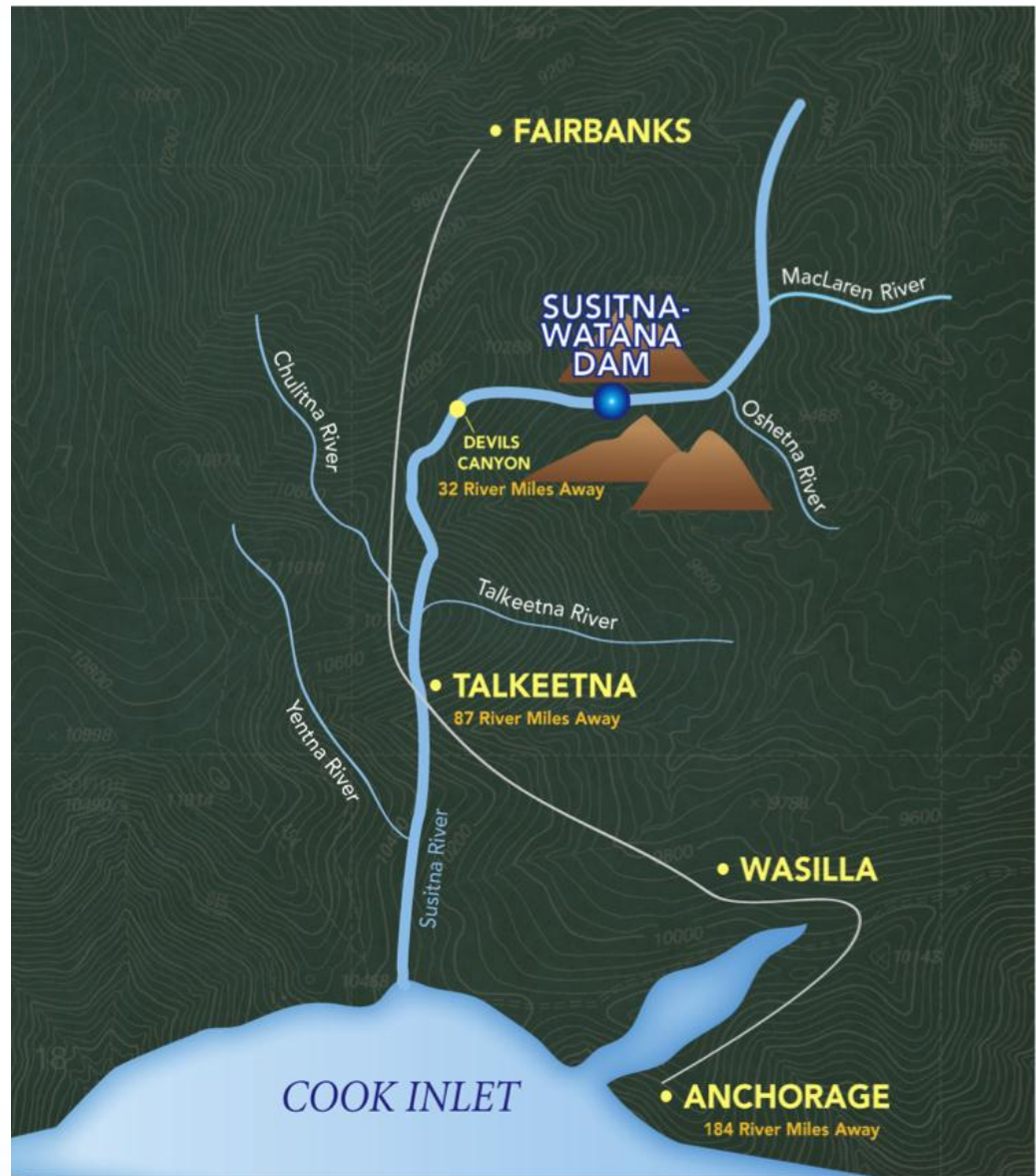


# Ice Processes

October 23 TWG Meeting



# Presentation Topics

## Review of Consultation Issues / RSP Updates

- Study Integration
- Role of Ice Study in Focus Site Selection
- Ice Study Field Data
- 1D Modeling
- Study Interdependencies
- Schedule



# Comments Since Last TWG

Three comments were received from NOAA that relate to ice processes.

Email to Dudley Reiser

09/12/2012

Eric Rothwell

NOAA

- 1) I have a concern with winter flow routing and ice processes, and how they will inform site selection. Site selection for analyzing winter instream flow effects to fish and their habitat will depend on an understanding of operational effects downstream (to flow timing and quantity, hydraulics, and water quality). Also the extension of the studies downstream will depend on these results. The winter hydraulic flow routing model will rely on ice process modeling to determine the downstream extent and magnitude of operational flow effects. The ice process modeling will need several years of data, in addition to the ice thickness measurements and discharge measurements at each of the cross-sections for the winter routing model. I see a lack of time to collect data for the models (winter flow routing and ice process) calibrate the models and then selection sites and methods to conduct ISF studies to assess project effects on fish during winter operations under the currently proposed study period.
  
- 2) What can be determined from each of the study components, a description of deliverables (not results) this will help us understand if our requests have been met.
  
- 3) How will uncertainty be determined for each of the study components? (ice processes -> hydraulic flow routing -> winter fish and habitat effects)



## How will Ice Processes Work Inform Site Selection?

### How will results be available in time?

- Proposed Condition Ice Modeling will not be complete in time for results to be used for site selection.
- Winter sites will need to be selected based on results of previous studies (ie, 1980's ice modeling), understanding of current ice regime, and a preliminary understanding of project effects based on HEC-RAS flow modeling.



## What are the Ice Study Deliverables?

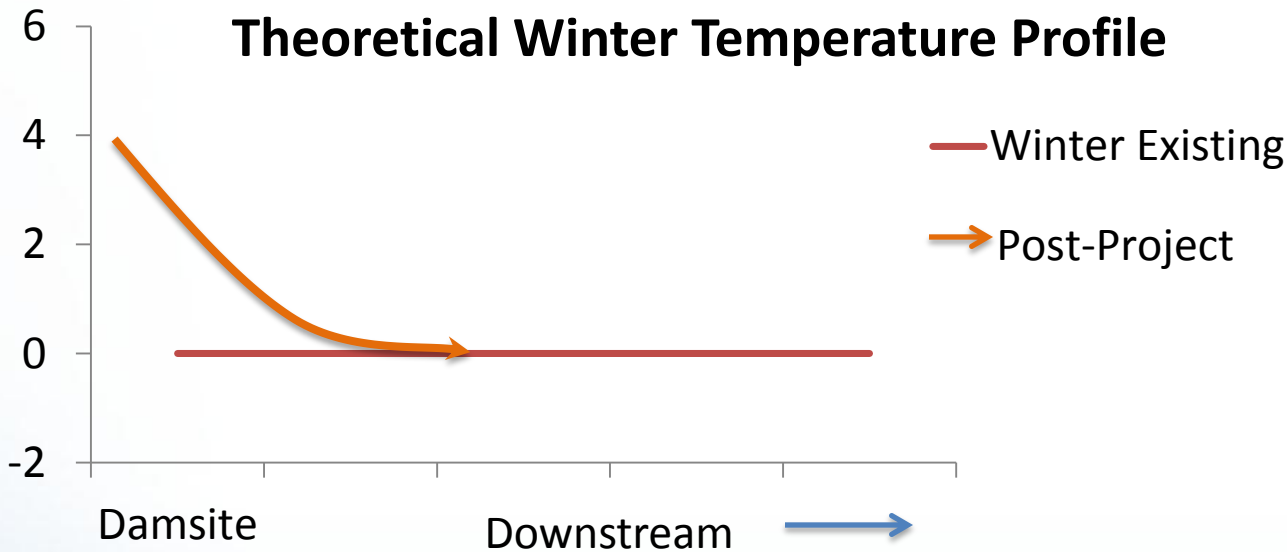
- Observations of ice processes:
  - Timing of ice cover progression in Lower and Middle Rivers, freeze-up processes such as sources of frazil ice, bridging locations, rate of upstream progression of ice cover, increases in stage associated with freeze-up, timing of tributary freeze-up.
  - Locations of open leads in late winter
  - Ice cover thickness at PT locations and focus sites
  - Timing of ice cover decay, progression of breakup, locations of ice jams, locations of overbank flow associated with ice jams.



# Ice Study Deliverables Continued

- Ice Processes Modeling

Thermal component of model describes winter temperature profile changes due to reservoir operations



# Ice Study Deliverable Continued

- Model Describes Ice Cover Progression – frazil formation, border ice growth, juxtaposition, and hydraulic thickening.

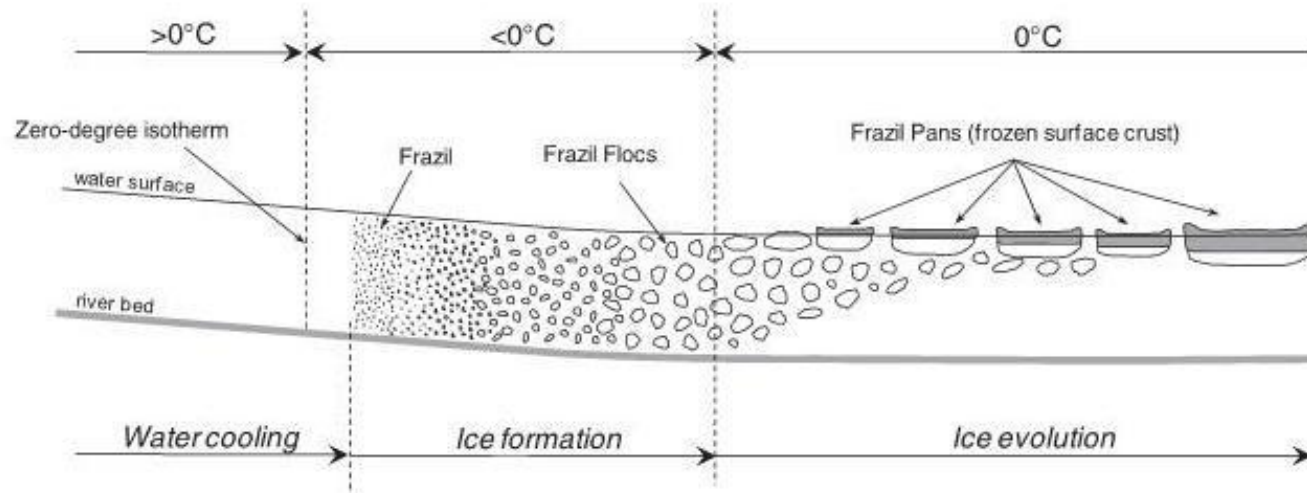


Fig. 1. Schematic diagram of ice cover development on regulated rivers (adapted from Michel, 1971).



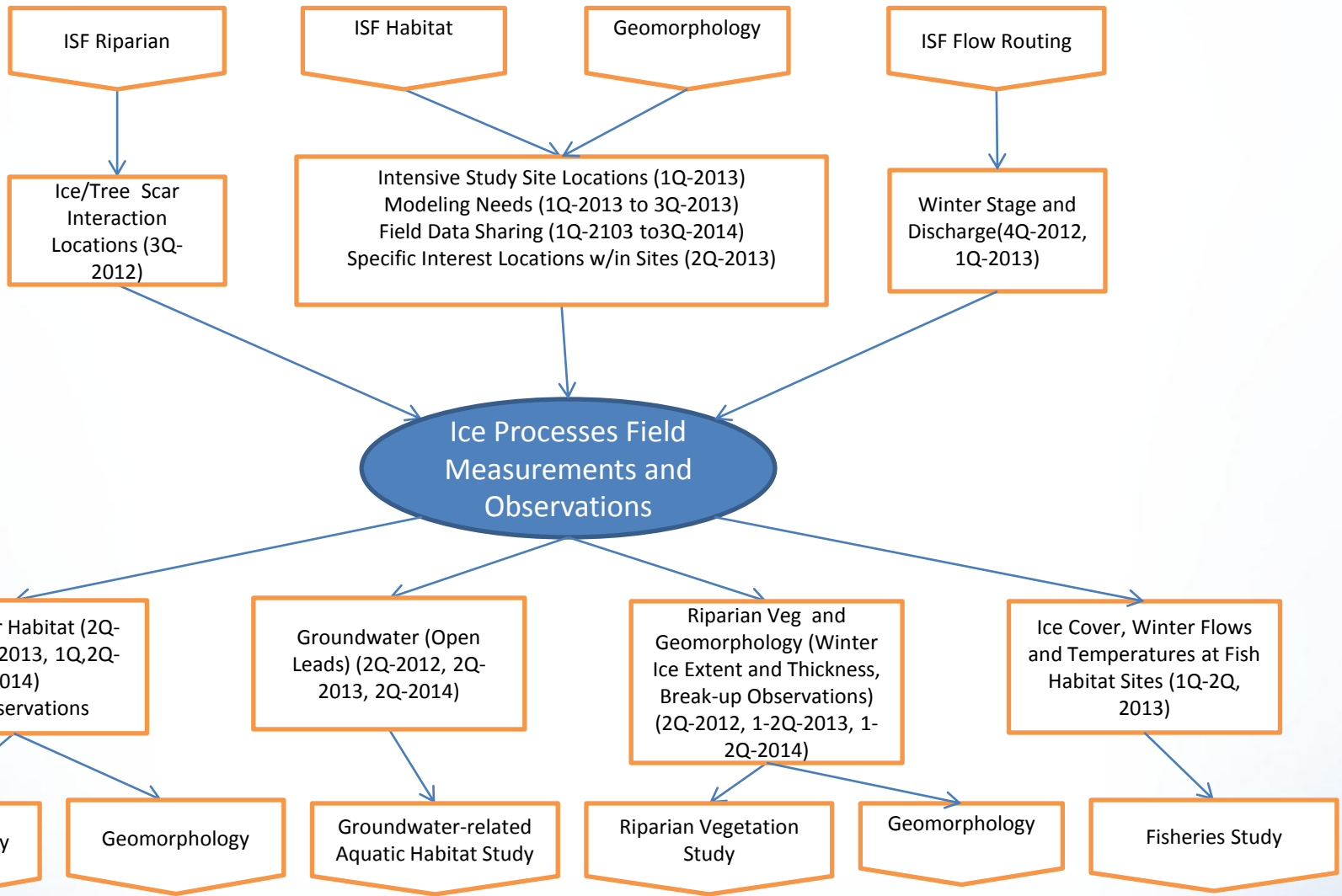
# Susitna-Chulitna Confluence, 10/19/2012

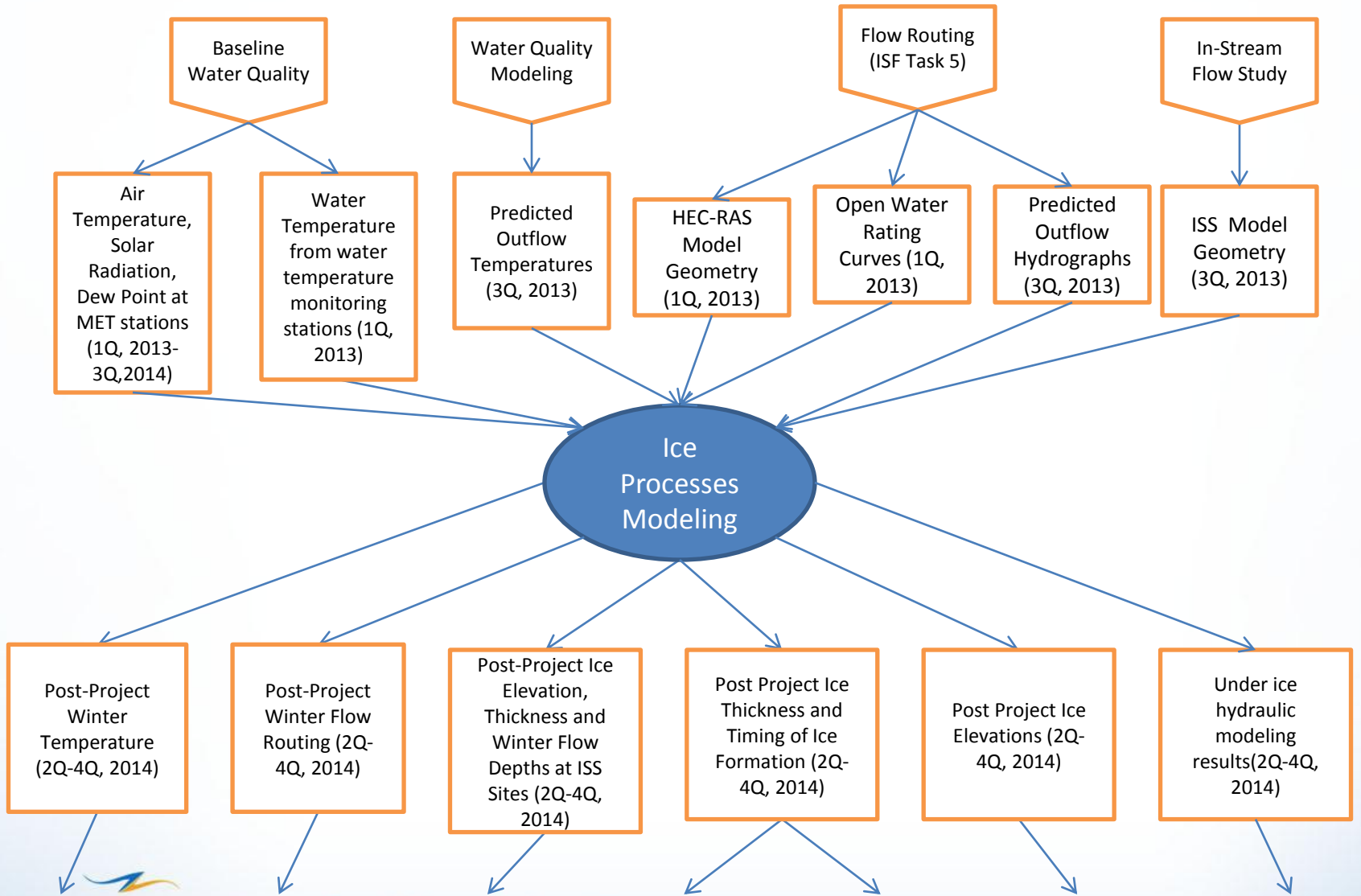




## Juxtaposed frazil pans on Lower Susitna, 10/19/2012







Activity	2012				2013				2014				2015
	1 Q	2 Q	3 Q	4 Q	1 Q	2 Q	3 Q	4 Q	1 Q	2 Q	3 Q	4 Q	1 Q
Open Lead Surveys, ice thickness and elevation	—				—					—			
Breakup Reconnaissance		—				—					—		
Freezeup Reconnaissance			—	—	—	—			—	—			
Initial Study Report									△				
Existing Condition 1D Model Development				—	—	—	—	—	—				
Proposed Condition 1D Model Development							—	—	—	—	—	—	
Intensive Site Models								—	—	—	—	—	
Updated Study Report													▲