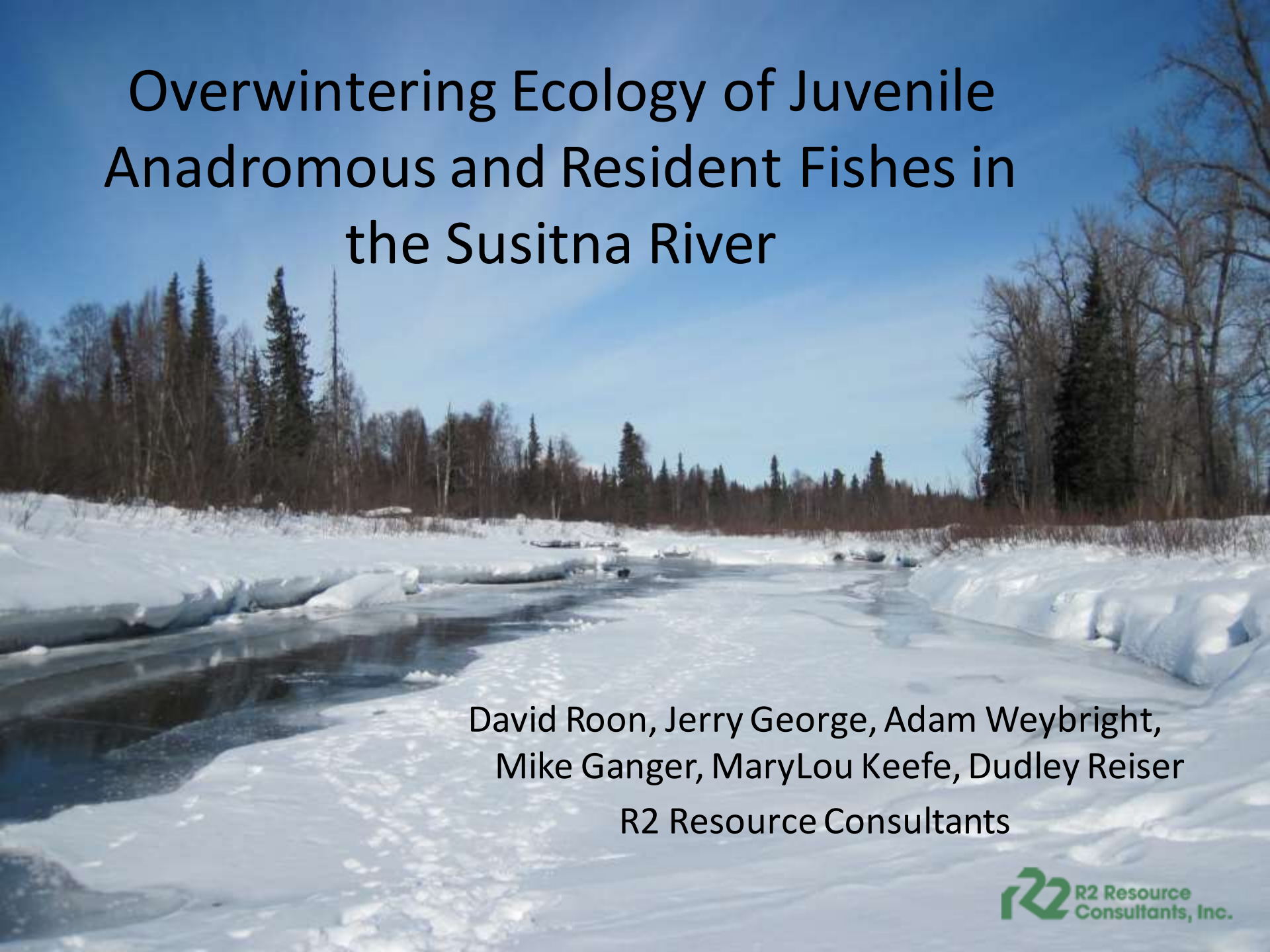
Overwintering Ecology of Juvenile Anadromous and Resident Fishes in the Susitna River



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Introduction

- Winter critical period for fish survival in Alaska (Huusko et al. 2007, Brown et al. 2011)
- Little known about overwintering ecology of freshwater fish populations in glacial river systems

Brown et al. 2011. A Primer in Winter, Ice and Fish: What Fisheries Biologists Should Know about Winter Ice Processes and Stream Dwelling Fish. Fisheries 36: 8-26.
Huusko et al. 2007. Life in the Ice Lane: The Winter Ecology of Stream Salmonids. River Research and Applications 23: 469 -491.

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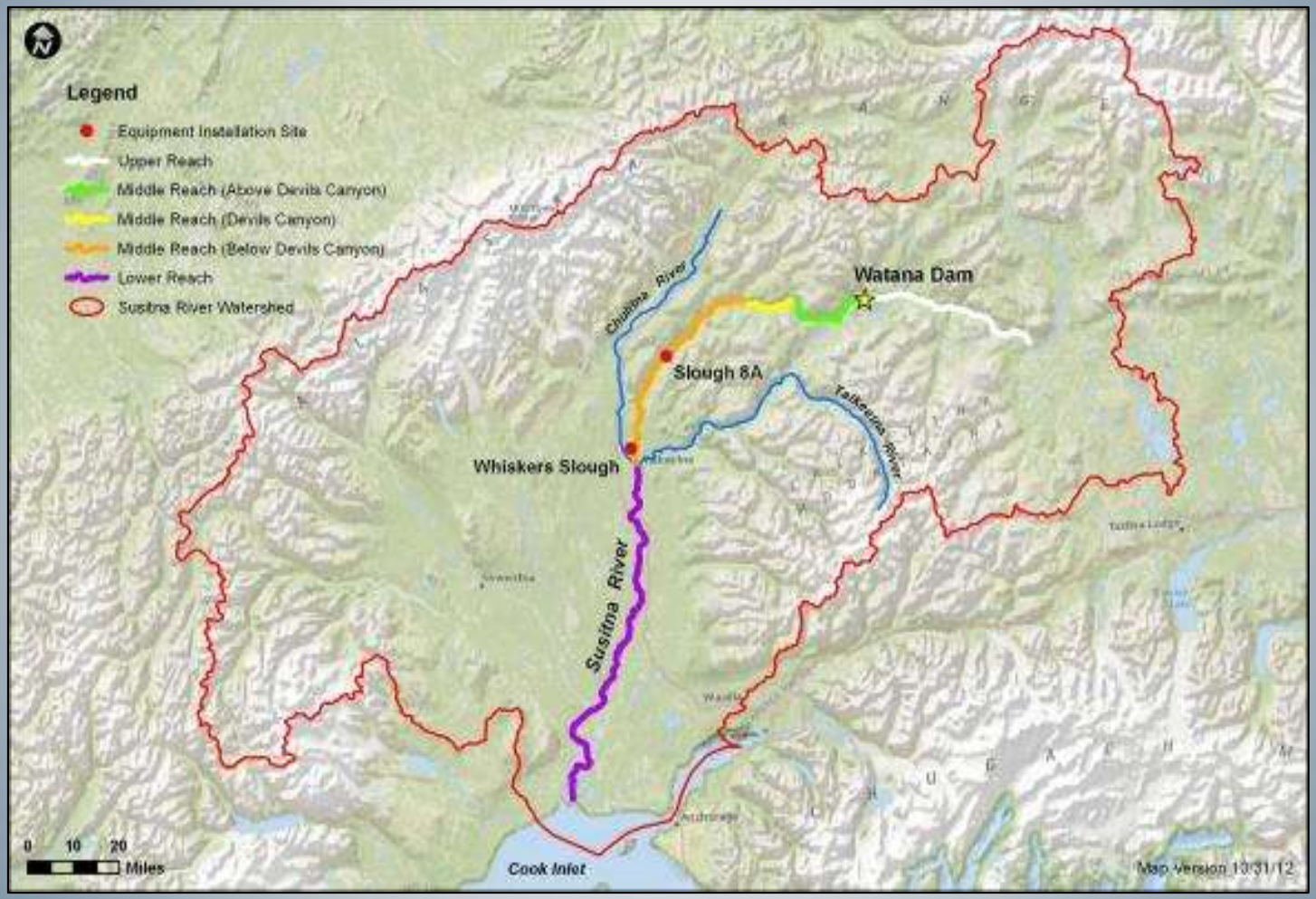
Susitna River Basin



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Susitna River a mosaic of ice-covered and open water habitats

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2013 Winter Pilot Study Objectives

Learn about winter sampling logistics

Test effectiveness of sampling techniques in under-ice and open water conditions

Understand habitat utilization of juvenile anadromous and resident fish species

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Winter Logistics

- 3 trips, February – April, 2013
- Whiskers Slough (RM 104) and Slough 8A (RM 128) study areas
- Transportation by snowmachine based from Talkeetna or local base camp

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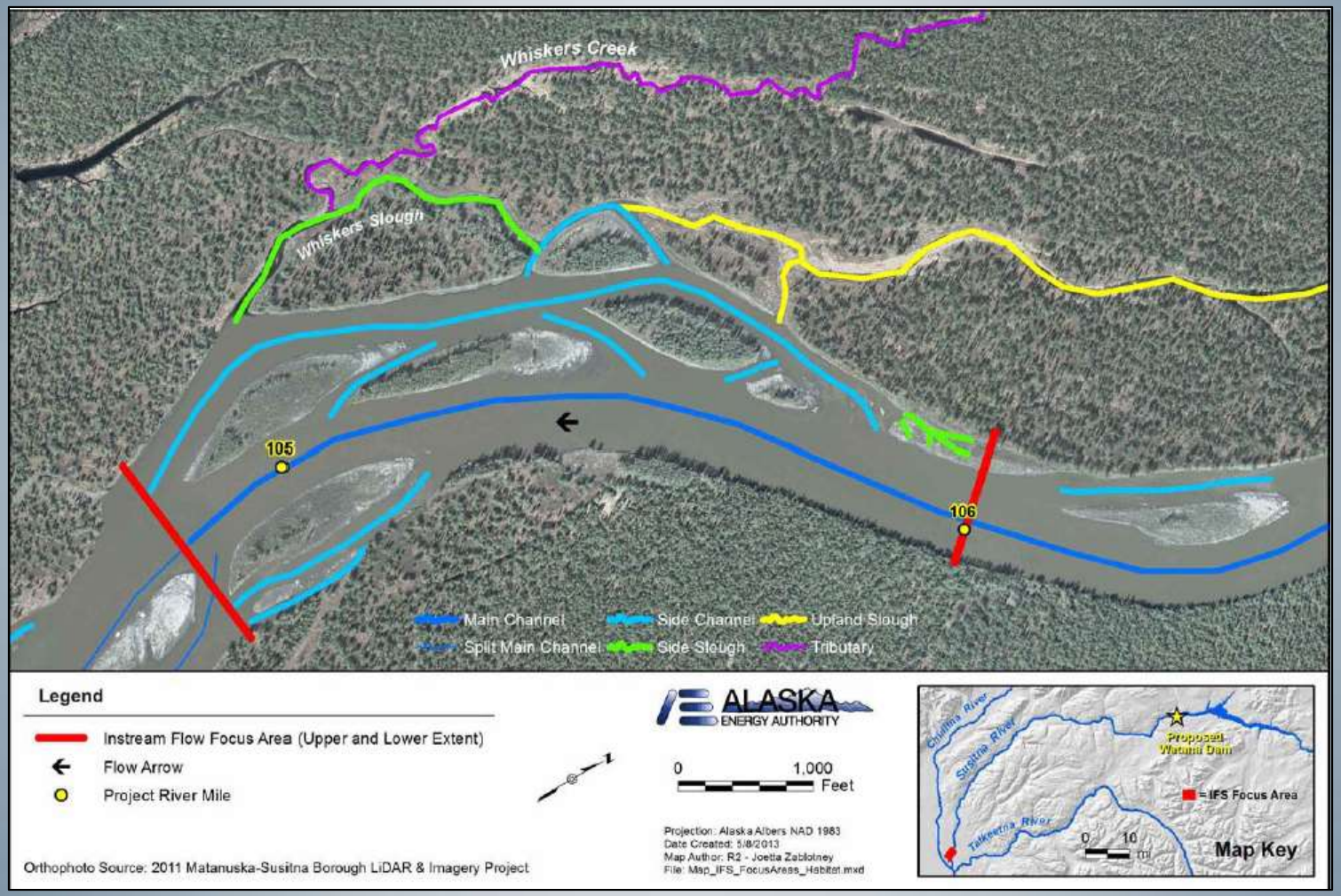
Whiskers Slough (RM 104)



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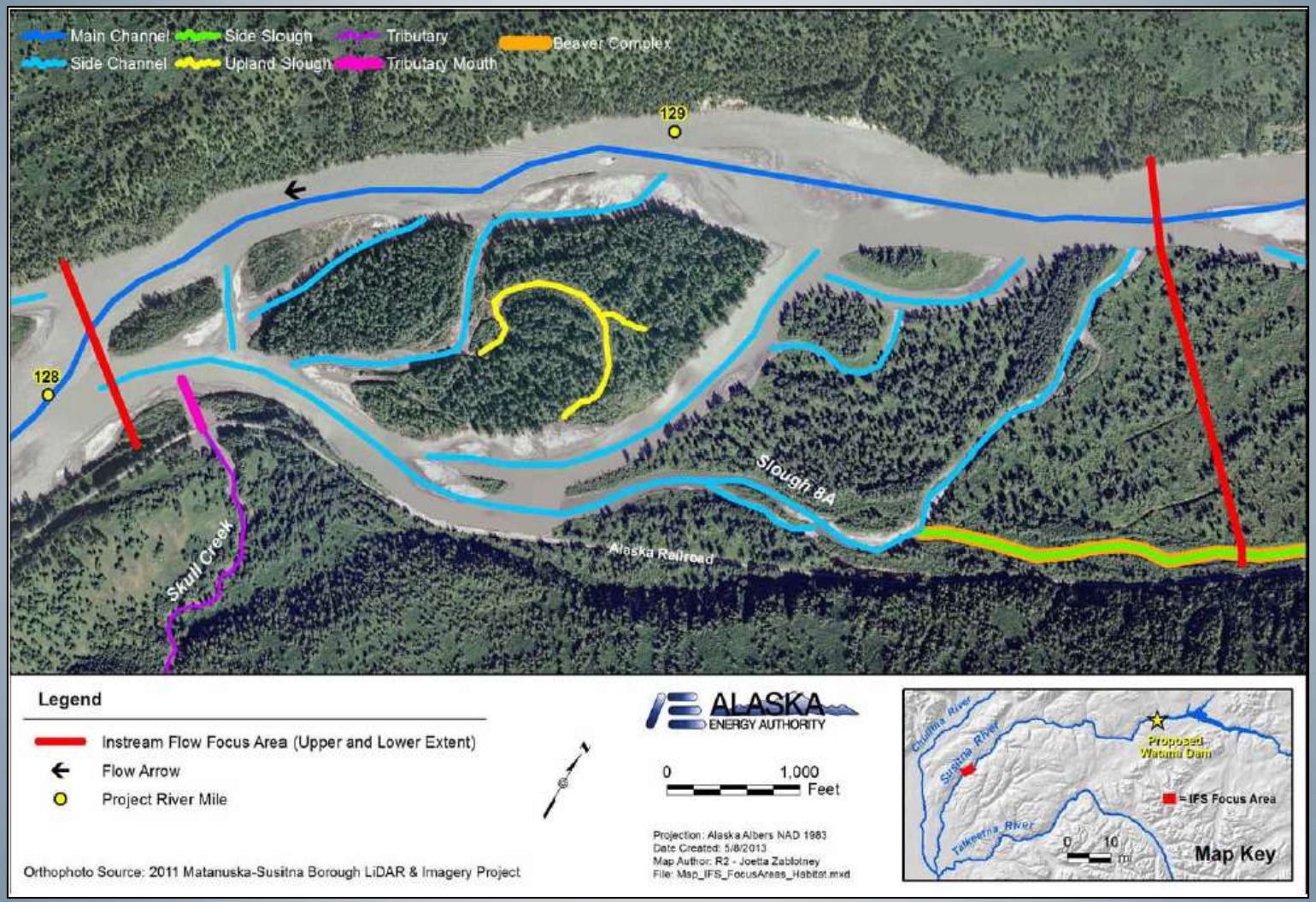
Slough 8A (RM 128)



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Winter Sampling Techniques

- Under Ice
  - Trotlines/Setlines
- Open Water
  - Backpack Electrofishing
  - Beach Seines
- Both
  - Minnow Trapping
  - Angling
  - Underwater Video

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Minnow Traps

- Under ice and in open water in slow water habitats
- Juvenile lifestages, especially salmonids
- Baited with salmon roe and set over night
- Method utilized by ADF&G in 1980's studies (Stratton 1986)

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Trotlines / Setlines

- Ice-covered habitats
- Targeted adult resident fish
- Baited hooks with whitefish/salmon roe and set overnight
  - Trotlines – 6 hooks
  - Setlines – 2 hooks
- Method used by ADF&G in 1980's to sample burbot

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Underwater Video

- Any ice-covered and open water habitat with slow water
- Set for a few hours or overnight depending on battery life
- Detect activity for broad spectrum of species and lifestages
- Compared 4 different camera set ups
  - Aqua-Vu Mico plus DVR
  - Aqua-Vu AV 710
  - Professional UW CCD Video
  - Go Pro Hero 3 Silver with BacPac

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Backpack electrofishing

- Limited to open water habitats with conductivity greater than 20 µS/cm
- Targeted juvenile anadromous and resident fish species
- Conducted during day and night

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Other Methods

- Angling
  - Open Water or Under Ice
  - Slough Mouth Habitat
  - Adult Resident Fish
- Beach Seines
  - Open water method
  - Side Channel Habitat
  - All Species

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PIT Antennas

- Swim-Through and Swim-Over designs
- Tested power consumption of each system
- Tested read range with and without ice cover with 12mm and 23 mm tags

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Anadromous Fish

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Resident Fish

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Species by gear type

	GearType					
Species	**Angling**	**Backpack Electrofisher**	**Baited Trot or Set Line**	**Minnow Trap**	**Seine**	**Underwater Video**
Arctic lamprey		X				
Burbot			X	X		
Chinook salmon		X		X		X
Chum salmon		X				
Coho salmon		X		X		X
Pink salmon		X				
Rainbow trout	X	X	X			X
Round whitefish						X
Sculpin		X		X		X
Sockeye salmon				X		
Threespine stickleback		X		X		

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Total catch by gear type

Species	Backpack Electrofishing	Minnow Traps	Seine	Angling	Trotline	Set Line	Total
Anadromous							
Arctic Lamprey	10	0	0	0	0	0	10
Chinook Salmon	16	60	0	0	0	0	76
Chum Salmon	6	0	0	0	0	0	6
Coho Salmon	5	63	0	0	0	0	68
Pink Salmon	3	0	0	0	0	0	3
Sockeye Salmon	0	5	0	0	0	0	5
Resident							
Burbot	0	1	0	0	7	0	8
Rainbow Trout	1	0	0	1	1	0	3
Sculpin	33	6	0	0	0	0	39
Threespine Stickleback	3	47	0	0	0	0	50
TOTAL	**77**	**182**	**0**	**1**	**8**	**0**	**268**

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Total catch by habitat type

Species	Main Channel	Side Channel	Side Slough	Upland Slough	Tributary Mouth	Tributary	Off-Channel Habitat	Total
Anadromous								
Arctic Lamprey	0	0	0	0	0	10	0	10
Chinook Salmon	0	0	32	2	5	16	21	76
Chum Salmon	0	0	0	0	0	6	0	6
Coho Salmon	0	0	1	2	4	9	52	68
Pink Salmon	0	0	0	0	0	3	0	3
Sockeye Salmon	0	0	1	0	0	0	4	5
Resident								
Burbot	7	0	0	1	0	0	0	8
Rainbow Trout	0	0	2	0	0	1	0	3
Sculpin	0	0	8	5	0	26	0	39
Threespine Stickleback	0	0	0	5	0	0	45	50
TOTAL	**7**	**0**	**44**	**15**	**9**	**71**	**122**	**268**

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Spring emergence of juvenile anadromous fish

- Mid-April caught newly emerged chum, sockeye and pink alevin and fry
- Arctic lamprey ammocoetes

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Lessons Learned

- Minnow traps most effective for juvenile salmon in open water or under ice
- Backpack electrofishing most effective in open water leads
- Baited trotlines very effective for adult resident fish (burbot)
- Observed increased activity at night via backpack electrofishing and underwater video
- Lateral habitats supported most of fish

Questions Raised

- Where are other resident fish overwintering?
  - Arctic grayling, longnose sucker, whitefish, Dolly Varden

Plan for upcoming winter

- Expanded effort
  - November, January - April
  - Whiskers Slough (104), Slough 8A (128), Slough 11/Gold Creek (138)
  - Opportunistic sampling at nearby tributary mouths and other important habitats
  - Other methods (e.g. fyke netting)
- Resample sites established over the summer
- Understand winter movement with PIT tags and PIT antennas

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Acknowledgements

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Questions/Feedback