

Initial Study Report Meeting

Study 9.6 Fish Distribution and Abundance in the Middle and Lower Susitna River

October 15, 2014

Prepared by
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Study 9.6 Objectives

1. Describe the seasonal distribution, relative abundance (by CPUE, fish density, and counts) and fish habitat associations
2. Describe seasonal movements of selected fish species with emphasis on identifying foraging, spawning and overwintering habitats within the mainstem of the Susitna River
 - a) Document the timing of downstream movement and catch using out-migrant traps
 - b) Describe seasonal movements using biotelemetry (passive integrated transponder [PIT] and radio-tags)
3. Describe early life history, timing, and movements of anadromous salmonids
 - a) Describe emergence timing of salmonids
 - b) Determine movement patterns of juveniles from spawning to rearing habitats
 - c) Determine juvenile salmonid diurnal behavior
 - d) Collect baseline data to support the Stranding and Trapping Study
4. Document winter movements and timing and location of spawning for burbot, humpback whitefish, and round whitefish
5. Document the seasonal age class structure, growth, and condition of juvenile anadromous and resident fish by habitat type
6. Document the seasonal distribution, relative abundance, and habitat associations of northern pike
7. Collect tissue samples to support the Fish Genetic Baseline Study (Study 9.14)

Study 9.6 Components

- Fish Distribution, Relative Abundance, and Habitat Associations (ISR Part A, Section 4.4; pg 15)
- Seasonal Movements (ISR Part A, Section 4.5; pg 20)
- Early Life History (ISR Part A, Section 4.6; pg 23)
- Document Winter Movements and Timing and Location of Spawning for Burbot, Humpback Whitefish, and Round Whitefish (ISR Part A, Section 4.7; pg 24)
- Document the Seasonal Size/Life stage Structure, Growth, and Condition of Juvenile Anadromous and Resident Fish by Habitat Type (ISR Part A, Section 4.8; pg 24)
- Document the Seasonal Distribution, Relative Abundance, and Habitat Associations of Northern Pike (ISR Part A, Section 4.9; pg 26)
- Collect Tissue Samples from Juvenile Salmon and All Resident and Non-Salmon Anadromous Fish (ISR Part A, Section 4.10; pg 26)

Study 9.6 Variances

- **Adjustments to fish sampling, trap and telemetry locations** (ISR Part A, Section 4.1.7)
- **Adjustments to fish sampling due to grouping main channel habitat classifications** (ISR Part A, Sections 4.1.7.2 and 4.4.4.3)
- Adjustments to Early Life history and downstream migrant trapping sampling timing (ISR Part A, Section 4.2.1)
- **Adjustments to sample unit lengths** (ISR Part A, Section 4.4.4.1)
- **Adjustments to gear type applications** (e.g., numbers of passes, soak times; ISR Part A, Section 4.4.4.2)
- Refinements to estimating the detection efficiency of PIT tag interrogation systems (ISR Part A, Section 4.5.3.1)
- **Adjustments to the timing of radio-tag implementation** and aerial survey methods for tracking resident fish (ISR Part A, Sections 4.5.3.2 and 4.5.3.3)
- Utilizing size instead of age to evaluate habitat associations of juvenile anadromous and resident fish (ISR Part A, Section 4.8.1)

Study 9.6 Temporal Scale

- All sites visited
- Most sites visited 3 times (FDA MR 177 sites LR 44 sites)
- Some sites visited 8-18 times during Winter (~50), ELH (36), and FDA
- Additional temporal sampling RST, PIT, Radio Telemetry, HSC

Location	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	
Upper River RSTs					•	•	•	•	•							•	•	•	•	•	•	
Upper River PIT					•	•	•	•	•													
Upper River Tribs					••	•		•	•									•		•	•	
Upper River Mainstem						•		•	•									•		•	•	
MR-1 non FA						•		•	•													
MR-1 FA						•		•	•													
MR-2 non FA						•		•	•													
MR-2 FA						•		•	•													
MR-5 non FA						•		•	•													
MR-5 FA					••	•		•	•							•	••					
MR-6 RSTs					•	•	•	•	•													
MR-6 PIT					•	•	•	•	•	•	•		•	•	•							
MR-6 non FA						•		•	•				•	•	•	•	••					
MR-6 FA			•	•	••	•		•	•	•			•	•	•	•	••					
MR-7 non FA						•		•	•													
MR-7 FA				•	••	•		•	•							•	••					
MR-8 RST					•	•	•	•	•													
MR-8 PIT					•	•	•	•	•	•	•		•	•	•							
MR-8 non FA						•		•	•				•	•	•							
MR-8 FA	•	•	•	•	••	•		•	•	•			•	•	•	•	••					
Lower River RST					•	•	•	•	•													
Lower River PIT					•	•	•	•	•	•	•		•	•	•							
Lower River Mainstem					••	•		•	•													
Radio Telemetry					••	••	••	••	••	••	••	••	••	••	••	••	••	••	••	••	••	••

Study 9.6 Summary of Results in ISR

(ISR Study 9.6, Part A – Section 5)

Location ^a	PRM	Chinook salmon	Chum salmon	Coho salmon	Pink salmon	Sockeye salmon	Salmon, undifferentiated	Arctic Grayling	Burbot	Dolly Varden	Lake Trout	Lamprey	Longnose sucker	Northern Pike	Rain bow trout	Sculpin	Stickleback, ninespine	Stickleback, threespine	Whitefish, Bering cisco	Whitefish, humpback	Whitefish, round	Whitefish, undifferentiated	
Upper River Study Area	187.1-234.5	X						X	X	X	X		X			X					X	X	X
Proposed Watana Dam (PRM 187.1)																							
MR-1 ^a	184.6-187.1							X	X	X			X			X						X	X
MR-2 ^b	169.6-184.6	X						X	X	X			X			X						X	X
Upper extent Devils Canyon (PRM 166.1)																							
MR-3 ^c	166.1-169.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MR-4 ^d	153.9-166.1									X						X							
Lower extent Devils Canyon (PRM 153.9)																							
MR-5 ^a	148.4-153.9	X	X	X	X	X	X	X	X	X			X		X	X					X	X	X
MR-6 ^a	122.7-148.4	X	X	X	X	X	X	X	X	X			X		X	X		X		X	X	X	X
MR-7 ^a	107.8-122.7	X	X	X	X	X	X	X	X	X		X	X		X	X		X		X	X	X	X
MR-8 ^a	102.4-107.8	X	X	X	X	X	X	X	X	X		X	X		X	X		X		X	X	X	X
LR-1 ^a	87.9-102.4	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X				X	X
LR-2 ^a	65.6-87.9	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X			X	X
LR-3 ^a	44.6-65.6	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X				X	X
LR-4 ^a	32.3-44.6	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X

- 18 species collected
- Fish observations
 - Middle River: 45,899
 - Lower River: 8,649
- Early Life History
 - > 2,000 juvenile salmon
- Rotary screw traps
 - Indian River (142): 4,551
 - Curry Station (124): 1,457
 - Talkeetna Station (107): 2,696
 - Montana Creek (81): 2,861
- PIT tagging
 - Over 5,000 fish tagged
 - 141 in hand recaptures (3%)
 - 649 detected at antennas (12%)
- Radio tagging
 - 158 fish tagged
 - 8 target species
- Fish collection for interrelated studies (8.5, 9.8, 9.14).

Study 9.6 Summary of Results in ISR (ISR Study 9.6, Part A – Section 5)

Tagging Macrohabitat		Detection/Recapture Macrohabitat										
		Main Channel			Off-Channel				Tributary			
		Main Channel	Split Main Channel	Total	Side Slough	SS Beaver Complex	US Beaver Complex	Total	Single Channel	Split Channel	Tributary Mouth	Total
Main Channel	Main Channel	3		3	34			34				
	Side Channel				7			7				
	Split Main Channel		3	3	61		5	66				
	Total	3	3	6	102		5	107				
Off-Channel	Side Slough				11			11				
	SS Beaver Complex				8	1		9				
	Upland Slough				1			1				
	US Beaver Complex				18		31	49				
Total				38	1	31	70					
Tributary	Complex Channel				3			3				3
	Single Channel				31			31	20	8		28
	Split Channel									1		1
	Tributary Mouth	3	3	6	30		3	33	69	8		77
Total	3	3	6	64		3	67	20	81	8	109	

Movements- Juvenile Coho Salmon

- 67% of all Coho Salmon re-sighted in off-channel habitat
- For Coho Salmon tagged in tributaries:
 - 60% re-sighted in tagging tributary
 - 37% moved to off-channel habitat

Tagging Macrohabitat		Detection/Recapture Macrohabitat											
		Main Channel			Off-Channel				Tributary				
		Main Channel	Side Channel	Split Main Channel	Total	Side Slough	SS Beaver Complex	US Beaver Complex	Total	Not Reported	Single Channel	Split Channel	Tributary Mouth
Main Channel	Main Channel	1	1	2	8			8		2			2
	Side Channel		1	1	23			23					
	Split Main Channel	1		1									
	Total	2	2	4	31			31		2			2
Off-Channel	Side Slough				26			26					
	SS Beaver Complex				3	1		4					
	US Beaver Complex				6		9	15					
	Total				36	2	7	45					
Tributary	Not Reported								7				7
	Single Channel				44			44	1	57			58
	Split Channel									2			2
	Tributary Mouth	1		2	3	4		4			18	10	28
Total	1		2	3	48		48	48	1	64	20	10	95

Movements- Juvenile Chinook Salmon

- 84% tagged in main channel moved into side sloughs
- 100% tagged in off-channel re-sighted there
- For Chinook salmon tagged in tributaries:
 - 65% re-sighted in tagging tributary
 - 33% moved to off-channel habitat

Study 9.6 Fish Identification

Coho Salmon?



Adipose fin
pigmented, no
clear “window”

Remnant black
edge on anal fin?

Pale orange caudal
and anal fin
coloration

Study 9.6 Fish Identification

Chinook Salmon?



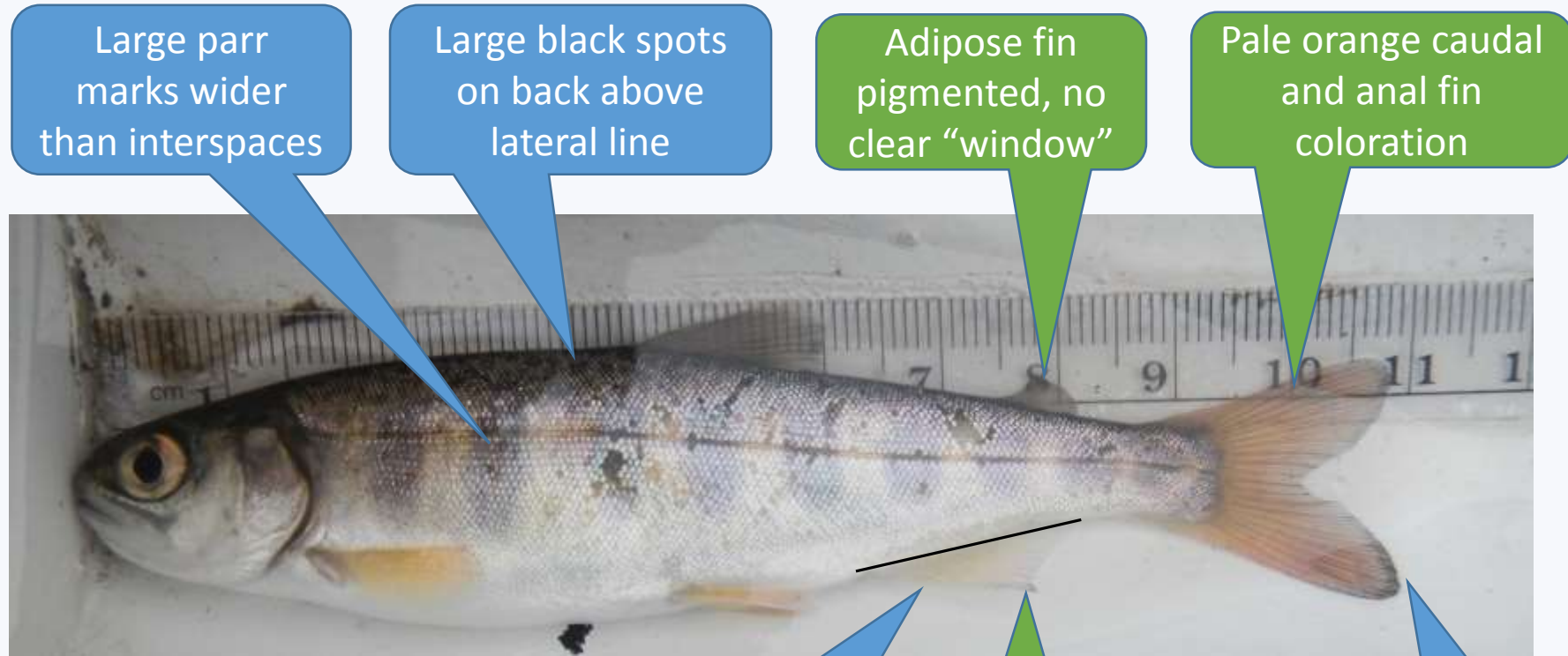
Large black spots
on back above
lateral line

Large parr
marks wider
than interspaces

Caudal fin tipped in
black

Anal fin not sickle-
shaped, leading edge
shorter than base

Study 9.6 Fish Identification



Chinook or Coho
Salmon?

Large parr
marks wider
than interspaces

Large black spots
on back above
lateral line

Adipose fin
pigmented, no
clear "window"

Pale orange caudal
and anal fin
coloration

Anal fin not sickle-
shaped, leading edge
shorter than base

Remnant
black edge
on anal fin?

Caudal fin
tipped in black

Study 9.6 Photo Review

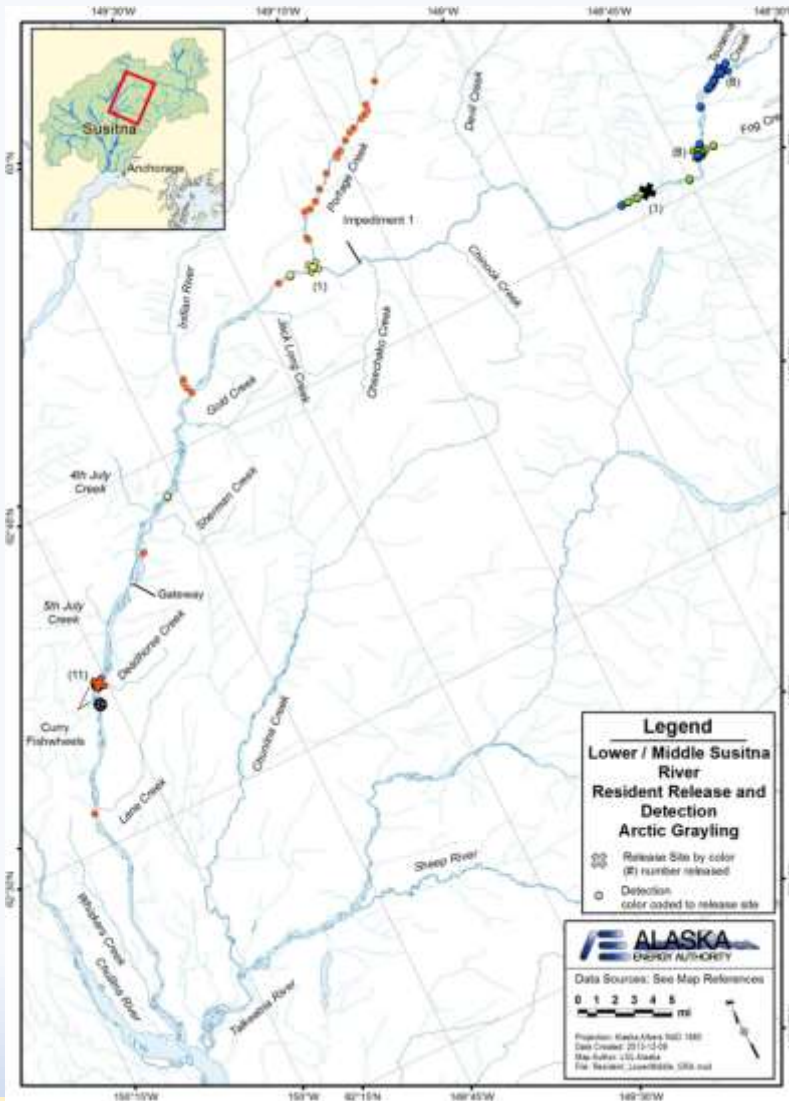
- 4 independent blind reviewers of 41 unidentified juvenile salmonid photos
- 68% in agreement
- 8 instances when reviewers disagreed between Chinook and coho salmon
- 3 instances when reviewers disagreed between sockeye and chum salmon
- Reclassification of 436 SAM records

Reviewer 1	Reviewer 2	Reviewer 3	Initial Call	Frequency
25+ YOE	15 YOE	12 YOE	5 YOE	
Sockeye	Sockeye	Chum	Pac Sam Undif	2
Unk Sp	Salmonid	Chinook	Pac Sam Undif	2
Chinook	Pac Sam Undif	Chinook	Pac Sam Undif	2
Chinook	Chinook	Chinook	Pac Sam Undif	1
Coho	Coho	Chinook	Pac Sam Undif	3
Coho	Pac Sam Undif	Coho	Pac Sam Undif	10
Rainbow Trout	Pac Sam Undif	Coho	Pac Sam Undif	1
Chinook	Chinook	Coho	Pac Sam Undif	2
Coho	Coho	Coho	Pac Sam Undif	11
Chum	Chum	Sockeye	Chum	1
Coho	Coho	Rainbow Trout	Chinook	1
Chinook?	Chinook	Chinook	Coho	1
Coho	Coho	Chinook	Coho	1
Unk Sp	Pac Sam Undif	Coho	Sockeye	1
Unk Sp	Salmonid	GRA	Unk Sp	2



Study 9.6 Summary of Results in ISR (ISR Study 9.6, Part A – Section 5)

Radio Tagging: June-August 2013



- Arctic grayling moved from mainstem to tributaries/ tributary mouths
- Burbot little movement in mainstem
- Dolly Varden limited movement in large tributary streams
- Longnose sucker mainstem movement varied by fish
- Northern pike remained near tagging locations (PRM 34)
- Rainbow trout moved into tributaries for the summer
- Humpback whitefish moved downstream after tagging
- Round whitefish movement varied in mainstem and tributaries, upstream and downstream, some >35 RM

Study 9.6 Summary of Results since ISR (Winter Studies TM, September 2014)

2013-2014 Interdisciplinary Winter Studies

- 4 sampling events: November, February, March, & April
- 59 sites around 3 FAs (104, 128, and 138) repeat, opportunistic, and oversamples
- Fish Collection: minnow trap, Fyke net, electrofishing, trotline
- Fish Observation: underwater video and sonar
- Fish Tracking: radio and PIT telemetry



Study 9.6 Summary of Results since ISR

Underwater Video



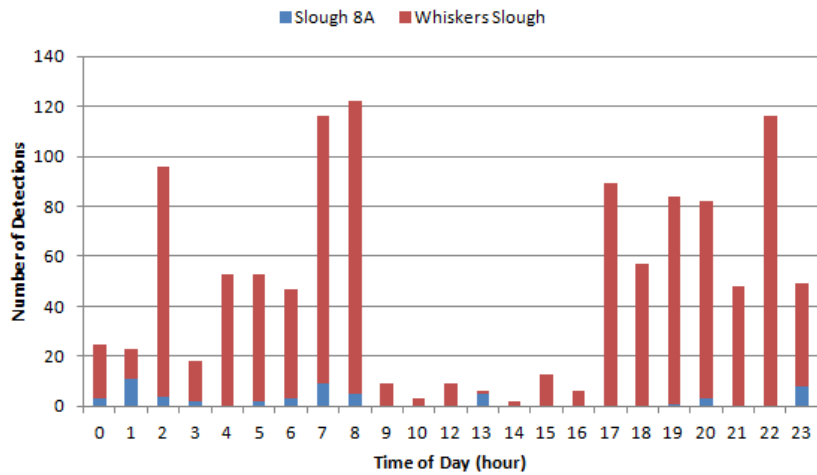
Study 9.6 Summary of Results since ISR (Winter Studies TM, September 2014)

- 13 species
- Juvenile salmon species composition varied by location:
 - FA-104 (Whiskers Slough) primarily coho and Chinook salmon
 - FA-128 (Slough 8A) primarily sockeye, coho and chum salmon
 - FA-138 (Gold Creek) primarily coho followed by sockeye and chum salmon
- Fry emergence (Chinook, chum, coho and sockeye salmon) began mid-March

Gear type	Salmon, Chinook	Salmon, chum	Salmon, coho	Salmon, sockeye	Salmon, undifferentiated	Arctic grayling	Burbot	Dolly Varden	Lamprey, Arctic	Lamprey, undifferentiated	Longnose sucker	Salmonid	Sculpin	Stickleback, threespine	Stickleback, undifferentiated	Trout, rainbow	Unknown species	Whitefish, round	Whitefish, undifferentiated	Grand Total
Fyke net	65	65	214	131	10		7	1	2	23		2	78			2		4		604
Minnow trap	73		817	5	5		4						66	19		1				990
Electrofishing	38	81	230	241	5	1	1			34	9	1	733			5				1,379
Trotline							3													3
Video ¹	11		131		861		1			1	3	84	44		7		583		2	1,728
Grand Total²	187	146	1,392	377	881	1	16	1	2	58	12	87	921	19	7	8	583	4	2	4,704

Study 9.6 Summary of Results since ISR (Winter Studies TM, September 2014)

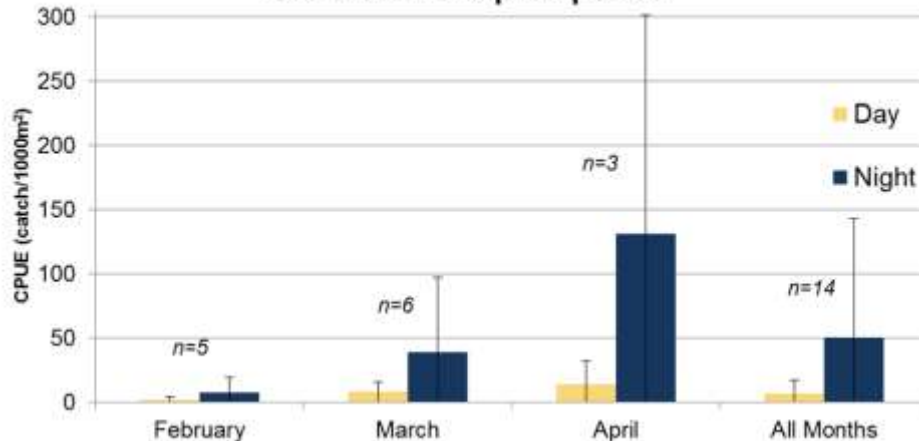
Detections by Hour (Oct 12-Nov 20)



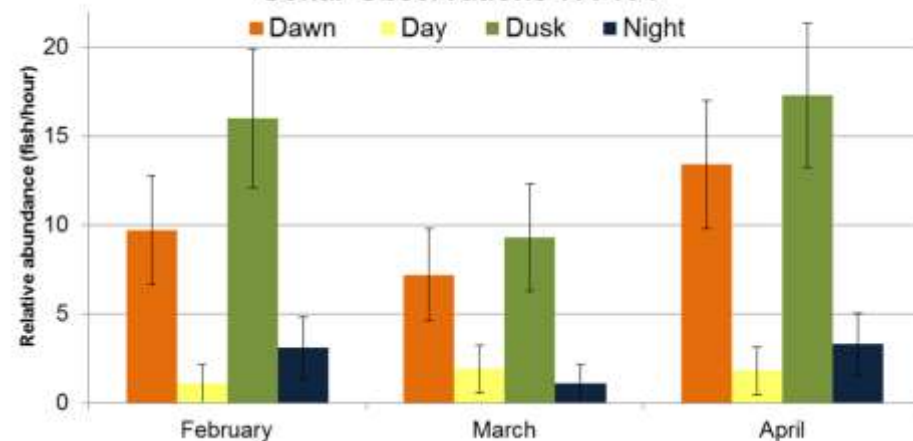
Diel activity

- PIT detections highest dawn and night
- Paired electrofishing: 290 juvenile salmon at night vs 35 in day
- More sonar observations at dusk and dawn
- Juvenile salmon more active in dawn, dusk, night
- Pattern consistent across winter study period

CPUE Non-Sculpin Species



Sonar Observations FA-104



Study 9.6 Summary of Results since ISR (Winter Studies TM, September 2014)

Winter Movement

- > 50% of juvenile coho salmon re-sighted in tagging Focus Area and macrohabitat
- Coho movements seen were mostly out of tributaries and to sloughs to overwinter



ISR Figure C.A1-17. Newly emerged pink salmon

Tagging Location	FA/PRM	Macrohabitat	Winter Detection Location															
			80.8	103.5	104					128				138		141		
			Tributary Array	Upland Slough	Side Channel	Side Slough	Side Slough Array	Upland Slough	Whiskers Cr.	Backwater	Side Channel	Side Slough	Side Slough Array	Side Slough	Upland Slough	Upland Slough	Indian Slough	River
	80.8	Tributary DMT																
	103.5	Upland Slough		6														
	104	Side Channel			1		1											
		Side Slough				3												
		Upland Slough			5	1	3	11										
		Whiskers Cr.					7		2									
	106.9	MC DMT					1	1										
	115	Upland Slough					3											
		Tributary			1													
	128	Backwater																
		Side Channel																
		Side Slough											2					
	138	Side Slough													11			
		Upland Slough														3		
	141	Upland Slough																
Indian River															2			
Tributary DMT							1	5							2			

Study 9.6 Summary of Results since ISR (Winter Studies TM, September 2014)

Winter Movement Middle/Lower River

- Arctic grayling utilized the mainstem Susitna River
 - Below Devils Canyon, fish from Indian River and Portage Creek overwintered in the mainstem between Indian River and Montana Creek.
 - Above Devils Canyon, fish overwintered in the Susitna River between Devils Island and the Watana Dam site.
- Burbot utilized the mainstem primarily between Montana Creek and Lane Creek , some winter movement documented.
- Longnose sucker had high winter mortality; located throughout the mainstem between Talkeetna and Slough 21
- Rainbow trout had minimal winter movements winter.
 - Fish tagged in Lower River primarily overwintered in the Susitna River between the Kashwitna River and Lane Creek.
 - Fish tagged in Middle River primarily overwintered in the Susitna River between Talkeetna and Slough 11.
- Northern pike exhibited little movement from release areas in Yentna or Deshka Rivers.
- Round whitefish limited movement in mainstem primarily overwintered from Sunshine to Slough 11.

Study 9.6 Summary of Results since ISR (Radio Tagging/Tracking)

Tags at Large

- Goal - up to 30 tags per species
- Monthly tags-at-large range from 0 (lake trout) to 25 (rainbow trout)
- Tracking continued in the Middle and Lower River over the winter and during fall and spring spawning seasons
- No tagging in Middle/Lower River in 2014 (except Arctic grayling above Devils Canyon in July)
- Most seasonal tagging events occur outside of spawning season



Species	Total Tags Applied	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14
Arctic Grayling	51	0	11	24	17	18	13	12	8	8	8	8	8	6	13	10	10
Burbot	14	0	2	2	4	4	3	3	2	2	2	1	1	1	1	1	6
Dolly Varden	9	0	1	5	6	4	4	3	3	3	3	3	3	3	2	1	1
Longnose Sucker	28	0	8	9	7	5	4	4	1	0	0	0	0	0	0	0	0
Northern Pike	5	0	0	0	3	3	3	3	3	3	3	3	3	2	2	2	2
Lake Trout	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rainbow Trout	44	0	11	25	14	21	21	20	20	20	20	20	17	16	16	15	15
Humpback Whitefish	7	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0
Round Whitefish	21	0	10	13	11	13	11	11	9	9	7	7	5	3	3	2	2

Study 9.6 Summary of Results since ISR (FDA Middle/Lower Update)

CIRWG and ARRC Sample Locations

- Locations on private lands not accessed in 2013 were sampled in 2014
 - Middle River Geomorphic Reach 7:
 - 3 tributary sites (2 FA) and backwater (FA)
 - Middle River Geomorphic Reach 6:
 - 2 tributary sites (1 FA), 1 clearwater plume, 1 upland slough
 - Middle River Geomorphic Reach 5:
 - 1 main channel (FA), 1 tributary (FA), 2 tributary mouths (1 FA), 1 clearwater plume (FA; partial sample in 2013)
 - Middle River Geomorphic Reach 2:
 - 1 main channel, 4 tributary sites (1 FA), 1 tributary mouth, 6 upland sloughs (3 FA)
- Direct Sample Tributaries: 2 days of effort each
 - Cheechako Creek
 - Chinook Creek- partial sample 2013
 - Devil Creek
 - Unnamed Tributary PRM 184
 - Tsusena Creek- partial sample 2013



AEA Proposed Modifications to Study 9.6 in ISR (ISR Study 9.6, Part C – Section 7.1.2)

- Combine main channel, split main channel, and multi-split main channel into one strata for the purposes of GRTS site selection in the Middle River (Section 7.1.2.2)
- Reduce the sample unit length from 500 to 200 meters for main channel and side channel sites when using techniques other than boat electrofishing or drift gillnetting (Section 7.1.2.6.1)
- Abandon multiple-pass sampling efforts for relative abundance in favor of consistent and rigorous single pass sampling for generating meaningful CPUE estimates (Section 7.1.6.2)
- Operate three rotary screw traps in the Middle River and one trap in the Lower River. The location of select rotary screw traps will be adjusted to improve catch (Section 7.1.2.3)
- PIT tagging of target species will continue to occur during FDA sampling within Focus Areas, at rotary screw traps, and during all sampling activities in close proximity to PIT interrogation antennas. AEA plans to continue to PIT tag fish at capture locations until 4,000 tags (1,000 tags x four PIT antennas) have been allocated per target species in the entire Middle/Lower River segments. The location of PIT interrogation antenna sites will be adjusted to improve channel coverage/detections (Sections 7.1.2.3 & 7.1.2.4.2)
- Biotelemetry studies will continue and fish will be radio tagged during non-spawning periods and prior to important spawning, overwintering, or foraging periods so that tags are active during these times (Section 7.1)

Current Status and Steps to Complete Study 9.6

Completed Activities:

- Winter Fish Studies Pilot Season (2012-2013)
- Salmon Early Life History (2013, 2014)

Activities with One Year Completed and Future Work Planned:

- FDA – Rotary Screw Trap Operation (2013)
- FDA- PIT Antenna Operation (2013)
- FDA- Radio Tagging and Tracking (2013)
- FDA- Fish Sampling (2013)
- Winter Fish Studies (2013-2014)
- FDA – Sampling CIRWG and ARRC Sites (2014)

Steps to Complete Study 9.6 (ISR Study 9.6, Part C – Section 7.1)

To complete this study, AEA will implement the methodologies in the Study Plan except as described in Section 7.1.2. These activities include:

- **Salmon early life history field sampling efforts were completed in 2013 and 2014. 2015 efforts include data analysis and integration** with other studies (8.5 Objective 8: Juvenile Fish Stranding and Trapping)

Steps to Complete Study 9.6 (ISR Study 9.6, Part C – Section 7.1)

- **Fish distribution and abundance sampling** activities in the mainstem Susitna River and select tributaries in the Study Area to support AEA's efforts to:
 - Describe the **seasonal distribution, relative abundance** (as determined by CPUE, fish density, and counts), **and fish-habitat associations** of resident fishes, juvenile anadromous salmonids, and the freshwater life stages of non-salmon anadromous species (Study Objective 1)
 - Describe **seasonal movements** of juvenile salmonids and selected fish species such as rainbow trout, Dolly Varden, humpback whitefish, round whitefish, northern pike, Arctic lamprey, Arctic grayling and burbot with emphasis on identifying foraging, spawning, and overwintering habitats within the mainstem of the Susitna River (Study Objective 2)
 - Characterize the seasonal age class structure, growth, and condition of juvenile anadromous and resident fish by habitat type (Study Objective 5)
 - Document the seasonal distribution, relative abundance, and habitat associations of **invasive species** (lake trout and northern pike) (Study Objective 6)
 - **Tissue samples** collection to support the Fish Genetic Baseline Study (Study Objective 7; Study 9.14)

Steps to Complete Study 9.6 (ISR Study 9.6, Part C – Section 7.1)

- **Biotelemetry including PIT and radio-tagging**, PIT interrogation antenna sites, fixed radio telemetry sites, and aerial surveys will continue to support AEA's efforts to:
 - Describe **seasonal movements** of juvenile salmonids and selected fish species such as rainbow trout, Dolly Varden, humpback whitefish, round whitefish, northern pike, Arctic lamprey, Arctic grayling and burbot with emphasis on identifying foraging, spawning, and overwintering habitats within the mainstem of the Susitna River (Study Objective 2)
 - Document the winter movements and timing and location of spawning for burbot, humpback whitefish, and round whitefish (Study Objective 4)
 - Document the seasonal distribution, relative abundance, and habitat associations of **invasive species** (lake trout and northern pike) (Study Objective 6)
- AEA will continue to operate four **rotary screw traps** in the Middle/Lower River Study Area to support describing seasonal movements of juvenile salmonids and selected fish species (Study Objective 2) and early life history (Study Objective 3).

Steps to Complete Study 9.6

(Winter Studies TM, September 2014)

Winter Fish Studies will continue to support AEA's efforts to:

- Describe overwintering habitat associations of juvenile anadromous salmonids, non-salmonid anadromous fishes and resident fishes.
- Use biotelemetry to describe winter movements of juvenile salmonids and selected fish species such as Arctic grayling, burbot, Dolly Varden, lamprey, northern pike, rainbow trout, humpback whitefish, and round whitefish within select Focus Areas (Study Objectives 2 & 4).
- Describe early life history, diurnal behavior, timing, and movements of anadromous salmonids (Study Objective 3).
- Document the seasonal age class structure, growth, and condition of juvenile anadromous and resident fish by habitat type (Study Objective 5).
- Collect tissue samples from juvenile salmon and opportunistically from all resident and non-salmon anadromous fish (Study Objective 7) to support the Fish Genetic Baseline Study (ISR Study 9.14).

Licensing Participants Proposed Modifications to Study 9.6?

- Agencies
- CIRWG members and Ahtna
- Public