 12, 2013

# Susitna River, Riparian Ice Interactions

## PRM 134.9



Sediment covered ice is still covering landscape  
Ice Jam Impacts on Riparian Conditions, June 12, 2013

# Susitna River, Riparian Ice Interactions

## PRM 134.9



Sediment covered ice is still covering landscape  
Ice Jam Impacts on Riparian Conditions, June 12, 2013

# Susitna River, Riparian Ice Interactions

## PRM 133.5

